

SH@W

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Launched in 2010, the aim of the journal is to provide a forum for the exchange of ideas and data developed through research experience in the broad field of occupational health and safety, manage scientific research to improve workers' health and safety by preventing occupational accidents and diseases, pursuing a better working life, and create a safe and comfortable working environment.

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- Occupational medicine
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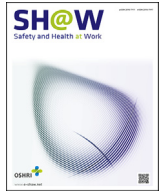
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Plenary, Semi-Plenary and Special Sessions

Plenary Sessions

PL01

Health inequalities in the workplace

Sir Michael Marmot

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As the world emerges from the COVID-19 pandemic 'Build Back Better' has become the mantra. Important, but we need to Build Back Fairer. The levels of social, environmental, and economic inequality in society are damaging health and wellbeing. Taking action to reduce health inequalities is a matter of social justice. In developing strategies for tackling health inequalities, we need to confront the social gradient in health, not just the difference between the worst off and everybody else. Inequalities in mortality from COVID-19 and these rising health inequalities as a result of social and economic impacts, have made such action even more important.

PL02

The past as prologue: How the history of occupational illness and injury teaches us about today

Paul D. Blanc

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The question posed in this presentation is not limited to "what" history teaches us about the occupational illness and injury we see around us today but, as importantly, how does history teach us. If we gain the insights into the "how," we can be alert to the warning signals of newly emerging novel exposures or re-emerging, long-established established hazards.

The history of occupational illness and injury is fundamentally the story of the myriad of ways in which technological change modifies the ways in which the environment of employment puts workers at risk. Sometimes such change makes that environment inherently safer, but all too often there are obvious and not-so-obvious hazards that accompany the innovation. History teaches us that steam and pneumatic powered processes in the 19th century dramatically increased worker exposure to silica dust, bringing an epidemic of disease. It is not that silicosis, albeit poorly characterized, hadn't

been present long before, but it had never been on such a scale. Similarly, technologic changes have driven the histories of various "trade palsies" as they evolved into modern repetitive strain injuries, from the metal pen nib causing scrivener's palsy to wall-to-wall carpeting creating carpet layer's knee to electronic mail sorters inducing carpal tunnel syndrome. History also teaches us how we need guard against the cyclical amnesia that characterizes the recurring recognition then apparent obliviousness and failure to control obvious hazards. Examples include carbon disulfide, a potent toxicant in the 19th century rubber industry, whose introduction into the viscose rayon industry proceeded without timely, critical evaluation by occupational medicine researchers or clinicians. The history of manganese neurotoxicity also can be characterized by similar pattern of discovery flowed by forgetting. Our current "surprise" at the resurgence of silicosis in the artificial stone industry, grinding a material that is nearly 100% crystalline silica, underscores this recurrent pattern. Finally, history teaches us how we should consider the lives and work of the leaders and pioneers of the discipline that we so often laud in the historical reviews. The stories of these figures should not be hagiographies, but rather need to show how Ramazzini, Thackrah, Proust, Hirt, Hamilton and others used their own experience paired with a critical reception of transmitted wisdom, to advance the field of occupational medicine. The history of occupational medicine is enriching. It is central to our discipline. And it is ignored at our own peril.

PL03

Effectiveness of basic occupational health services in the informal sector

Hanifa Denny

Diponegoro University, Indonesia

PL04

Impact of the 24-hour society on workers' health and safety

Frida Marina Fischer

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It's been a hard day's night, I've been working like a dog/It's been a hard day's night, I should be sleeping like a log" is part of the lyrics of the famous song by "The Beatles", released in October 1964. At

that time, very little was said about the organization of shift work, as the concern with work environment and illnesses were focused on other stressors. The fact is that 24-hour society is here to stay due to the continuous production processes and the need for uninterrupted services that are offered and necessary to the society. For the last decades thousands of publications have highlighted the negative effects of shift and night work on health, quality of life and safety at work. The dissemination of information in both scientific journals and non-scientific media reports has shown the non-glamorous and less apparent sides of the problems faced by those who work during the night, on weekends, on public and religious holidays while most of the population is resting and or enjoying free time. The intrusion of work at nighttime and consequent daytime rest lead to a biological mismatch and partly explain chronic health problems and malaise faced by shift and night workers. There are several consequences already well-studied, such as sleep, metabolic and cardiovascular disturbances, mental health symptoms, a less effective immune system and the still controversial requiring further studies- cancer development. But there are other shift work issues directly or indirectly associated with malaise, issues to be yet reconciled and solved, in addition to the biological ones. These include living and working conditions. At the occupational level, the organization of work schedules such as work hours during day and non-daytime, daily and weekly working hours, recovery time within and between shifts, how healthy the work environment is, including policies of respect and health promotion is essential and can be the source of the mentioned problems and possible solutions. Regarding safety at work, it is necessary to pay attention to sleepiness, which changes throughout the 24 hours. Interventions to improve sleep duration and quality are required to maintain alertness and adequate performance, especially during hours of greater sleepiness. It is also necessary to investigate the combined effects of environmental and organizational factors and how occupational exposures can be mitigated. My presentation will focus on several aspects related to biological, work and social issues, as well as health issues, including sleep and health of healthcare workers during the new coronavirus pandemic. The presentation will include what has now become commonplace in 24-hour society - the extension of working hours, particularly those carried out using telework environments, which are associated with domestic and professional overload. And finally, a brief comment at the future of decent work - what awaits workers who cannot follow daytime work patterns and nighttime rest? In post-pandemic times, there is hope the new labor regulations will be more equitable, leading organizations to provide greater protection and health at work for those who take care of production and services, while we, day workers, are resting.

PL05

Occupational cancer: Future opportunities and challenges

Lin Fritschi and Renee Carey

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Occupational cancer is estimated to cause 350 000 deaths and 7 million DALYS worldwide every year. These numbers, from the Global Burden of Disease project, are the best estimate we have. However, they are almost certainly underestimates, as they only include a limited number of carcinogens and are based on prevalence data from the early 1990s.

This presentation is therefore focused on these two issues: the identification of occupational carcinogens; and determining who is exposed to those carcinogens.

Identifying carcinogens is a difficult and time-consuming process. Thousands of new chemicals are introduced every year, and only a very small proportion have been assessed by any of the major international organizations. The biggest challenge to speeding up the process is the reliance on traditional epidemiological studies in humans, which need long time periods (often decades), high-quality records and measurements, and a very large stable workforce. Other approaches such as rodent and mechanistic studies, while more rapid, still require a huge investment of resources. Challenges also arise from the lack of co-ordination between the different regulatory and scientific organizations meaning that the same agents can (confusingly) be assigned different carcinogenicity ratings. An exciting opportunity in this area is the recent development of in silico or computational methods, and the push to develop internationally accepted protocols to use these tools.

Determining exposure to established carcinogens is necessary not only for identifying who is exposed to carcinogens, but also where inspection and education campaigns should be focused. Exposure assessments are traditionally in the form of individual workplace measurements by highly trained specialists using customized equipment and well-equipped laboratories. These assessments are typically conducted in large companies with in-house expertise or the funds for consultants. In the past, national bodies conducted large-scale surveys or collected measurements from representative samples of the workforce. However, with nearly two-thirds of the workforce in high income countries now working in small and medium sized enterprises, national surveys a thing of the past, and the move of many dirty industries to low-income countries, the likelihood that representative data are being collected is minimal. These challenges need to be met by a change of approach, from expert measurements to new opportunities including the development of low-cost real-time wearable devices, online applications which assess work practices of individuals, and the opportunity to collect anonymous data to provide a more comprehensive understanding of exposure patterns in the community.

There are exciting developments in the areas of identifying carcinogens and determining exposure to those carcinogens which we hope can be taken up in not only the high income countries, but also in low income countries, where the need is much greater.

PL06

Emerging workplace health and safety threats—has the pandemic changed the trajectory?

Margaret M. Kitt

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Prior to the pandemic we imagined emerging health and safety threats in terms of the Future of Work related to the workplace, work, and the workforce. The occupational safety and health community viewed these emerging threats in terms of the impact of new technologies, globalization, changes in employment patterns, and an increasingly diverse and aging working population. While we still give considerable attribute to these influencing factors, the COVID-19 pandemic may have changed the trajectory of the threats associated with the Future of Work,

temporarily at least. Additionally, we may see workplace health and safety benefits emerging from the pandemic. The use of some technologies accelerated over the past several years while the attitudes and expectations of many workers and employers are changing, at least in some sectors. This presentation will explore the potential impact of the pandemic on the trajectory of the Future of Work- has it changed significantly or just made course corrections?

PL07

Preventing infectious diseases in the workplace

Franklin Muchiri

International Labour Organization, Switzerland

PL08

Mental health, sickness absence prevention and return to work

Karen Nieuwenhuijsen

Coronel Institute, Amsterdam UMC, Amsterdam, The Netherlands

Mental health problems constitute a major occupational health problem causing substantial productivity losses. In line with the central theme of this conference, in this talk I will highlight solutions. Which strategies can prevent workers from developing mental health problems? Which interventions enhance return to work once mental health problems occur? What are the challenges and new avenues for future occupational healthcare?

Prevention of sickness absence

The WHO framework guides workplaces in creating a working environment that promotes, supports and protects the mental and social wellbeing of all workers. Nevertheless, additional strategies are needed, such as selective prevention, targeting groups at high-risk of developing mental health problems. These can be occupational groups such as healthcare workers and teachers, but also workers with informal care responsibilities. An alternative approach is indicated prevention, screening for early indicators of mental ill health in workers. I will review methods to identify high-risk workers along with the evidence on the effectiveness of preventive interventions based on these assessments.

Return-to-work strategies

Evidence on effective return-to-work strategies is accumulating. In a review including over 12,000 depressed workers, the combination of symptom treatment and support with work was most effective and reduced sick leave with 25 days over one year. The strategies for early identification of workers at risk of a late return to work are emerging. However, effective interventions for vulnerable groups such as precarious workers are still lacking.

PL09

Occupational health: Challenges and solutions in the COVID-19 era

Doo Yong Park

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PL10

The new WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Frank Pega

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Introduction: Previously, the World Health Organization (WHO) and International Labour Organization (ILO) produced separate estimates of the work-related burden of disease. Since 2016, following requests from Member States and United Nations reform, these Specialized Agencies have developed and produced a single set of interagency estimates, supported by over 200 individual experts in 35 countries. These are the new WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury (WHO/ILO Joint Estimates). In 2019, a Collaboration Agreement was signed to establish and regularly produce these estimates.

Materials and Methods: WHO and ILO harmonized their estimation methods for 39 established pairs of occupational risk factors and health outcomes. For additional pairs, the agencies conducted 15 systematic reviews and meta-analyses of the latest bodies of evidence. To date, from these systematic reviews, the evidence has been judged as sufficient to produce WHO/ILO Joint Estimates for two of the additional pairs: stroke and ischemic heart disease attributable to exposure to long working hours (≥ 55 hours/week). Using the global Comparative Risk Assessment framework, estimates were produced for the 39 established pairs. Additionally, the disease burden was quantified for the two additional pairs. For these, population attributable fractions were calculated by combining risk ratios obtained in the WHO/ILO systematic reviews, with data on prevalence of exposure to long working hours obtained from new WHO/ILO exposure databases ($>2,300$ surveys). The population-attributable fractions were applied to WHO's burden of disease envelopes. Global, regional and national estimates were produced for 183 countries, by sex and age, for the years 2000, 2010 and 2016.

Results: An estimated 1.88 (95% uncertainty range 1.84–1.92) million deaths and 89.72 (95% uncertainty range 88.61–90.83) million disability-adjusted life years (DALYs) were attributable to the 41 included occupational risk factor-health outcome pairs, globally in 2016. Diseases accounted for 80.7% of the deaths and 70.5% of the DALYs, whereas injuries accounted for 19.3% of deaths and 29.5% of DALYs. Almost 40% of deaths and 26% of DALYs were due to exposure to long working hours, establishing this as the occupational risk factor with the largest burden.

While the absolute numbers of work-related deaths and DALYs increased from 2000 to 2016, rates per 100 000 working-age population decreased. Disproportionately large burden is carried by the WHO African Region (for DALYs), South-East Asia Region, and Western Pacific Region (for deaths), as well as males and older age groups.

Conclusions: The WHO/ILO Joint Estimates highlight the large work-related burden of disease, particularly the newly quantified burden from exposure to long working hours. They can be used as indicators for monitoring workers' health and to aid development and evaluation of laws, policies and actions to prevent exposure to occupational risk factors and the attributable disease burdens. To progressively quantify more of the work-related burden of disease,

more pairs must be established in future estimation cycle; this requires more data and evidence on exposures and their effects, especially from low- and middle-income countries.

PL11

Globalisation and the implications for worker health

Jorma Rantanen

Finnish Institute for Occupational Health, Finland

PL12

Worker health and safety in a changing climate

Alistair Woodward

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Scientific reports on the advance of climate change signal 'code red for humanity' according to the Secretary-General of the United Nations. The threats to the health and well-being of workers mirror those faced by the population at large, but with important differences. In some sectors, such as maintenance of utilities and emergency services, exposures to climate hazards are not discretionary. Those paid by piece work may be forced, under extreme conditions, to risk personal well-being in order to protect incomes. Given their long-term connections with land and place, farmers are especially susceptible to mental health issues caused by environmental degradation. Workers will also be affected in particular ways by steps taken to prevent climate change: closure of industries that rely on fossil fuels will expose millions of workers to transitions and disruptions that may have significant effects on health, if poorly managed. The future is challenging. It is projected the intensity and frequency of heat waves and floods and storms will increase. The structure of human mortality is changing as heat-related causes of mortality and morbidity prevail over conditions that are cold-related. Compounding exposures, such as the conjunction of climate instability and the COVID-19 pandemic, will multiply. In these circumstances it will be necessary to radically strengthen measures to protect health and safety at work.

Semi-Plenary Sessions

SPL01

What Kind of Mask Should Workers and the Public Wear for an Aerosol-Transmissible Infectious Disease?

LM Brosseau

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In a Commentary published by the University of Minnesota Center for Infectious Disease Research and Policy (CIDRAP) in early 2020, I demonstrated that SARS-CoV-2 easily fulfills the criteria for biological plausibility of aerosol transmission. Not until early 2021, however, did CDC and WHO finally admit the possibility of close-range aerosol inhalation transmission. In a second CIDRAP Commentary on the role of masks – cloth face coverings, surgical/medical masks, and respirators – I found that data on cloth face coverings were limited but suggestive of ineffectiveness at limiting

person-to-person transmission in indoor, enclosed spaces. Data on surgical masks also did not support a strong role for their ability to prevent person-to-person transmission. Respirators, on the other hand, even if not fit tested, could be effective at limiting both aerosol emission and inhalation, for workers and the public. Time has been the most important element missing from the discussion of COVID-19 exposure and transmission. Masks may lower the concentration of exhaled or inhaled particles, but with time their role diminishes as the wearer continues to emit and inspire infectious particles. While the infectious dose of SARS-CoV-2 is not known, it is clearly very low. Even if a mask lowers the inhaled concentration, exposure over time ensures the receipt of an infectious dose.

Why are CDC and public health and medical professionals so fixated on “masks” as an effective intervention for preventing person-to-person transmission? The perspective and underlying “science” of the infection prevention and control “droplet dogma” have been continuously debunked throughout the pandemic by numerous scientists in numerous high impact journals, but this perspective continues to hold sway. Is there a chance, with this pandemic, for a “paradigm shift” toward a more informed scientific theory of aerosol transmission that will better inform the selection of more effective controls than cloth and surgical masks?

SPL02

Healthcare waste management and occupational health of health workers in developing countries during the era of the COVID-19 pandemic

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The sound management of health care waste has been noted to be a major challenge facing developing countries especially Africa. This has resulted in several health threats to already ailing health systems. The situation could have worsened in recent years considering the current challenges the continent is facing in the midst of the COVID-19 pandemic. The health sector has been confronted with increased volumes of highly infectious wastes from the body fluids of patients patronising health facilities while the use of personal protective equipment (PPEs) such as nose masks, gloves, aprons and face shields during the pandemic have also increased due to the stringent protective practices recommended by the World Health Organization as well as several national ministries of health. This has resulted in the use of millions of PPEs both by health workers and patients. Studies have found that the coronavirus is capable of surviving on surfaces such as plastics, glass and fabric for up to nine days. The wastes from used PPEs therefore end up as wastes potentially infected with micro-organisms including the coronavirus which may persist in the environment for several days. Improper management of these wastes are therefore likely to pose environmental, occupational and public health threats especially in developing countries where sustainable waste management practices are yet to be achieved.

Globally, healthcare workers represent less than 3% of the population but account for 14% of COVID-19 cases reported to WHO. It is a challenge to provide corresponding statistics in developing

countries, because to date, few countries are able to provide complete counts of infections and deaths among health care workers related to COVID-19.

To what extent is inadequate management of health care waste likely to be contributing to morbidity and mortality from COVID 19 and other infections among health care and waste management workers within and outside the confines of healthcare establishments?

With the aid of some country examples, the paper demonstrates weaknesses in the waste management cycle that have the potential to militate against the occupational health and safety of healthcare and waste management workers. Other contributory factors to high morbidity and mortality hinge on weaknesses in IPC and WASH measures among others.

The paper concludes that a dedicated health care waste management system facilitated by national and sub-national policies and guidelines, human capacity development and public-private partnerships for resource mobilization and investments to support essential infrastructure are needed for sustainability of the waste management function. Closely linked and integral to these measures is the existence of functional national and institutional infection prevention and control (IPC) and WASH programs. Also important are ensuring protection (through access to training, vaccines, testing and psychosocial support) as well as decent work conditions that include protection against excessive workloads and reasonable wages.

SPL03

Basic health care/family and workers' health programs performed by occupational health professionals among vulnerable populations

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Primary Health Care (PHC), in the traditional model or in different organizational formats, such as the Family Health Strategy, represents an important alternative for quality care to workers' health, especially for the most vulnerable. The basic guiding principles of PHC, in search of a comprehensive basic health care are: the capillarity and organization of a territorial base, with attribution of health responsibility to a multidisciplinary team of health workers, doctors, nurses, dentists, technical and administrative staff and community health agents, usually residents of the community, who form the link between the health team and the population. It is up to this team to follow, in a longitudinal way, individuals and families who live and/or work in a geographical and sociocultural space. The team's work begins with the characterization of the population registered in the territory, including workers and productive activities developed in the territory, the situational diagnosis necessary for planning health actions. The relationship between work and people's health-disease, particularly workers, results from the organization of production processes for the generation of goods, technologies and services, based on society's wealth and well-being, even if unequally distributed. Currently, the processes of productive restructuring and globalization of the economy on a planetary scale, result from the massive incorporation of technologies and communications, and modify people's ways of life, values, beliefs and behaviors. However, high-tech

processes coexist with archaic, physically strenuous, dangerous, dirty and polluting work, to ensure maximum accumulation or profit, with increased social exclusion, structural unemployment, informal and precarious work. Work, which should favor health, the construction of subjectivity and social inclusion, causes suffering, disease and death and environmental degradation. In neoliberalism, the social protection of citizens and workers guaranteed by the State is diluted in different ways of hiring work, fragmented, precarious relationships, outsourcing of activities, seasonal work and work at home in all productive sectors, even in the big economic ones. ventures such as agribusiness, mining, civil construction, and is dramatic in the service sector; compounded by restrictions on Social Security and labor protection. The "feminization" of work, marked by new forms of work, low wages and precarious conditions, is expressed in the expansion of the female presence in the labor market in Brazil, 54.5% in 2019, even though the accentuation of gender and race inequalities In the Brazilian Unified Health System (SUS), with universal coverage, PHC is organized in a care network in the country's 5,852 municipalities and has the potential to provide comprehensive care to workers' health, with promotion, protection, surveillance and health care actions in integrated manner at the more complex secondary and tertiary levels, as long as adequate SUS funding is guaranteed, as well as valuation and training and technical and pedagogical support for the teams.

SPL04

Employment of people with mental illness: Challenges and solutions

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Employment matters to all of us, including people with mental illness (MI). Work gives our life meaning, structure, and a place in society, as well as an income. People with MI want to work, and contributing to the economy and community is important for mental health and inclusion.

In common with many other countries, Australia has range of measures to facilitate employment for people with disability and MI, including the Individual Placement and Support (IPS) model. Job matching, training, wage subsidies, workplace adjustments and in-work supports are also offered.

Despite these measures, employment outcomes for people with MI lag behind those with other disabilities as well as the general population. For those who gain employment, the majority are out of work again in six months. Some of the reasons for these outcomes are specific to the Australian context while others are more commonly experienced:

Australian employment legislation (with a relatively high minimum wage and good conditions) may make some employers wary of the perceived risk of hiring someone with MI

Australia has a lower proportion of people with disability in employment than other OECD countries, in part because of an open competitive employment strategy and the absence of a disability employment quota system, in place in many European countries. Interrupted education and employment history for many people with MI

Impaired cognitive and social functioning associated with MI, affecting skills increasingly required for modern workplaces

Lack of understanding of MI and workplace adjustments
Lack of coordination between employment support agencies and mental health services.

Solutions include:

Improving access to employment; social enterprises, such as social firms, provide responsive accessible workplace environments

Commitment by employers (including government agencies) to quotas

Social procurement from social enterprises for products and services

A greater recognition of the importance of vocational rehabilitation to prepare people for the world of work, effective job matching and ongoing employment support is a key step in helping people to get and keep a job. Building the mental health literacy of employers is also critical.

WISE Employment has a specialist program, WISE Ways to Work, which focuses on innovation in employment for people with MI. Its team of occupational therapists and vocational coaches assists people with MI to:

build vocational awareness, confidence and cognitive and social skills in its evidence based vocational rehabilitation program, Employ Your Mind get exposure to different work environments through work-orientation opportunities transition into responsive employment with employers who have been trained in best practice workplace support.

Evaluation of the two-year pilot demonstrated improved cognitive functioning and belief in ability to work, improved job retention as well as increased confidence to provide workplace support by employers. WISE is now replicating WISE Ways to Work in other locations.

SPL05

Occupational health for migrant workers in Spain, why does it matter?

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Spain is the fourth country with the largest number of immigrants in Europe, resulting in a large proportion of migrant workers. Women constitute 48% of international migrants who suffer poor working conditions linked to the positions they mainly occupy within certain fields such as the domestic sector and caregiving services. In this connection, Spain is the second country in Europe with the highest number of domestic workers (619,600 people). In addition, 95% of caregivers in Spain are Latin American women.

It also should be noted that during the COVID-19 pandemic, women have been the most affected, making up 54.8% of the total infected. They have been frequently working under unsafe and hazardous OHS conditions, often without the necessary personal protective equipment (PPE) and many being exposed to significant risks due to their direct personal contact with patients with COVID-19.

To date, many researchers have examined the working conditions of immigrants in Spain who are known to have to deal with adverse working conditions. The main objective of this research is to investigate the patterns of work and working conditions of immigrants living in Spain and to understand how these factors may affect their health.

Many of our results have showed:

In general, four employment sectors were most commonly occupied by these immigrants, including caregiving and food service for women and agriculture and construction for men. Most immigrants

were from Latin America, either unemployed or working part-time jobs, and not hired under an employment contract. Most worked in low-qualified jobs, and were exposed to occupational hazards such as falls from heights, manual handling of materials, and psychological strain. The lack of training on occupational risk prevention and labour rights were related to a low identification of work-related situations leading to a negative impact on the health of immigrants.

In caregiving sector (mainly occupied by women) the main risks identified were biological risks, physical attacks, falls, wounds and musculoskeletal complaints related to handling patients and carrying out household chores. Most of them had not taken an occupational health test and did not report accidents occurring in the workplace for fear of losing their jobs. The main health problems were related to physical and mental health (such as musculoskeletal diseases and stress).

During the current COVID 19 pandemic, women have been the main providers of care and domestic work in the homes where they have been confined, renouncing their own freedom of movement and social interaction. They have been responsible of all the domestic work, resulting in non-stop working days during the lockdown.

SPL06

Preventing Tuberculosis (TB) in health workers and silica-exposed occupations

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The COVID-19 pandemic has reminded us of the importance of workplace exposures and transmission in the control of airborne infectious diseases. The importance of workplace transmission of Tuberculosis (TB) has been well documented for decades, yet these past lessons have largely gone unheeded for health workers and silica-exposed occupations which are some of the highest risk subpopulations. It is estimated that health care workers who represent 3% of the global population made up 14% of reported COVID-19 and the same front-line workers are at three times greater risk for active TB compared to the general population. Despite these known risks, multiple studies have demonstrated that few health workers are provided with training or protections. Workplace TB prevention measures overlap with measures known to reduce the spread of COVID-19 and include improved ventilation, UV germicidal irradiation, personal protective equipment and training. These dual pandemics present an opportunity to refocus investment in Infection Prevention Control (IPC) measures in healthcare settings. Silica dust exposures and silicosis are known to significantly increase the risk of active TB among miners, construction workers and other exposed occupations. Reducing silica dust exposures has been shown to reduce TB incidence in high-risk workers. Recent studies have demonstrated that informal sector miners experience much higher rates of TB infection than large-scale miners. However, low-cost dust controls have been shown to reduce respirable silica dust by 80% which can have a large impact in reducing TB and silicosis. Workplace interventions to reduce TB in healthcare setting and among silica-exposed workers are cost effective and are considerably less expensive than treatment. The International Commission on Occupational Health (ICOH) has been taking an active role in working to increase recognition of workplace interventions to reduce TB transmission. Starting in 2017 the organization spear-headed efforts at the United Nations (UN) to gain recognition for workplace interventions in the General

Assembly TB declaration (2018) and has since engaged with UN agencies, the World Bank and other global TB funding organizations. There is a considerable need to expand primary prevention in the workplace as part of the global TB response.

SPL07

Reconciling epidemiological and toxicological data: Some general principles and the example of firefighters

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The fundamental relationship between toxicology and epidemiology is that increasing exposure results in an increasing response varying with the degree of individual susceptibility that at some point becomes either detectable and counted as an outcome or an increased density of cause that increases the frequency of a stochastic (random) response. Toxicologists count the magnitude of the response, epidemiologists count the frequency, and clinicians observe the new onset of outcomes that appear with exposure. A toxic agent may be the driver of the outcome or a contributing factor adding to or modifying risk. Firefighters demonstrate all of these effects as they occur together but outcomes are largely concealed or offset by lower personal risk factors. Epidemiology has therefore often been under-interpreted as a guide in terms of relative risk, a problem compounded by many methodological problems (chiefly low power, illogical aggregation of disease rubrics, dilution of risk estimates, and confounding). The data cannot be assumed to tell a simple story: interpretation requires understanding, not meta-analysis of phenomenology, which has been less helpful in etiological studies of firefighters than in other applications. What the investigator is usually seeking is an indicator of risk, which is not the same thing as the frequency of past experience. Epidemiology provides a summary of experience but it is a trailing indicator, because that experience happened earlier, in a different time and place. Looking backward, assessing causation in the individual case, one asks: "Given that something bad happened, what is the probability that it was causally related to the attribute in question?" but epidemiological methods apply to populations, not individuals. Causation analysis may benefit from Bayesian methodology to individualize risk estimates. Looking forward for prediction, in order to design more effective prevention, one asks: "Given the attribute, what is the probability that something bad will happen?" That requires a leading indicator, which more reliably emerges from an understanding of the mechanism driving the response. Looking forward, toxicology and biological markers (indicators), together with exposure science (the exposome) may have greater predictive potential than extrapolating from past experience imperfectly understood. The synthesis of epidemiology and toxicology needs to be taken further into analysis.

SPL08

Child Labor in Conflict Settings

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A high child labor rate is one of the greatest misfortunes that can be imposed on a society, destroying the innocence of the young, harming their health, and making them economically

weak. Child labor is defined by the International Labor Organization as "work that deprives children of their childhood, their potential and their dignity, and that is harmful to their physical and/or mental development". Around the globe, there is an estimated 152 million children affected by child labor; 72 million child laborers are in Africa, and 62 million are in Asia and the Pacific. While there has been a 38 per cent decrease of child labor globally, the progress against this phenomenon across regions has been uneven. In particular, conflict-stricken countries that continue to experience deteriorating political economy and governmental instability consequently show an increase in child labor rates, as demonstrated across the Middle East and North African region. Humanitarian crises, including conflict, often lower living standards which may result in reversals in progress to counter child labor especially in low- and middle- income countries. Children in circumstances of poverty, precarity and who come from marginalized minority groups are more vulnerable and at risk to child labor. While conflict settings exacerbate the threat posed to children, ensuring accurate and non-biased research in these settings is often difficult as a result of political and bureaucratic limitations. The hidden forms of exploitation that continue to occur in these contexts therefore require further research. This presentation aims to highlight the underlying causes for high child labor rates in conflict-stricken countries, such as political unrest, economic crises, and devastating wars.

SPL09

The challenge of ensuring business sustainability during outbreak

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Pre event:

All the aptitudes, attitudes, training and capacities for when the event happens are described.

Epidemic, pandemic event or outbreak:

Event: The event is any circumstance that requires an extra action, which goes through people and marks a before and after: floods, natural disasters such as the eruption of a volcano, outbreaks, epidemics or pandemics, in this case the COVID Pandemic -19.

Let's refer to the Pandemic

The COVID-19 pandemic is a global pandemic currently underway derived from the disease caused by the SARS-CoV-2 virus. His first case was identified in December 2019 in the city of Wuhan, 9 capital of Hubei province, in the People's Republic of China. The WHO recognized it as a pandemic on March 11, 2020, when it reported that there were 4,291 deaths and 118,000 cases in 114 countries.

In January 2020, when the personalities of the world of public and private health declared that Argentina would not be affected, I wrote the first infographic on COVID-19 that was disseminated by internal communications to all collaborators in Argentina.

We anticipate the regulations. In mid-February 2020 we began to isolate in quarantine employees returning from destinations abroad that had the outbreak. Before the ministerial norm and every day we looked at the evolution on the John Hopkins epidemiology map. We added countries to the list in all cases before the ministerial norm, analyzing the total number of cases, mortality, and the speed of progression.

In March we spoke with the ICOH Vice President for the Far East and Pacific Region and implemented the chinstrap prior to the WHO recommending its use.

We implement a protocolized response service to COVID from Monday to Monday from 9 a.m. to 12 p.m. in a financial services company. We implement a system for reporting suspected cases and close contacts online.

COVID training online and via videoconference, with the possibility that they listen to us with the participation of families.

We treat people's physical and mental health. We provide workshops on resilience, support for critical incidents, online psychological first aid, telework organization, COVID and emotions, isolation management.

How to deal with the subject with children, with adolescents.

Adaptation to new information and communication technologies.

Post Event OR epidemic outbreak or Pandemic:

Post event

Participate in the return to work plan.

Generate the protocols for the new normal.

Update good business practices and safe work.

Assess what came to stay like telemedicine.

Transforming the healthcare opportunity to perpetuate it.

Immerse yourself in the world of medicine based on big data and artificial intelligence

Manage your own data with tools such as Google Data Studio, Powerpivot or PowerBi.

Finish incorporating virtuality as part of hard reality

SPL10

Increasing urgency of psychosocial risk management in the changing world of work: the added value of linked surveys

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Psychosocial risks are changing and are becoming even more important. Digitization is one of the drivers and facilitates the exchange of information and communication, and aims to make the workplace more efficient by using artificial intelligence, robots and cobots. This development also supports globalization and sets the scene for large scale outsourcing where production is more and more situated in low-wage countries, in order to be sold and consumed or used in higher wage countries. In addition, in Europe anyway, tertialization takes place, where local (mainly public) services as well as the commercialized service sectors are increasing to either accommodate the greying work force as well as the search for new (digital?) products and services. This results in changed and new labour relations as well as changing 'demands' and autonomy or dependencies for the workforce, both for employers and employees. The urgency to monitor psychosocial risks in their multilevel context appears more important than ever. In addition, insight into the drivers and barriers of psychosocial risk management is compelling.

Can we link the indicators of a changing world of work to what is happening in organizations and in workers? Can we capture all these changes using the abstract and standardized way we generally measure psychosocial risks in surveys as we generally do? In this presentation we will discuss what we actually pick up of these changes in psychosocial risks as measured in Europe. Additionally, we will discuss the perception of psychosocial risks at work by

employees as related to the perception hereof by employers (or their spokesmen) and risk management at the enterprise level. By not only considering the survey information on itself, but also linking information from respondents with different roles in the organization, or even by linking surveys that collect their data from different sources using multi-level modelling, we will show that additional information relevant for policy makers as well as practical information on drivers and barriers at the enterprise level may become available.

First we present the trends in digitization and in psychosocial risks at work and the awareness of these trends and their impact on employers as well as on mental and physical health outcomes of workers. Linking surveys to hard figures on morbidity and mortality show that there are significant and valid causal relationships between psychosocial risks and cardiovascular morbidity and mortality. These data may convince policy makers in countries where psychosocial risks are considered 'not to exist'.

By linking surveys, interesting information can be gained on the topic of psychosocial risk awareness and risk management, as well as on its drivers and barriers at the enterprise level. When comparing the drivers and barriers of psychosocial risk management to those for general OSH risk management or physical risk management, the specific needs for stimulating psychosocial risk management at policy, as well as at enterprise level are highlighted. Using new technology in monitoring and by linking these data in the future, we will broaden our insights in effective psychosocial risk management.

SPL11

Artificial stone and a new epidemic of silica-related diseases

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Background: High silica content artificial stone (AS) slabs have been imported into Australia since the early 2000s. The material rapidly became a popular choice for the fabrication of domestic kitchen benchtops. The initial Australian case of AS silicosis was reported in 2015. As in other countries where AS is fashionable, major health problems have emerged resulting from the failure to adequately control the exposure to respirable silica when working with AS. In the State of Victoria, Australia, there are an estimated 1500 workers in the stone benchtop industry.

Methods: As part of a government response, the Victorian Work, Health and Safety regulator (WorkSafe Victoria) developed and implemented a free comprehensive health assessment program. Protocolised primary health assessments, overseen by an occupational physician, included an occupational and health questionnaire, respiratory function testing (spirometry and gas transfer), and International Labor Organisation (ILO) categorised chest x-ray (CXR). Workers requiring secondary assessment underwent a high-resolution CT (HRCT) chest, blood tests (including autoimmune panel) and assessment by a respiratory physician. Consenting workers' occupational and health assessment details were provided to Monash University for research.

Results: Between July 2019 and August 2021, 402 screened stone benchtop industry workers with a final assigned diagnosis were registered. 107 (26.6%) were diagnosed with silicosis, 89 with

simple silicosis and 18 with complicated silicosis. 93% of workers were male and 48.5% were born in a country other than Australia. Workers diagnosed with silicosis had a mean age of 42 years and mean career duration in the stone benchtop industry of 11 years. Based on the longest-held job group, rates of silicosis were highest in factory machinists and benchtop installers. Compared to the final respiratory physician and HRCT chest diagnosis, CXR had limited sensitivity to identify silicosis (ILO profusion score > 0/1, sensitivity 67.9%, specificity 73.2%). Fewer than 5 workers were also diagnosed with an autoimmune disease, but 28% of screened stone benchtop workers had blood tests which demonstrated detectable anti-nuclear antibodies (ANA).

Conclusions: The identification of silicosis in one quarter of screened stone benchtop industry workers is a major public health issue. The prevalence of detectable ANA highlights the risk of the development of other silica-associated diseases in these workers. Considering the rapid growth in the popularity of high silica content artificial stone material worldwide, urgent investigation and implementation of control measures is required in all countries where this material is in use.

SPL12

OSH Regulations and Enforcement: Comparison Between Low and Middle Income Countries and High- Income Countries

Ehi Iden

Entrustable professional activities and core competencies for OEM training have been driven by the members of the society

Introduction: Occupational Safety and Health (OSH) Regulation and Enforcement being a key driver of compliance, has contributed greatly towards the growth in workplace health and safety improvement globally, and as well prevented many workplace incidents, accidents and ill health. This has resulted in much economic gain, improvement in health, safety and wellbeing of employees, and even improved productivity. This further brings to mind why OSH should be seen as an integral part of countries' economic development programs. So many countries have been signatories to several global OSH conventions, why are some countries doing far better in terms of domestication and afterwards enforcement of the clauses in those conventions? Low- and Middle-Income Countries (LMICs) seem to struggle in both domestication and enforcement while we notice relative improvement in their high-income country counterparts.

We will be looking at possible OSH enforcement enablers within both categorizations, also identifying the factors behind the regulatory enforcement constraints and also the gains if these constraints were to be removed for ease of enforcement. How can we improve the existing practice in most LMICs from just signing and assenting to a convention of formulating local policies without adequate enforcement mechanism towards supporting the implementation of those regulations?

What are the high-income countries doing differently and how has this improved workplace safety and health? What are the lessons to be learnt by LMICs?

Conclusions: Sharing of information will improve regulatory provisions, and enforcement in pursuant of decent OSH practices globally will strengthen systems. Has this been the case? We do not think so. There is an urgent need for strengthening of global collaboration in OSH and stimulation of discussions towards OSH

development globally, with the overall aim of strengthening the weak links along the OSH value chain towards achieving a safe workplace for our increasing global workforce.

SPL13

Lessons learned for global occupational health from the COVID-19 pandemic and building forward better

Ivan Ivanov

SPL14

The role and activities of public interest NGOs in promoting occupational safety and health

Jeong-ok Kong

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It is the main activity of public interest NGOs working in the area of occupational safety and health (OSH) to find occupational victims and to visualize their existence socially. People come to public interest NGOs seeking help when they need to identify the work-relatedness of their diseases or when they file a claim for workers' compensation or when they face difficulties in the course of treatment or rehabilitation. Public interest NGOs do not only help individuals but also concentrate on the social meaning of their experiences, which enables society to see new problems that used to be invisible such as new hazards in workplaces, workers exposed to those new hazards, and loopholes of pre-existing safety and health management systems.

To propose new legislation or policy and organize campaigns to create social pressure for their causes are also the roles of public interest NGOs. There have been significant contributions of public interest NGOs especially in improving coverage and inclusiveness of OSH systems. Public interest NGOs in many countries are still working hard for their OSH systems to include workers in small-sized enterprises or informal sectors, unorganized workers, and unregistered migrant workers.

Justice and equity are the values emphasized frequently by public interest NGOs in their work. Justice usually means social controls to protect the interest of workers and the public from the private interest of employers. This is often the philosophical base of the OSH Act in countries. Equity is often a public interest NGO demand that government provide OSH service to workers who have been left behind.

Public interest NGOs have been bridges among various social partners for general or specific missions of safety and health in workplaces. They organize dialogues between workers and OSH professionals, employers and researchers, and discussions between different stakeholders and lawmakers. Those activities enable academics and professionals to see a broader reality than their own specialties and to facilitate contributions to the public interest.

Global capitalism has grown rapidly and become highly structured, creating gaps in OSH systems. Invisibility becomes more serious, leaving more people left behind. It also becomes more difficult to keep the key values of justice and equity in an OSH system of a single country. Physical distance as well as language barriers are a big burden for most public interest NGOs to overcome for

international communication or solidarity actions. The ability of public interest NGOs to address these issues is a key component of effective OSH.

SPL15

The complex interface between occupational health, public health and travel medicine

Peter Leggat

SPL16

Protecting the Unprotected – Occupational health and safety among informal workers in Southern Africa

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The International Labour Organisation (ILO) estimates that approximately 2 billion people, about 61% of all globally employed people, are in the informal economy. This statistic is substantially higher for continental Africa (approximately 86%), and varies across the continent: 31.5% in South Africa, and exceeding 95% in Mozambique, Democratic Republic of Congo and Chad. The informal sector is characterised by vulnerabilities in income, job security, occupational risks and access to healthcare.

The ILO, in addressing these challenges, developed Recommendation 204, the “Transition from the Informal to the Formal Economy Recommendation, 2015”. This provides a policy framework that requires a transition that provides adequate social and labour protection, extends legal coverage and protection and ensures compliance with laws. While this transition is necessary, its character particularly with regard to occupational health and safety, needs to be shaped in accordance with needs of workers, harnessing resources from the formal economy and structuring legal frameworks that prioritise health and social protection.

Informal work environments vary from extractive, manufacturing, food preparation, commercial, social and retail. Hazardous exposures vary, with workers having little or no resources to introduce controls or to protect their health. Most lack the knowledge about the risks posed by their exposures. Access to medical surveillance is non-existent. While workplace exposures are important factors, social contexts further drive health outcomes: lack of health facilities close to working environments reduce primary health care access, lack of childcare facilities result in child exposures and precarious conditions increase gender and xenophobic violence.

Numerous interventions have been piloted and proposed for protecting the health of workers in this sector, including the ILO initiatives such as Work Improvements in Small Enterprises (WISE). However, the success of any intervention is dependent on the multi-stakeholder context.

The SARS-CoV-2 pandemic brought into sharp focus the vulnerability of the informal sector – both in terms of economic stability as well as health protection. In South Africa alone, approximately 1.5 million informal sector jobs were lost in the first quarter of 2020. The nature of work has meant that the risk for transmission of infection is extremely high, thus return to work is likely to have resulted in disproportionately higher rates of hospitalisation and death compared to formal workers – but few countries have collected data to better understand the epidemic-related risk of informal work.

The growth in the informal economy is a direct result of neo-liberal economic policies championed by government and big-business. The policy infrastructure that encourages the growth in this sector excludes the protection of the health of these workers. All tiers of government should be obliged to commit to policy frameworks, local infrastructure for informal work activity and provision of resources for hazard control and medical surveillance. It is the responsibility of the state to ensure that these workers enjoy the rights to safe and healthy workplaces.

SPL17

The Future of Work: Emerging Risks and Opportunities for Health and Well-Being

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COVID has transformed work for many people. Projections are that higher levels of work from home will continue into the future as hybrid models become more common. This change, whilst giving rise to opportunities for workers such as greater job autonomy, also creates new - or heightens already well-understood - psychosocial risks for workers (such as social isolation, exclusion, increased work demands). At the same time, the digital agenda also has major implications for how people work. Algorithmic decision-making, for example, is pervading work contexts beyond the gig economy. Increasingly autonomous forms of automation likewise have significant implications for the roles humans carry out at work.

In this presentation, I describe a work design perspective for understanding the implications of these large-scale future changes (e.g., increasing work from home, accelerated digitalization) on workers' health and well-being.

I introduce the SMART model of work design to describe both positive and negative potential implications of future work. SMART is a model of work design based on a higher-order factor analysis of more than 20 work characteristics, involving five higher-order elements: Stimulating, Mastery, Agency, Relational, and Tolerable.

Using this model, I make the case that there are few deterministic impacts of digital technologies and other large-scale future work changes. Rather, there are positive choices that can be made (e.g., about the design of technology, how change is implemented, and leaders' work design behaviors), complemented by appropriate health and safety policies, that strongly shape the impact of digital technologies and other such changes on worker health and well-being. Without a proactive approach in which positive evidence-based choices are consciously adopted, the risks to workers' health and well-being are high.

I conclude with suggestions for research directions and opportunities for change in practice and policy.

SPL18

THE DEVELOPMENT OF MOBILE COMMUNICATION SYSTEM AND HUMAN HEALTH RISKS

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The problem of occupational and general public electromagnetic safety is very important. Electromagnetic fields (EMF) are human

health risk factor: under occupational exposure EMF is purposeful risk factor; in case of other workers and general public EMF is enforces risk factor and in case of different EMF emitters use (mobile phones, laptops, Bluetooth, etc.) EMF is voluntary risk factor.

The introduction of new 5G communication networks may change the current electromagnetic environment. 5G mobile networks will transmit 35% of the total traffic and can cover up to 65% of the world's population in 2024.

The problem of occupational and general public electromagnetic safety due to 5G-communication systems implementation is discussed all over the world.

Mobile communication system improvement leads to frequency range elevation: from 450, 850-900 and 1,800-2,100 MHz at 1-3G standards, up to 2.6 GHz at 4G standard and up to 10-40.5 GHz (and even up to 100 GHz) at 5G standard, without enough 2-5G EMF exposure human health risks data. This frequency range biological efficiency is discussed.

The development of 2-5G EMF risk problem management includes: the need of hygienic regulations improvement; new methods of EMF control enhancements suitable for new frequency ranges development, cellular standards, widespread radio channels, beamforming technology; as well as study of new risks (related to new EMF sources) in order to assess and reduce the likelihood adverse effects. It is very important to carry out experimental studies directed to find the possible biological effects of current and future mobile communication standards EMF frequency ranges.

The problem of electromagnetic safety under 5G mobile communication system improvement in Russia is very important: there are the most strict EMF hygienic standards in Russia; different principles of hygienic rating in RF and western countries; lack of 5G communication systems compared to the current 2G-4G systems improvement general public risks common understanding.

Comparative analyses of some publications in area of 5G system electromagnetic safety possible did not answer to the question of possible occupational and general public risks of this systems improvement.

In this regard, it seems appropriate to carry out experimental investigation directed to study the possible biological effects of EMF in the frequency ranges of current and future mobile communication standards. FSBSI "Izmerov Research Institute of Occupational Health" has developed and created special setup for experimental study of comparative effects of 2-4G modern mobile communication systems standards and new 5G/IMT-2020 standard. There was carried out experimental study of EMF chronic effects as well as animal exposure numerical dosimetry models development.

Comparative study of 2-4G and 5G EMF chronic exposure biological effects, new base station EMF exposure assessment pilot study results, prognostic "animal-human" model development (based on experimental studies data and the results of numerical modeling of animals and humans "biological time") allowed to determine the main directions of occupational and general public electromagnetic safety under 5G mobile communication system improvement.

SPL19

Occupational Health – Adding Value to Business

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The well-known saying is "Prevention is Better than Cure". In real life, however, a doctor is expected to carry out curative services most of the time! As a result of this practice, medical services in industries also tend to focus on curative services. Occupational

Health Services (OHS) in industries should ideally provide preventive health services to prevent occupational diseases, many of which do not have antidotes or curative treatment. The concept of preventive health is often missing in developing economies and many, including some medical professionals, believe that doctors are supposed to come into the picture only after disease has set in. The approach to health care is often "reactive" rather than "proactive".

Medical professionals are frequently employed in industry merely to fulfill statutory obligations and are not perceived to be adding value to business. They are viewed as a welfare activity with stress on curative services and managing accidents and are therefore considered to be a "Cost Centre". It is rather very unfortunate that the very important human resources are not as well monitored as the other resources like money, material and machinery. Medical professionals who joined industry also often believed that their job was curative and hence did not lay stress on occupational health. They did not venture to convince the management to introduce a occupational health program. They were content to provide emergency and curative service to the employees. The long latent period of occupational diseases, the apprehension of industrial relation problems if employee became aware of hazards and fear of penalties on reporting occupational hazards were also responsible for Occupational Health not getting the importance it deserved.

The author was working as the Corporate Medical Advisor responsible for occupational health and medical services to the Reliance Group of Industries, the largest private sector organization in India. This presentation describes the initiatives taken to implement Occupational Health Programs at manufacturing sites after creating Awareness on the subject and empowering them to come up with solutions to mitigate Occupational Hazards. This gave in an enterprise wide fillip to Occupational Health which proved to be beneficial to the employees as well as the organization.

The program named CASH (Change Agents for Safety & Health) has been widely accepted by the workers and the managers and has sustained for nearly two decades. It has become an integral part of the business. The key to the success of the program was the understanding by the management and the workmen that proactive measures to prevent exposure to Occupational Health hazards go a long way in being healthy and productive thereby adding Value to Business

SPL20

Preventing overwork related disorders ("Karoshi")

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In 2014, the Japanese government established the Karoshi Prevention Measures Promotion Law to take preventive measures against the Karoshi problems. According to the law, Karoshi etc. is defined as:

- death due to cerebrovascular disease / heart disease due to excessive workload
- death from suicide due to mental illness due to strong psychological burden at work
- although not fatal, these cerebrovascular diseases, heart diseases, and mental disorders.

Evidence has accumulated showing long working hours leads to heart diseases and stroke. A systematic review conducted as a

WHO/ILO project confirms those working at least 55 hours a week are at higher risk of dying from heart disease and stroke. Globally, 488 million people worked excessively long hours, leading to 745,000 heart disease and stroke deaths in 2016 (Pega et al., 2021). Association between long working hours and depression is not evident (Rugulies et al., 2021), but a systematic review indicates that long working hours were associated with depressive symptoms and the estimated risk was larger among Asian countries where long working hours are more prevalent compared with other regions (Virtanen et al., 2018). Overall association of long working hours with adverse health outcomes is modest (Ervasti et al., 2021). However, as the prevalence of long working hours is so large that the impact on health problems cannot be ignored (Li and Siegrist, 2021). During the pandemic of COVID-19, overwork of essential workers has become a big issue. Working from home (tele-working) is also considered to lead to long working hours.

Long working hours may lead to morbidity through both exposure of adverse working conditions and loss of necessary leisure time activities. The adverse working conditions include hazardous factors including psychosocial stress. Activities lost due to long working hours are healthy behaviours such as physical activities and sleep. The most important function during leisure time is to provide the time for recovery. Long working hours have been shown to affect both quantity and quality of sleep: which prevent recovery and influence hormonal regulations.

Based on the Karoshi Prevention Measures Promotion Law, the Japanese Cabinet decided "Outline of Measures to Prevent Death from Overwork" in 2018 and revised it in 2021. The outline stipulates various measures to prevent Karoshi by taking into consideration anticipated work-style changes that going with the spread of the new coronavirus disease. According to this new outline, the Ministry of Health, Labour and Welfare of Japan will continue to work on the measures toward the realization of "zero Karoshi" society in cooperation with related ministries and agencies.

Karoshi cannot be prevented by reducing working hours alone. Research pointed out that the impact of long working hours on health problems was larger among workers of lower socioeconomic status than those of higher socioeconomic status (Li et al., 2020). Business practices and general consumption behaviours may also be related to working hours. To prevent Karoshi, continuous and multi-faceted efforts, including increased public understanding, are necessary.

SPL21

Occupational Health in the Small Islands Developing States of the Pacific

Collin Tukuitonga

SPL22

Quality assurance approach for basic occupational health services provided by Primary Care Units (PCUs) in Thailand, an example for others?

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Introduction: Total of 9,815 PCUs in Thailand are as a key mechanism for providing health services for all because their locations are close to the community. Integration of basic occupational health services (BOHS) in this setting is very crucial because high risk community workers can access services easily. Thailand has launched BOHS program in PCUs since 2008. Ten years later, the quality control strategy using the OHS practices standards tool was established. Such standards are divided into 5 components and 25 items including 1) organizational set up, human resources, plans, evaluation and occupational health network collaboration, 2) OHS for health workers of PCUs, 3) pro-active OHS for community workers, 4) in-house OHS and 5) integration of environmental health services (EHS). This work was undertaken to explore the OHS quality control program among PCUs following such standards.

Material and Method: The staff of the Regional Office of Disease Prevention and Control (RDDC), and the staff of the Provincial Public Health Office have been trained to audit PCUs. Additionally, the basic OH course has been developed and trained PCUs' staff. The evaluation system using the web-based has been established since 2019 and the instruction manual for all users have been documented as well. The PCUs' staff conducted self-assessment and RDDC staff approved their results through such platform. The assessment criteria of the standards have been classified into 4 levels including starting level, good level, very good level and excellent level depending on the performance of PCUs practices.

Results: During 2018–2021, 2,456 PCUs (25.7%) participated in the project and conducted self-assessment following OHS standards. Of them, 1,529/ (62.3%) PCUs could pass the criteria approved by the external auditor. Their levels were starting, good, very good and excellent amounting to 262 (17.1%), 585 (38.3%), 321 (21.0%), and 361 (23.6%) respectively. E-learning basic OH curriculum has been developed after gathering training need information from PCUs' staff. There were 12 study hours and 7 subjects packed in the course including OH policy, walkthrough-survey, risk assessment and control, common occupational diseases (OD), practical BOHS, OD record and related OH laws. This course will plan to begin next year (2022).

Conclusions: Participated PCUs could provide BOHS following such criteria. However, they had some limitations, such as 1) the capacity of PCUs' staff for early diagnosis of OD and EHS provision were limited, 2) common hazards related to health problems have been identified, but control measure still need to be strengthened. Currently, the web-based audit platform was very helpful because of COVID-19 outbreak. Capacity building, training and supervision were the main activities for strengthening the quality assurance system.

Recommendations: The future development should be addressed in 4 issues as follow: 1) specification of OHS interventions in the benefit package of universal coverage scheme to support operational finance, 2) training PCUs' staff to enhance competency, 3) OHS quality continuous development and 4) OHS legislation enforcement.

SPL23

How did mental health became a problem in working life?

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Despite improved physical health and material welfare, numerous manifestations of mental vulnerability (depression, work stress,

burnout etc.) have spread over the past few decades among working age populations in Western countries. This presentation will deal with the key production- and culture-related mechanisms that have provoked the emergence of mental vulnerability among the working aged in 1960–2020. The objective of this presentation is to form a more historically-based understanding of mental health at work.

The main body of empirical data will be drawn from Finland, which has transformed exceptionally rapidly from a country with a strong secondary production and material poverty to a country with an advanced high-tech and service sector – and a high level of mental vulnerability.

I will present an empirical strategy to examine mental vulnerability by combining approaches from social sciences, history, and epidemiology. It includes a detailed analysis of people's accounts (e.g., expert interviews, archival documents, occupational journal materials), but also uses mental national health records (e.g., drug prescriptions, sick leaves) and other long-term structural materials. Several empirical examples will be presented from various sub-studies conducted over the recent years. For instance, occupational experiences among teachers and occupational health professionals will be dealt with. These materials will illustrate how the mental health became a problem in different parts of working life and how different societal transitions (both work-related and cultural) fuelled the emergence of this challenge.

The presentation brings to the fore perspectives that have not genuinely interacted, or that have remained silent in the study of occupational mental health. This presentation questions our contemporary wisdom regarding mental health at work, relocates this challenge in a transitioning society, and opens a new avenue for understanding the paradoxical nature of mental vulnerability in current working life.

Special Sessions

SPL24

Reform of Occupational Health Authority in China and its perspectives

Sun Xin

Special Session 1 Occupational health and safety implications for the post pandemic workplace

Chair: Karen Michell and Su Wang

Session introduction

The Covid 19 pandemic had and continues to have a significant impact on the world of work as we know it. From this global experience has emerged tragic reports of the devastating impact of the pandemic on organisations and individuals alike through lockdowns, market insecurities and the negative impact on mental and physical health. Yet, we have witnessed how agile organisations with employee health, safety and wellbeing at the heart of their organisational culture have forged their way through the pandemic and have emerged as better workplaces. One of the lasting impacts of Covid 19 will be to the health of those who have suffered mental and physical health issues. Interventions will be necessary to ensure recovery as demonstrated through the MENTUPP programme.

Sp1-1

Aviation's Aerotoxic Syndrome in a post pandemic world

Susan Michaelis

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Introduction: While there is strong interest in aircraft air quality in respect to COVID-19 and emissions into the environment, the concerns regarding oils and hydraulic fluids leaking into the aircraft air supply and cabin have yet to receive the same level of attention. This is despite considerable knowledge about this design problem first recognised in the late 1930s.

Materials and Methods: A brief review of what we know, and the various current activities related to aircraft bleed air contamination will be undertaken in order to determine what are and why it may be necessary to implement various mitigation strategies.

Results: Aircrew, aviation workers and passengers are exposed to low levels of engine oils and hydraulic fluids on a regular basis in normal flight. There have been considerable initiatives over the past two decades exploring this topic and assessing if there is a need and what steps may be undertaken to mitigate the risk of exposing aircrew and passengers to particles and contaminants that enter the air supply either in normal operations or during a failure event. The aviation industry has not given the same attention to bleed air contamination of the air supply as it has to contamination due to COVID-19 and emissions into the outside environment.

Conclusions: Aircrew and passengers are exposed to low levels of ultrafine particles and chemical compounds that enter the aircraft breathing air supply in normal operations, which require a range of risk mitigation strategies to be undertaken.

Sp1-2

Learnings from the MENTUPP Project: The Impact of the COVID-19 Pandemic on the Mental Health of SME Employees

Ella Arensman

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Introduction: MENTUPP is a multi-level intervention aimed at promoting mental wellbeing in the workplace, addressing clinical and non-clinical mental health issues and reducing stigma in SMEs. Within the context of MENTUPP, a study has been conducted to explore the impacts of COVID-19 on the mental health of SME employees.

Materials and Methods: A researcher-designed, semi-structured, online survey was completed anonymously by key stakeholders across nine countries in Europe and Australia. Key stakeholders (N=65) included representatives from academia, SMEs, occupational health associations, labour and advocacy groups, and representatives from the construction, health and information technology sectors. They were from countries with established mental health provisions (Central and Western Europe) and countries with lower resources (Central and Eastern Europe).

Results: An overview of the MENTUPP project will be provided, followed by outcomes of the online survey. Stakeholders across different countries and sectors agreed that COVID-19 pandemic has increased clinical and non-clinical mental health issues in SMEs. Experts in Central and Western Europe reported that the capacity of workplaces to promote wellbeing decreased due to COVID-19, and experts from Eastern and Central Europe thought that this did not change much. Mental health stigma has reportedly remained the same, however, mental health awareness may have increased. Conclusions: This study observed that the COVID-19 pandemic has negatively impacted employee mental health indicating the timeliness to introduce a targeted intervention, such as MENTUPP.

Sp1-3

People sustainability and Covid-19: challenges, lessons learnt and the future of health, safety & wellbeing in a VUCA world. A L'Oréal case study

Malcolm Staves

Health & Safety, L'Oréal, Paris, France

Introduction: In 2020, L'Oréal, as with many other companies saw the value of its shares fall as Covid-19 traversed the world. However, as many parts of the world eased lockdowns and entered their "new normal" L'Oréal is recognised as one of the most successful companies to survive the pandemic. The author believes this is as a result of L'Oréal putting its people and their health, safety and wellbeing firmly in the center of its values.

Materials and Methods: A case study

Results: The author provides insights into how L'Oréal adapted globally, and continues to do so, to address the challenges posed by the Covid-19 pandemic and describes how their approach to the pre-covid volatile, uncertain, complex and ambiguous (VUCA) world helped them be "ready" and agile for the unthinkable. From his unique position within the Global Crisis Management committee, the author will give an overview of the critical and central role of the Occupational Health and Safety network to the deployment of internal and external resources to keep their people healthy and safe, both at work and at home.

Conclusion: The author shares practical experience and lessons learnt from covid management across a multinational organisation, and explores what this means for the future of health and safety and the profession.

Special session 2 Working towards a healthy longer working life?

Chair: Jodi Oakman

Session introduction

In most developed countries, there is an aging population and life expectancy is increasing. Together with the pressure on the social security system, this has led to a rise in the retirement age. This however raises the question on the impact on health. This special session focusses on the topic of retirement age and the impact on health. The presentations are about studies that used a variety of methodologies, including a meta-analysis, epidemiological analyses and forecasting models to investigate the health effects of retirement age.

Sp2-1

Designing interventions to maintain work ability

Paul Rothmore and Susan Williams

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Introduction: The working population is ageing and people are now encouraged to work for longer. As a result many workers are extending their exposure to musculoskeletal risk factors when their work capacity is declining. This study aimed to examine the outcomes, over 3-years, in Work Ability Index (WAI) scores in a cohort of outdoor workers following application of the APHIRM (A Participative Hazard Identification and Risk Management) toolkit. Materials and Methods: The APHIRM toolkit and WAI were administered to 155 Council workers. Based on responses, action plans were developed and workplace changes implemented. Three-years post-implementation, workers were resurveyed.

Results: In the primary analysis we used linear mixed-effects models to examine associations between WAI scores at baseline and follow-up. Analysis was undertaken for all workers who completed pre- and post-surveys (matched and unmatched) and those who were =50 years old (matched and unmatched). No significant differences were seen. We undertook secondary analysis, using bivariate linear regressions, to examine associations between risk factors and WAI scores. This identified that six of the 18 psychosocial risk factors and 3 of the 8 physical risk factors which were associated with reduced work ability at baseline, were no longer significant.

Conclusions: Significant declines in mean work ability scores over time have been previously reported in the literature but not seen in our study. Our results indicate that the APHIRM toolkit may be effective in identifying hazards which, if addressed, could contribute the maintenance of work ability over time.

Sp2-2

Effect of a workplace factors and intervention on retirement pathways

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Introduction: The study examined the effect of workplace interventions on the different retirement types and which work-related factors predicted disability pension.

Materials and Methods: A quasi-experimental study among Finnish food industry employees was conducted between 2003 and 2009. Data from 265 individuals who participated in the questionnaire surveys and had information on their pension type were analyzed in this study. In total 110 participated in the senior program and 155 were the controls. The intervention, so called "senior program" aiming to maintain and promote work wellbeing and work ability among employees aged 55+ years was implemented as voluntary program in the company in 2004 and continued as a normal

workplace health promotion program. Information on type of pension until December 2019 was obtained from the Finnish Centre for Pension and was dichotomized as normal vs. disability retirement. Work-related information of the participants was obtained from the questionnaire. s.

Results: In total 51 employees (19.2%) retired on disability pension (24% in controls compared to 14% in the senior program). In multivariable model, work ability was associated with disability pension, so that those with good work ability had 70% lower risk of disability pension as compared to those with poor work ability. Multisite pain was associated with increased risk of disability pension in a crude model.

Conclusions: Workplace interventions targeted at older workers can be useful in reducing accessing the disability pension.

Sp2-3

Disability free life expectancy and working conditions

Cécile Boot¹, Ranu Sewdas¹, Emiel Hoogendijk², Dorly Deeg², Allard J. van der Beek¹ and Astrid de Wind¹

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Introduction: Increasing life expectancy does not always go along with an increasing healthy life expectancy (HLE). The life expectancy without and with disability by occupational exposure during working life helps to gain insight into health inequalities in later life.

The objective of this study was to examine differences in life expectancy without and with disability by occupational exposures. Materials and Methods: Longitudinal data on disability, and physical and psychosocial work demands and resources of 2,513 (former) workers aged =55 years participating in the Longitudinal Aging Study Amsterdam between 1992 and 2016 were used. Life expectancies without and with disability by occupational exposures were calculated using multistate survival models.

Results: Women aged 55 years with high physical work demands could expect to live fewer years without disability than those with low exposure (1.02-1.57 years), whereas there was no difference for men. Men and women with high psychosocial demands and resources at work had a longer life expectancy without disability than those with low exposure (1.19-2.14 years). Life expectancy with disability did not significantly differ across occupational exposures. Conclusions: Workers in jobs with higher psychosocial demands and resources and lower physical demands can expect to live more disability-free years. Information on occupational exposure helps to identify workers at risk for a lower life expectancy, especially without disability, who may need specific support regarding their work environment.

Sp2-4

Future health prior to state pension age – explorations for the Netherlands 2040

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Introduction: In many Western countries, the state pension age is being raised to stimulate the extension of working lives. In the Netherlands, the state pension age is expected to be raised to 68 years in 2040. It is not yet well understood whether health of the 60+ permits this increase. In this study, the future health of Dutch adults aged 60 to 68 is explored up to 2040.

Materials and Methods: Data are from the Dutch Health Interview Survey 1990-2017 (N10,000 yearly) and the Dutch Public Health Monitor 2016 (N=205,151). Health is operationalized using combined scores of self-reported health and limitations in mobility, hearing or seeing. Categories are: good, moderate and poor health. Based on historical health trends, two scenarios are explored that are likely for the Dutch situation: a stable health trend (neither improving nor declining) and an improving health trend.

Results: In 2040, the health distribution among men aged 60-68 is estimated to be 63-71% in good, 17-28% in moderate and 9-12% in poor health. Among women this is estimated to be 64-69%, 17-24% and 12-14%, respectively.

Conclusions: This study's explorations suggest that the majority of the older working-age population will be in good health and thus should be capable to extend their working lives. However, also a substantial share of people will be in moderate or poor health and thus may have difficulty continuing working. Policy aiming at sustainable employability will therefore remain important, even in the case of the most favourable health trends.

Special Session 3 Immunotoxicology in workplaces: Prevention, Early detection and Treatment

Chair: Claudia Petrarca and Hiroo Wada

Session introduction

Particulate/fibrous respirable (nano)materials in occupational settings, either purposely manufactured or occasionally aerosolized, represent potential elicitors of immuno-mediated and neoplastic diseases. Monitoring of non-reported effects, even below TLV-TWA limits, and molecular biomarkers of exposure and early damage might improve risk assessment and workers protection. Learning outcomes include clues for better risk assessment, prevention and biomonitoring through evaluation of environmental nanoparticles and measurement of new molecular biomarkers in workers.

Sp3-1

Asbestos-caused key events of altered expression of gene in mesothelioma patients

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Introduction: Asbestos-related disease is a global problem, where malignant mesothelioma is characteristic. Our previous studies clarified that asbestos exposure causes altered characteristics in immune cells, some of which were also confirmed in mesothelioma patients. Additionally, our recent study found that long-term

exposure to chrysotile asbestos resulted in low cytotoxicity and INF- γ production by CD8+ T cell line. Therefore, we examined alteration in gene expression caused by asbestos by using transcriptome analysis.

Materials and Methods: EBT-8 of human CD8+ T cell line was cultured under exposure to chrysotile A, chrysotile JAWE, crocidolite asbestos or TiO₂ particle at 30 μ g/ml compared with the control. Cells were analyzed weekly for mRNAs including INF- γ by RT-qPCR. Finally, RNA-sequencing was conducted for total RNA of cell samples (n=3, 5 groups).

Results: Regardless of asbestos types, the cells showed gradual decline in INF- γ expression. Transcriptome analyses showed that all of the asbestos types share decreased and increased expression of limited genes, in which over 4-fold changes were shown in 5 transcripts including INF- γ . However, chrysotile A and JAWE exposures showed positive correlation in all of the altered gene expressions, whereas crocidolite showed relatively low effect and negative correlation with chrysotile A in a part of the genes.

Conclusions: These results indicate that continuous exposure to asbestos causes a key event in T lymphocytes served by limited genes leading to immune suppression, where chrysotile and crocidolite showed different impacts, related with mesothelioma.

Sp3-2

Environmental Exposure in workplaces in the post-/with-COVID-19 era

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Introduction: The COVID-19 pandemic has posed concerns for individual health issues of inequity and a divide in communities. To address these health issues, elucidation of the physical mechanism of health impairment will help us find the way to approach both to individuals and to communities.

Materials and Methods: We measured the skin elasticity and lung forced expiratory volume in 1 second (FEV₁) in 50 workers of a company. The results, that of our previous studies, are compared and discussed.

Results: We showed that skin elasticity and lung forced expiratory volume in 1 second (FEV₁) are associated depending on age. Therefore, skin elasticity may predict the airway condition and will be helpful in identification of airway impairment. In addition, smoking is tightly associated with FEV₁ decline, and weekly with decline in skin elasticity. These environmental exposure may be accounted for by accelerated ageing process, since cigarette smoke exposure lowered the level and activity of Sirt-1 in mice.

Conclusions: These findings suggest that the skin and the airway are both located in the border between environment and body, directly under the effect of environmental exposure. In addition, these findings and its application will facilitate the accessibility of people in various work place. We will discuss various approaching strategies to maintain workers' health.

Sp3-3

Do microRNAs characterize exposure and asbestos-related diseases?

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Introduction: Asbestos-related diseases can be latent for long time after exposure cessation. We analyzed the expression of a set of 179 microRNAs in the plasma these workers in search of relevant microRNAs as biomarkers, regulators of disease pathways and potential targets for risk assessment. Furthermore, the study was designed to evaluate longitudinal changes in microRNA patterns in each subject for a personalized management of the disease course. **Subjects and methods:** Asymptomatic high-risk workers were enrolled. Plasma was obtained to extract and analyze the microRNAs through biomolecular techniques and specialized instrumentation. Data were compared to those obtained by control subjects (not exposed, N=30). The present study was approved by the local Ethical Committee.

Results: Ex-asbestos workers (n=7, analyzed individually and as a pool) showed a pattern of overexpressed microRNAs, a subset of which already described as mesothelioma-related miR. Other mesothelioma-linked microRNAs were not detected in these workers. Other were variably expressed amongst subjects.

Conclusion: Up-regulated microRNA might represent early footprint of the dysregulation associated with occupational exposure to asbestos. Not expressed and variably expressed miR might may represent a biomarker of pre-clinical disease after validation in larger cohort of subjects and if confirmed by comparison with subject-matched prospective clinical data. The evaluation of (patterns) of the miRs highlighted here might be interesting to monitor disease onset/progression and help to define asbestos-oriented health surveillance protocols.

Sp3-4

Green coffee allergy and exposure to nanoparticles in harbour workers

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Introduction: The exposure to Green coffee beans (GCB) powders can cause allergic symptoms. The presence of ultrafine powders (below 100 nm) can increase the risk of inhalation and can induce the sensitization process in exposed workers. The aim of our study was to investigate the exposure to ultrafine particles in workers handling GCB sacks in Trieste harbor.

Material and methods: Ultrafine particles exposure was investigated during the handling of GCB sacks in dock workers in Trieste by means of a portable particles counter DISCMIN during different work tasks. Inhalable and respirable dust exposures were evaluated by means of personal and environmental pumps.

Results: During some work tasks CGB ultrafine particles resulted significantly higher compared to background: inside the containers the geometric average of particles was over 45.000/cm³ with a geometric average size of 37.27±1.35 nm. During the emptying of the sacks the number of ultrafine particles reached the 39.000/cm³. Total and respirable powders exposure during different work tasks resulted below the TLV-TWA limits. Work related oculorinitis was reported by the 7.1% of workers. Spirometry and exhaled nitric oxide were normal.

Conclusion: During the handling of GCB sacks the level of ultrafine particles resulted high suggesting a possible relevant exposure to green coffee allergens, despite the values below the TLV-TWA for respirable powders. More efforts are needed to prevent the exposure to ultrafine particles containing allergens using personal protective equipment such as FFP3 masks and increasing ventilation.

Special Session 4 Stress, sleep, cardiovascular autonomic disorders and health promotion

Chair: Nicola Magnavita and Franca Barbic

Session introduction

Three studies involving over 4000 workers demonstrate that sleep quality is a significant predictor of metabolic syndrome. A review study indicates how sleep problems can alter the autonomic nervous system function, so increasing the cardiovascular risk. A Polish study shows the existence of adaptation mechanisms to night work in truck drivers, which limit the effect of sleep on the autonomic nervous system. An Italian study demonstrates that post-acute COVID19 patients often show an autonomic dysfunction, which impairs their work ability and obstacles their return to work. Finally, a review indicates that COVID19 disease is associated with sleep problems. All authors underline the importance of health promotion interventions in the workplace.

Sp4-1

The mediating role of sleep in the relationship between occupational stress and cardiovascular risk

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Introduction: Many occupational factors, including occupational stress, may interfere with sleep. Sleep problems (SPs) can, in turn, endanger the health and safety of workers. The purpose of this study was to verify whether SPs are associated with metabolic syndrome (MetS).

Materials and Methods: The quality of sleep was investigated in three groups of workers during their periodical medical examination at work, by means of the Pittsburgh Sleep Quality Index (PSQI). MetS was defined as the co-occurrence of three or more of the known cardiovascular risk factors: obesity, hyperglycaemia, low HDL-cholesterol, hypertriglyceridemia, and hypertension. The group A was composed by 2226 persons (male 32.3%, age 47.6±9.4

years), group B by 741 persons (male 35.4%, age 47.2±10.7), and group C by 1042 persons (male 34.5%, age 45.8±11.3).

Results: In all three groups, using logistic regression analysis adjusted for age and gender, the PSQI score was a significant predictor of MetS. The Adjusted Odds Ratios were: 1.099 (CI95% 1.056;1.142, p<0.001) in group A; 1.075 (CI95% 1.011; 1.144, p<0.05) in group B; 1.075 (CI95% 1.022; 1.132, p<0.01) in group C.

Conclusions: SPs are consistently associated with cardiovascular risk factors and play a mediating role in the relationship between occupational stress and MetS. A correct sleep hygiene could help to reduce the incidence of cardiovascular risk factors at work.

Sp4-2

Sleep, autonomic nervous system and cardiometabolic risk: occupational implications

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Introduction: Indonesia has a worker population of more than 138 million, with 60,47% among them working in the informal sector. With only less than 200 Occupational Medicine Specialists and about 600 doctors with a master's degree in Occupational Medicine, there is a wide gap to provide workers with access to Occupational Health Services. The Indonesian Government and Medical Schools have recognized this problem and have implemented various approaches to increase access to Basic Occupational Health Services.

Materials and Methods: A qualitative approach has been conducted by reviewing recently developed training programs and medical curricula which try to put BOHS as a priority. Short training programs from the Ministry of Health and curricula from 8 Medical Schools (public and private) have been reviewed on the content. In addition, evaluations of the participants/students are used.

Results: The newly developed short training program by the Ministry of Health has been improved and is widely implemented throughout Indonesia. The training is interactive and focuses on the ability to recognize and diagnose Occupational Diseases but lacks an evaluation of individual competencies. While there is a big variation in curricula on BOHS for medical students, there is a clear focus and prioritization of BOHS in several Medical Schools.

Conclusions: There is a clear effort to put more attention to providing BOHS for the Indonesian worker population. It is still in the implementing stage. The results cannot be evaluated yet.

Sp4-3

Physiological reaction to the night work in truck drivers

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Statistics show that driver fatigue is responsible for about 10 -15% of serious traffic accidents, and one of the causes is night work and lack of sleep. The aim of this study was to evaluate the effect of drivers' night work on fatigue and physiological parameters. The study was conducted in 20 truck drivers aged 32,8±4,4 yrs. Work experience as a driver was 12,6±5,6 yrs. A technologically advanced truck driving simulator was used in the study. The 40 min

test was performed 2 times: after a normal night's rest (NR) and after an 8-hour period of driving (ND) on the average distance of 471.4± 282.4 km. The interval between tests was at least 1 week. Holter ECG with heart rate variability (HRV) analysis, blood pressure monitoring (ABPM) were used. Fatigue was assessed using Fatigue Scales ("usual fatigue" and "current fatigue").

After (ND) the level of "current fatigue" was significantly higher than the level of "usual fatigue" (an increase in symptoms in the cognitive, executive and physiological spheres). There were no significant differences in ABPM. HRV analysis from the 40 min. simulator test showed no differences between time- and frequency-dependent parameters. Significant differences were found ($p < 0.05$) when these parameters were compared in the post-test period (SDNN, pNN50, total power, VLF, LF, HF) between NR vs. ND. The lack of difference in HRV parameters during the whole recording period between NR and ND indicates that the subjects are well adapted to shift work, but the additional stimulus of the test on the simulator induces significant changes in HRV, which appear after the test

Sp4-4

Cardiovascular autonomic disorders and work ability: A focus on post-acute Covid19 syndrome

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A relationship between the autonomic nervous system and work ability has been recently described in autonomic disorders, i.e., Postural Orthostatic Tachycardia Syndrome (POTS).

It is unknown whether COVID19 may induce a post-acute viral syndrome potentially affecting the autonomic nervous systems. No data are available on work ability and time of return to work of patients after Covid19.

Forty patients (age 53±9 years) admitted to Humanitas Research Hospital during the 2nd and 3rd outbreaks in Italy were consecutively enrolled at the time of their hospital discharge (T0). Work ability and autonomic symptoms were assessed at T0, 1 month (T1) and 3 months (T2) after hospital discharge by the Work Ability Index (WAI, 7 domains, 0-49) and by the Composite Autonomic Symptom Score (COMPASS31 Total Score, 0-100; CTS). CTS > 16.4 reflects an initial autonomic dysfunction. At T0, the patients were asked to retrospectively complete the additional questionnaires to assess their work ability and autonomic symptoms before COVID19 (PRE).

At PRE, the patients' WAI was 42.3±5.4, corresponding to "good work ability" and the CTS was 10.7±11.9. At T1, WAI was lower (35.9±6.5; $p < 0.0001$), and CTS was higher (20.4±17.4, $p < 0.0001$) compared to PRE. At T2, WAI was still lower compared to PRE (38.9±6.4; $p < 0.001$). At T1 and T2, the patients who returned to their previous work were 95% and 97%, respectively.

Post-acute COVID19 are characterized by an autonomic dysfunction, like what is observed in POTS. This post-viral autonomic syndrome reduced patients' work ability and delayed their return to work.

Sp4-5

Neurophysiology of sleep in workers' health and safety during Covid19 pandemic

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Introduction: Sleep problems appear to have been common and associated with higher levels of psychological distress. Sleep quality, however, has been mainly assessed by the use of self-reported measures, thus limiting clinical usefulness. We review the literature about the sleep quality of workers supported by objective neurophysiological tools, during the COVID-19 pandemic.

Materials and Methods: We conducted a systematic search of the PubMed database through October 27, 2021, including terms Covid-19, sleep, workers, neurophysiology, polysomnography and actigraphy.

Results: A total of 13 studies were included. Out of these, only two studies evaluated sleep problems in workers (Healthcare professionals) with objective neurophysiological tools such as actigraphic evaluation. About 35% of healthcare workers were suffering from sleep disturbances having a sleep efficiency value less than 90% and high PSQI scores with a significant negative correlation between SE and PSQI and a trend of a negative association between SE and age. No other job categories were evaluated.

Conclusions: During the lockdown, increases in sleep problems are associated with sense of time and are more pronounced in individuals with higher levels of depression, anxiety, and stress. People who isolated at home (smart-working) reported significantly earlier sleep onset and wake-up times than actigraphy-defined, tending to overestimate their specific sleep times. It is of utmost relevance to assess sleep by objective measures to set appropriate preventive strategies treating sleep problems, thus also obtaining reduced psychological distress.

Special Session 5 Development of Basic Occupational Health Services, more needed than ever

Chair: Frank van Dijk and Somnath Gangopadhyay

Session introduction

Good quality support in occupational safety and health is not available for 85 % of all workers. Many workers are threatened by hazardous working conditions, especially informal workers, workers in agriculture, in small companies, in urban industry areas, and self-employed. Primary and community/public health care can provide Basic Occupational Health Services. Good education in OSH is needed, OSH expert support, referral clinics, a national infrastructure inclusive financial resources and online facilities. Evaluation studies and international collaboration can stimulate quality and coverage. Mutual contact, coordination and visible leadership must be improved. Initiatives in several countries will be presented. Developments in other countries and in agriculture will be communicated.

Sp5-1**Video based Modular Training on Occupational Health risks in Informal Work for Primary Care Physicians in India**

Suvarna Moti and Ramnik Parekh

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Introduction: Mission Basic Occupational Health Services of the Indian Association of Occupational Health has been working to accentuate Occupational Health competency of primary health care personnel. Limitations of organizing contact training programs with scant support from formal services compelled the mission to leverage technology to create industry-specific learning resources as video-based modules for online learning followed by a mobile application. This modular program has been utilized during COVID-19 pandemic that had profoundly affected contact training due to movement restrictions during lock-downs.

Materials & Methods: BOHS for Informal Industry: Manual for Primary Care Providers was used to create videos defining epidemiological profiles of twenty-two informal trades. These videos were released on the website and YouTube platform for free access. Mobile application IAOH BOHS was launched in 2019. Game-based assessment to determine effectiveness of video-based training was undertaken in a group of 100 doctors at a tertiary care institute in India.

Results: Video modules were formally recognized as training resource. Video-assisted learning was appreciated for trade-specific content and showed selective improvement in knowledge and competence enhancement. With over 3000 views among diverse audience, 300 contact & online training sessions were conducted until 2020.

Conclusions: Video-based learning through virtual platforms offered accessible engaging learning opportunities for primary care professionals. Restrictive circumstances demand workable alternatives to facilitate learning with effective outcomes.

Sp5-2**Recent Approaches to Increase Access to BOHS for the Indonesian Worker Population by Government and Medical Schools**

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Introduction: Indonesia has a worker population of more than 138 million, with 60,47% among them working in the informal sector. With only less than 200 Occupational Medicine Specialists and about 600 doctors with a master's degree in Occupational Medicine, there is a wide gap to provide workers with access to Occupational Health Services. The Indonesian Government and Medical Schools have recognized this problem and have implemented various approaches to increase access to Basic Occupational Health Services.

Materials and Methods: A qualitative approach has been conducted by reviewing recently developed training programs and medical curricula which try to put BOHS as a priority. Short training programs from the Ministry of Health and curricula from 8 Medical Schools (public and private) have been reviewed on the content. In addition, evaluations of the participants/students are used.

Results: The newly developed short training program by the Ministry of Health has been improved and is widely implemented throughout Indonesia. The training is interactive and focuses on the

ability to recognize and diagnose Occupational Diseases but lacks an evaluation of individual competencies. While there is a big variation in curricula on BOHS for medical students, there is a clear focus and prioritization of BOHS in several Medical Schools.

Conclusions: There is a clear effort to put more attention to providing BOHS for the Indonesian worker population. It is still in the implementing stage. The results cannot be evaluated yet.

Sp5-3**The Development of tools and interventions for improvement of Basic Occupational Health Services (BOHS) in Thailand**

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Introduction: Although most Primary Care Units (PCUs) in Thailand can provide BOHS, staff at PCUs still need empowerment in terms of health risk assessment and management. The project was initiated to find out solutions to support the BOHS program. The aims of the project were to identify health risk situation in some particular workers and to develop tools, information system, and suitable preventive measures for further disease prevention and control.

Materials and Methods: The project was a research and development design, targeting five groups of informal workers: farmers, waste collectors, cloth makers, masons, and taxi drivers. 26 pilot PCUs were selected to join the study. The activities included setting up the One Health (OH) information framework and data collection from target workers by questionnaire. The data were analyzed and used to identify the high priority of OH problems. Then, the models for preventive measures were developed.

Results: Ergonomic factors were a major problem among farmers (100%) and cloth makers (59.8%). In addition, stonemasons (83.8%) were very high risk groups for getting Silicosis. Tools and other interventions which were developed included telephone application for personal health record keeping, health assessment checklist tools, and health education packages.

Conclusions: The products and outcomes of the project can support PCUs' staff to improve BOHS. Tools and preventive measures can be applied for other PCUs to provide BOHS.

Sp5-4**Occupational Ergonomics and Industrial Hygiene for Evaluation of Health-Related Hazards in Informal Sectors and SMEs**

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Introduction: More than 60% people all over the world come under informal sectors. In developing countries such as India the percentage is 85%. In India 80% of the labor force as well as 50% of GDP is dependent on different informal sectors. The International Labor Organization estimates informal employment worldwide to consist of 2 billion workers, or 62% of all workers. Informal employment constitutes 90% of workers in low-income countries, 67% in middle-income countries and 18% in high-income countries. Further, women tend to be more exposed to informality in low- and lower-

middle-income countries, which makes them more vulnerable to economic shocks. These informal workers are bound to work in conditions with several ergonomic and health hazards.

Materials & Methods: The prime and first task of ergonomics and industrial hygiene is to find out the hazards related to health and work. Several methods are used to investigate poor working conditions like analysis of working posture, identification of mental and physical status through questionnaire and checklist, and evaluation of repetitive motions. Temperature, light and humidity of a work environment are also taken into consideration when analyzing health and hygiene concerns in that work place.

Results: Poor postures and poor working conditions are solely responsible for the development of different types of musculo-skeletal disorders

Conclusions: Through these noninvasive and low or no cost investigations, work and health status of workers can be evaluated to make a better work environment.

Special Session 6 Great opportunities for online sources for education and information

Chair: Yohama Caraballo-Arias and Max Lum

Session introduction

Adequate information & education on occupational safety and health (OSH) is a workers' right, an enterprise's need and basic for expert's formation. Excellent information and education are certainly a main tool to foster progress in OSH and part of social and technical solutions. OSH practice is discovering the amazing opportunities of online information and blended education, supporting the quality and coverage in an unprecedented way. Search engines, databases, websites, apps, Wikipedia, evidence-based guidelines, MOOCs, e-lessons, webinars, YouTube, online point of care summaries, are part professional's life. Surprisingly, there is almost no coordination and evaluation in the field of OSH and developing appropriate quality criteria is needed.

Sp6-1

How to find reliable online information, a bottleneck for Occupational Safety and Health (OSH) professionals?

Yohama Caraballo-Arias¹ and Frank Van Dijk²

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Introduction: Printed books & scientific journals have been steadily replaced by online information in a large variety of sources. Nevertheless, OSH practice is only slowly discovering the amazing opportunities of online conveniences. One bottleneck is that finding reliable information online is not easy without a roadmap and training to complete an accurate and fast search. Most OSH professionals are not well-trained in finding and using online sources. **Materials and Methods:** The lecture is based on the book "Occupational Safety and Health online, how to find reliable information" (third edition, 2016), free at www.ldoh.net, and an Open Access article on "where to find evidence-based information" (2021) published in the Annals of Global Health: <https://annalsofglobalhealth.org/articles/10.5334/aogh.3131/>.

Results: Commonly used strategies, search engines and online sources are briefly introduced including PubMed/MEDLINE, Virtual Health Library, LILACS and SciELO (Latin America), Cochrane

reviews, evidence-based guidelines, synopses such as Up-to-date, Google (Scholar), YouTube, Wikipedia, and authoritative sources for chemical or biological exposure and effects. The relevance of the information and the need for quality appraisal are addressed and diverse options for training are shown.

Conclusions: Adequate information and education access can improve the professional performance and the quality of practice in favor of workers and companies, saving time, money, case management errors and delays. Surprisingly, there is almost no coordination and evaluation related to online information in the OSH field, with a few exceptions.

Sp6-2

A MOOC to teach basics on Occupational Health in a global setting. A collaboration between Norwegian and African universities

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Introduction: In 2015 researchers at the University in Bergen launched the Massive Open Online Course (MOOC) Occupational Health in Developing Countries. The course was developed in cooperation with researchers at Muhimbili University of Health and Allied Sciences, Tanzania and at Addis Ababa University in Ethiopia. The objective of this presentation is to describe the development of the course and how it was structured, as well as the participation of students in the period 2015-2021. A second objective is to discuss the importance of this type of course.

Materials and Methods: This course is run 6 weeks each time, twice a year. The MOOC platform Future-learn is used. Topics on general occupational health, chemical factors, physical factors, and factors concerning musculoskeletal disorders as well as mental problems related to the work situation are the main topics of the study. Data from the learning platform was obtained to describe the students attending the course.

Results and Conclusions: Altogether, 20 303 students have participated in the course, from 159 different countries. Participants the first year were 5866, 72.4 % from a low- or middle-income country. 71.9 % of the 768 course completers were LMIC residents. Of the participants, 46% were females and 54% males; about 50% of the participants were working in health and social care. Anyone can register for this course. There is no control over the activity, and not all complete. However, it might be of importance for some to learn occupational health this way, as not all countries have education in this topic. The effect of the course is difficult to evaluate.

Sp6-3

Global initiatives for online and blended education in occupational hygiene

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Introduction: The increasing demand for worker protection from occupational hazards forces increased demand for professionals with the training and education in occupational hygiene. In many parts of the world where the need for knowledgeable occupational hygienists is most urgent, formal training programs do not exist. As a means to compensate the shortfall of occupational hygiene programs and instructors numerous online and blended educational

courses have been developed and conducted to build capacity in far reaching regions where need is most urgent.

Materials and Methods: This study analyzes and evaluates a broad range of organizations and courses that have been developed in the past several years in terms of types of courses, numbers and types of students, and the quality of the courses including their abilities to achieve intended course or program objectives. The study then evaluates how training has shifted during the global pandemic to continue to meet development needs as more courses began to be conducted via the internet and in blended formats.

Results and Conclusions: In the past decade numerous courses and programs have been created and implemented to address the need for occupational hygiene capacity around the world, primarily by instructors who traveled to distant regions to teach in-person courses. This has resulted in high quality successful courses that greatly benefited recipients. As the pandemic curtailed international travel and the ability to conduct these courses, training quickly shifted to efficient and successful online and blended modalities.

Sp6-4

Mission Impossible? Utilizing Wikipedia in the Pandemic Era: Building our Community of Practice

Max Lum

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Introduction: Wikipedia is the dominant online global reference for patients, health providers and the public. Wikipedia ranks as the seventh most accessed internet web site. This presentation examines how Wikipedia is currently used by NIOSH, and its specific use during a crisis communication events

Materials and Methods: This presentation is guided by the results of a continuing investigation of how traffic from Wikipedia articles correlates with traffic to the main NIOSH web site and how page view statistics compare to organic search and other web site drivers of the information dissemination. Investigators compared Wikipedia's occurrence, mean position, and topic page views and examined which factors influenced web site ranking.

Results and Conclusions: Data shows that by developing and implementing a carefully crafted online strategy Wikipedia edits can become an important driver of evidenced-based information during a crisis communication event. Currently, after organic search Wikipedia is the number one driver of visitors to the Institute's web site.

The rank of a web sites among search engines results depends on search engine algorithms and search engine optimization strategies (SEO), which aim to influence rankings. Wikipedia enhances global search algorithms. Given Wikipedia's unique global reach the possibility for international collaboration has the potential of enhancing the worldwide delivery of free, high quality, and up to date health and safety research findings.

Special Session 7 Occupational Health Services for all

Chair: Stefania Curti and Seong-Kyu Kang

Session introduction

This Special session will provide some examples of Occupational Health Services (OHS) by inviting a good balance of representatives. This will help to depict the development of OHS worldwide. The Seoul Statement on the development of OHS for all was announced

during ICOH Congress 2015. This Special Session will explore the current distribution of OHS in the world. Four representatives will speak about the progress of OHS in their countries.

Learning objectives include: 1) Understand the current distribution of OHS across countries; 2) Be familiar with the existing differences between countries with respect to OHS coverage and procedures; 3) Understand what kind of OHS could be taken as good example and implemented elsewhere.

Sp7-1

Occupational Health Services in Serbia

Jelena Djokovic

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Occupational Health Service (OHS) in Serbia has a special place in every respect; due to the period of transition, OHS, which is dominantly performed by occupational medicine specialists, is facing with a period of adaptation to new circumstances- both in terms of the development of capitalism (after a long socialist approach to work and workers), and in terms of work in institutions for the treatment of COVID-19 patients.

Occupational medicine specialists are in most cases also general practitioners but they must work check-ups of employees too (according to a contract with companies).

In 2020, they have been maximally involved in working with COVID-19 patients at all levels; from COVID-19 ambulances in the competent Health Centers to work in COVID-19 hospitals. Specifically, occupational medicine specialists and doctors of other specialties who work at Serbian Institute of Occupational Health were involved in infectologies for 9 months at their own institution, which was also COVID-19 institution.

At this moment, the perspective of occupational health in Serbia mostly depends on the position of the competent institutions, primarily the Ministry of Health.

Sp7-2

Occupational Health Services in Kenya

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Introduction: Kenya is a country in East Africa with a population of 53.7 million. In 2020, around 17.4 million people were in employment with about 83% being in informal sector. This labor force excludes small-scale farming and pastoralist activities. Directorate of Occupational Safety and Health Services (DOSHS) under Ministry of Labour is in charge of Occupational Health Services (OHS). This paper reviewed the current status in management of OHS in Kenya. **Materials and Methods:** Secondary data and information from key persons was utilized. Information was obtained from publications and documents from local, national and international organizations involved in OSH. National policies, legislations, policy guidelines and other government publications were reviewed.

Results: DOSHS carry out workplace inspections to ensure compliance of health and safety laws. It is the responsibility of the employer to provide occupational safety and health services. These services include: formation and training of health and safety committees in the workplace, risk assessment, medical examinations, first aid services, healthcare for occupational injuries. There

are 119 safety and health advisors, 77 training institutions, 61 medical doctors approved by DOSHS to aid in provisions of OHS. Less than 10% of the working population have access to these services.

Conclusions: There is a functional system for provision of occupational safety and health services that is guided by national policies and legislations. A small proportion of working population access OHS and therefore need to look into avenues to increase availability and utilization.

Sp7-3

Occupational Health Services in Indonesia

Nuri Purwito Adi

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Occupational Health Services (OHS) in Indonesia was started in 1970. OHS implementations in the workplace vary depending on scale of industry and geographical location. OHS is mandated under two Ministries: Manpower and Health. Although there is an intersection between them, the Ministry of Manpower mostly deals with large-scale industry and the Ministry of Health regulates small-scale industry. OHS implementation is technically regulated and supervised by local authorities at district level. District authorities can manage their own regulation, refer to national regulation and have their own infrastructure for OHS implementation from promotion through inspection and law enforcement. In 2014, there was a reform in the social security system. Since that period, workers have had the same health insurance with other residents and there is no difference between public and private workers. Workers' insurance for occupational accidents and diseases, deaths, and retirement were re-arranged into three different state-owned companies, for public officers, army and police, and private workers. Health and workers' insurance became mandatory for all workers including who are self-employed and working at small scale industries. However, Indonesia still faces challenges like data recording & statistics, reporting occupational diseases, implementation of OHS, and implementation of health & workers' insurance prevention program especially in small scale industries and informal sectors. Government should be assisted by other stakeholders such as professional organizations, academia, and workers unions to promote better OHS implementation.

Sp7-4

Occupational Health Services in Peru

Aquiles Monroy

International Commission on Occupational Health National Secretary, Lima, Peru

Occupational Health Services (OHS) aim to monitor the health of workers, which is technically managed by specialized physician for Occupational Health.

Peru with 32.6 million inhabitants has 17 million working population in mostly informal sector and 7.9 million wage earners with Social Security.

Since 1922 the large mining companies have had medical services and hospitals for the care of their workers and families. Over time, they have become well-organized OHS. However, in 1997, the Complementary Risk Work Insurance was created, recognizing 21 sectors required to take out additional insurance for the care of

Work Accidents (WA) and Occupational Diseases (OD). In 2011, the Occupational Health and Safety Law was enacted and the procedure for Medical Examinations for workers was regulated.

Currently, only large and risky companies have their own OHS, 80% since 2010. 76% of them are paid by employers and 56% of them depend on their Safety Departments. Medium sized companies that do not have OHS hire companies that perform this function; some of them have occupational doctors or nurses.

The main functions of OHS are: Medical Surveillance, Prevention of OD, Follow-up of workers with common illnesses, and response to emergency situation.

COVID-19 has brought changes such as business closures, work suspension and remote work with strict return-to-work procedures for both workers who have suffered COVID-19 and those who have not. Companies that did not have OHS have hired doctors or nurses to comply with the laws and then implement OHS. The situation is similar in Latin America.

Special Session 8 From the chemical massive disaster to the prevention

Chair: Alexis Descatha and Kate Jones

Session introduction

Co-organizers. Alexis Descatha (EPROH) /Kate Jones (SCOT)

Example of recent feedback, monitoring, preparedness plan will be presented in the view of sharing expert guidelines to field practitioners potentially involved in immediate response.

All around the world, massive chemical exposure happened. Even experts are aware of what to do and not to do, the field practitioners including occupational professionals as well as responders usually don't.

Sp8-1

Feedback after a massive chemical disaster. What field practitioners should know

Alexis Descatha

U1085 Irset Ester, Poisoning Control Center, Univ Angers CHU Angers Inserm, Angers, France

Introduction: We aim to describe the consequences for field practitioners after a massive chemical disaster.

Materials and Methods: Using an example of a recent massive chemical disaster, we described the potential role of occupational field practitioners in critical phase, as well as the post-critical phase, as well as the anticipation phase.

Results: In the critical phase, the occupational practitioner cares was mostly involved of toxicologic support for the industry involved. The post-critical phase can be defined as the period starting when all victims have been identified, managed, and sent for appropriate care. This phase may last from hours to months. During this phase, the occupational practitioner would play a substantial role in monitoring people and symptoms that were directly concerned by the events as well as screening workers who were indirectly involved. They were particularly involved helping victims in the return-to-work process, and improving procedures and organizing drills. In addition to their usual work of primary prevention, occupational practitioners should endeavor to improve preparedness by taking part in contingency planning, and defining

immediately applicable protocols that vary according to chemical hazard.

Conclusions: In conclusion, field practitioners are more and more involved, even after a massive chemical disaster.

Sp8-2

Biological exposure monitoring after massive chemical disasters

Gunnar Johanson

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Introduction: Exposure biomonitoring may be useful in chemical accidents and disasters for triage and acute treatment, addressing worries among affected subjects, and for follow up of long-term health effects. Here, an approach to identify for which substances biomonitoring would be most useful in disasters is presented, using Sweden as an example.

Method: In 2014-6, a group of experts in Sweden identified 83 industrial chemicals that could (if released in air) acutely and severely affect many people's health, and therefore be a burden on emergency and health services. The identification was based on estimated annual use, physical properties, reactivity, toxicity. For this presentation, I compiled data on biomonitoring methods and biomarker half times.

Results: Biomonitoring methods were readily available for 25 of the 83 chemicals. For these 25, use ranged from 107 to <1 tonne/y and the half time from months to hours. Long half times are obviously an advantage, however biomarkers with short half times are also valuable for reverse dosimetry, given that the times of exposure and sampling are known.

Conclusions: Compilation of relevant data may help identify priority areas for biomonitoring preparedness in chemical accidents and disasters. For substances of high concern and with biomonitoring methods available, actions should be taken to improve disaster preparedness, including e.g. descriptions of sampling procedures, sample treatment and storage, analytical methods, and where to send the samples. For substances presently lacking suitable biomonitoring methods, the possibility to develop a method should be investigated.

Sp8-3

Crisis preparedness of companies – examples especially in the light of chemical incident preparedness

Susanne Schunder-Tatzber

Austrian mineral oil administration Corporation, Vienna, Austria

Introduction: Doctors for Occupational health play a critical role in the disaster and crisis preparedness of companies – especially in the oil-and gas business. In the past the preparedness focus was on chemical emergencies and impact of natural disasters – but due to the COVID crisis pandemic preparedness had to be attention too.

Materials and Methods: All Oil and Gas Companies worldwide focus on risk mitigation, which needs first a proper risk assessment and the development of tailor-made plans for preparedness – from information, to scenario building and training.

Results: In this presentation the main focus will be given on chemical hazard prevention on the example of H₂S prevention – from risk assessment, to proper PPE, occupational health examination of staff working in H₂S environment, rescue provision &

awareness, First Aid and medical staff training. Besides this example of “classical” preparedness ideas of pandemic preparedness will be presented with a focus on “lessons learned” during the pandemic crisis.

Conclusions: In this session the tasks of occupational health staff in crisis and disaster preparedness are described with the focus on H₂S preparedness and some main lessons learned from the pandemic crises with specific examples of organisations are given as well.

Sp8-4

Investigating Adverse Respiratory Health Effects After a Major Disaster: the World Trade Center Experience

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Introduction: Workers and volunteers participating in the recovery, rescue, and service restoration at the World Trade Center (WTC) disaster site in 2001-2002 were exposed to a poorly characterized mix of inhaled toxicants. We outline our approach to move from symptom reports to the objective assessment of the adverse respiratory health outcomes (ARHO) and their predictors.

Materials and Methods: After initial clinical descriptions, we created the WTC Chest CT Imaging Archive with more than 3500 chest CT scan studies in ~ 1700 WTC workers. We systematically assessed imaging abnormalities, have performed studies of longitudinal lung function trajectories and evaluated their predictors.

Results: The WTC occupational cohorts are predominantly male, and overweight/obese (~85% prevalence for both). A clinical case series demonstrated lower and upper respiratory and gastro-esophageal reflux disease diagnoses, with extensive comorbidity among themselves and with psychiatric diagnoses. Low forced vital capacity clearly emerged as the most frequent spirometric abnormality. An examination of chest CT scans in the Archive revealed abnormalities not previously reported by clinical radiological readings. Longitudinal analyses demonstrated quantitative CT imaging indicators associated with accelerated lung function trajectory. Those analyses also established that besides empiric high WTC exposure indicators, obesity and weight gain are important predictors of worse respiratory outcomes.

Conclusions: Systematic classic and novel approaches are needed in episodes of acute and chronic exposures, to characterize resulting ARHO.

Special Session 10 Indoor air quality in modern office buildings

Chair: Kenichi Azuma

Session introduction

Effects of office environment on health status of workers in modern office buildings are reported with high prevalence despite modern building technology, advanced ventilation, and use of low-emitting construction products. Indoor air quality in the buildings continues to be an issue of concern, also in view of potential synergies with psychological and psychosocial stressors. An integrated approach for the environment is recommended for periodical risk assessment and specific indoor problem solving, through an integration of building assessment, questionnaire survey, and environmental

measurements. In this session, these issues and future perspectives are presented from researches in Europe and Asia.

Sp10-1

Environmental intolerance to indoor air

Markku Sainio, Aki Vuokko and Sanna Selinheimo

Neurology, Finnish Institute of Occupational Health, Helsinki, Finland

Introduction: Symptoms and reactions to indoor air in office-like environments are very common, reported by up to one third of workers in Finland. Three decades of national actions have improved recognition and intervention of indoor air problems. However, the symptoms and reactions have not withdrawn, and they continue even in the absence of defects in indoor air (IA). Some individuals develop a disabling chronic sensitivity to IA.

Materials and Methods: A review of clinical studies on non-specific illness and environmental intolerance related to IA.

Results: Individuals with disability related to a suspected water-damage related asthma or respiratory symptoms showed a clinical picture of environmental intolerance and functional disorders. Disability was not caused by exposure but high subjective risk estimation of exposures. Individuals with intolerance appreciated psychoeducation and short cognitive behavioral therapy but it did not advance recovery.

Conclusions: In the absence of disease, IA related sensitivity is consistent with environmental intolerance. Disabling intolerance can be seen as the severe end of an annoyance continuum, which may share the same central nervous system mechanisms than noise sensitivity and functional disorders. The insufficient recovery from environmental intolerance may be due to changeless risk perceptions.

Sp10-2

Indoor air quality and health effects in Japanese modern office buildings

Kenichi Azuma

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Introduction: Building-related symptoms (BRSs) have emerged as an occupational and environmental health issue since the early 1970s. Indoor air quality (IAQ) is significant factors associated with BRSs.

Materials and Methods: Three phase studies were conducted: (1) Nationwide cross-sectional questionnaire survey (315 offices with 3335 office workers during winter and 307 offices with 3024 office workers during summer) to investigate association between indoor environmental factors and BRSs; (2) the nested cross-sectional surveillance (11 offices with 107 office workers during winter and 13 offices with 207 office workers) to examine the association with the measured data of IAQ (thermal, particles, and chemicals); (3) One-year longitudinal study (24 offices with 648 workers) in Osaka and Tokyo to examine the effects of IAQ on BRSs.

Results: Phase 1 study revealed that BRSs were significantly associated with thermal comfort, dryness, odors, dust, noise, and psychological stress. In phase 2 study, upper respiratory symptoms showed a significant correlation with increased indoor concentration of suspended particles. Several irritating volatile organic compounds (positively correlated among their compounds, i.e.,

combined exposure) were associated with upper respiratory symptoms. Phase 3 study revealed that upper respiratory symptoms were significantly correlated with decrease in both relative and absolute humidity.

Conclusions: These results suggest the importance of improving office environments in terms of factors affecting the health of workers, including, in particular, dryness, particles, and irritating chemicals.

Sp10-3

OFFICAIR project: Indoor Air quality and health effects in European modern office buildings

Paolo Carrer

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Introduction: Indoor air quality related problems are common in offices, and should be addressed by occupational health care providers when evaluating the health risks of a work environment.

Materials and Methods: "OFFICAIR project - On the reduction of health effects from combined exposure to indoor air pollutants in European modern offices" (FP7-CP-FP) consisted of three complementary phases: (a) General Survey (167 buildings - 7440 office workers), aimed to describe the building characteristics, to identify the sources of pollution, and to investigate IAQ perception and symptoms; (b) Detailed study (37 buildings - 685 office workers), including measurements for well-established health relevant indoor pollutants and compounds never investigated previously for their health relevance, and evaluation of health effects and performance; (c) Intervention study (9 buildings, 230 office workers), to investigate the benefits of an intervention on IAQ on health.

Results: OFFICAIR provided an overview of buildings characteristics, indoor concentrations of many pollutants and ambient thermal conditions. The most frequently reported complaints were "Air too dry" (47%) and "Unsatisfactory noise from inside the building" (43%). The most reported symptoms were "Dry eyes" (16%) and "Dry skin" (15%). Associations between building characteristics, questionnaires and clinical tests taking into account the potential role of work-related stress and psychological characteristics has been found.

Conclusions: Health complaints in modern offices due to the office environment may have an impact on their wellbeing and on the work performance.

Sp10-4

Indoor air humidity – the forgotten indoor parameter; impact on health, work performance, and risk of infection

Peder Wolkoff, Kenichi Azuma and Paolo Carrer

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Introduction: Epidemiological and experimental studies in office-like environments have shown the effects of the indoor air humidity, room temperature, and ventilation on human health, work and cognitive performance, and risk of infection.

Materials and Methods: Here, we integrate epidemiological, experimental, and clinical studies about the influence of the indoor

air humidity and assess its impact in offices based on focused literature searches.

Results: Exposure to low indoor air humidity causes vulnerable eyes and airways from desiccation and less efficient mucociliary clearance. This elevates the reporting of the most common mucous membrane-related symptoms in office-like environments, like dry and tired eyes, which deteriorates the work and cognitive performance. Intervention of dry indoor air conditions by humidification stabilizes the precorneal tear film and the mucous membranes in the upper airways. This alleviates symptoms of dry eyes and airways, fatigue symptoms, more clearly in the elderly population. Further, less complaints about perceived dry air are reported and work performance appears to be less compromised. The elevation of the indoor air humidity from dry air conditions reduces the risk of infection by lower viability and transport of influenza virus, and more robust mucous membranes.

Conclusions: Relative humidity between 40 and 60% appears optimal for health, work performance, and lower risk of infection.

Special Session 11 Respirable Crystalline Silica – exposure limits, measurements and control measures

Chair: Lena Andersson

Session introduction

Respirable Crystalline Silica (RCS) exposure has for a long period of time and is still today an issue all over the world. Measurements of RCS exposure is crucial to be able to control and decrease the exposures. The exposure limits for RCS is questioned since research show health effects at exposures lower than many countries set limits. RCS is found naturally in the Earths crust and exposure comes from activities within earth, like mining, or when handling material containing sand or stone. We do not see an end of these work operations in the near future or at all. Together with the new sources of RCS exposures from the use of new material, such as artificial stone work, the RCS exposure will continue to be an issue for many years to come.

Sp11-1

Changes to Silica Exposure Control Measures in the Artificial Stone Benchtop Industry in Victoria Australia

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Introduction: We have previously shown that cumulative exposure and intensity of silica exposure, estimated from the proportion of time dry processing and proportion of time working on artificial stone predicted the risk of adverse respiratory outcomes for workers in the artificial stone bench top industry.

Materials and Methods: Respiratory health screening, which included a job history, was offered to stonemasons in Victoria, Australia. Workers reported on determinants of exposure for each job, including proportion of time dry processing, the proportion of time working on artificial stone, the use of respiratory protection, and of ventilation for up to five jobs.

Results: In jobs held after April 2019, 60% of workers reported never undertaking dry processing, compared to 15% before April 2019, and 17% of workers reported at least 10% of their time was spent dry

processing. The percentage of workers always wearing respiratory protection doubled after April 2019. Use of ventilation on the tools increased from 7% to 23% after April 2019. The most common types of ventilation reported in both time frames were 'open window/doors' and 'in the ceiling', neither of which were likely to be effective control measures.

Conclusions: There has been increased awareness of the risks associated with silica dust since early 2019. Control measures have been implemented, with areas for improvement identified in this study.

Sp11-2

Health effects of RCS exposure - reduced OEL

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Introduction: The EU Commission announced in 2017 a binding occupational exposure level for respirable crystalline silica. Bindings OELs are legally binding for the EU member countries, and Norway is, due to the European Economic Agreement, committed to follow the regulations.

Materials and Methods: All OEL audits in Norway are treated in the same way. The Labour Inspectorate delegates to a committee (TEAN) at the National Institute of Occupational Health (STAMI) to perform a toxicological and epidemiological evaluation of the literature used as background for the binding OEL. These assessments are an important part of the background material used during discussions of a new limit value with the social partners. Newer references are collected, and other countries' evaluations are also surveilled.

Results: The literature reviews gave evidence that the binding OEL for crystalline silica would give a disproportionately high risk of occupational disease given 40 years of exposure 40 hours a week. TEAN therefore recommended that the Labour Inspectorate assess whether the Norwegian OEL should be set lower than the binding EU level. After discussions between the Labour Inspectorate and the social partners the Norwegian limit value was halved July 2021.

Conclusions: The EU binding OELs are based on knowledge about health effects from exposure, but also on technical and economical circumstances. In addition, the agreed binding level shall suit all EU countries. The extra workload of a literature review and documentation of health effects may give national workers an extra security.

Sp11-3

RCS exposure and control measures for artificial stone work

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Introduction: Recent outbreaks of silicosis among artificial stone workers have drawn attention to potentially high exposure to respirable crystalline silica (RCS) during machining of these materials. Wet methods, though strongly recommended, may be insufficient to protect workers operating hands-on tools on silica-rich stone. This study examined the effectiveness of combined wet methods and ventilation controls during stone countertop fabrication.

Materials and Methods: Personal breathing zone sampling for respirable dust was conducted on workers during routine wet fabrication activities with handheld tools, such as polishing, grinding, drilling, and cutting, with and without the use of a crossdraft-type mobile particulate capture booth.

Results: In task-specific sampling, use of the mobile particulate capture booth was found to reduce mean RCS exposure by about 50% ($p=0.059$) during a wet polishing task and significantly reduced the variance of RCS. During full-shift or partial-shift sampling, when exposure was averaged over multiple wet finishing tasks and ancillary activities, use of the booth resulted in smaller, nonsignificant reductions in the central tendency of the respirable dust exposure and significant reduction in the variance. Time-weighted average RCS exposures ranged from $<4-85 \mu\text{g}/\text{m}^3$ with the booth off and $<5-37 \mu\text{g}/\text{m}^3$ with the booth on.

Conclusions: Use of a particulate capture booth as an adjuvant to wet methods may further control exposure to stone dust during countertop fabrication by constraining the variability of exposures and possibly reducing the central tendency of the exposure distribution.

Special Session 12 Mining occupational safety and health

Chair: Erik Jors and Jinky Leilanie Lu

Session introduction

This session discusses a broad array of research and advocacy issues on occupational safety and health in mining. We will hear from various country-experiences on mining hazards, health and safety risks, interventions, programs, and policy statements.

Sp12-1

ZIMGOBIO - Biomonitoring and Health Data from two ASGM areas in Zimbabwe

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Background: ASGM is in an important economic driver in Zimbabwe, especially during the ongoing severe economic crisis of the country, gold mining is an important source of income for a growing part of the population.

Methods: A cross-sectional study was conducted in two ASGM areas in Zimbabwe. 207 participants were recruited in Kadoma and Shurugwi. All participants were asked to fill out a questionnaire. Health-related quality of life (EQ-5D + C) was assessed with a questionnaire. To assess the exposure to mercury and other toxic metals, blood and urine samples were collected, shipped to Germany and analysed in our laboratory.

Results: The participants Hg levels were elevated compared to people not involved in ASGM. Furthermore, we were able to identify exposure risk factors that have a significant impact on Hg levels. Distribution of mercury in different blood components was significantly affected by time and intensity of exposure. In addition to mercury, arsenic, cadmium and lead levels were elevated in a significant part of the participants, possibly due to mining-related activities that result in the liberation of these metals from the soil. Quality of life was negatively affected by mercury exposure.

Conclusion: From a public health perspective, working conditions must be improved in order to reduce exposure to mercury and toxic metals.

Sp12-2

Tuberculosis and silicosis burden in artisanal and small-scale gold miners in a large occupational health outreach programme in Zimbabwe

Dingani Moyo, Philip Landrigan, Johanna Elbel, Gunnar Nordberg, Roberto Lucchini, Casey Bartrem, Philippe Grandjean, Donna Mergler, Dingani Moyo, Benoit Nemery, Margrit von Braun and Dennis Nowak, and the Collegium Ramazzini

University of the Witwatersrand Midlands State University, Zimbabwe, Africa

Introduction: Artisanal and small-scale miners (ASMs) labor under archaic working conditions and are exposed to high levels of silica dust. Exposure to silica dust has been associated with an increased risk of tuberculosis and silicosis. ASMs are highly mobile and operate in remote areas with near absent access to health services. The main purpose of the study was to evaluate the prevalence of tuberculosis, silicosis and silico-tuberculosis among ASMs.

Method: We conducted a cross-sectional retrospective review of 514 occupational health records of ASMs who were screened for TB and silicosis in the Midlands and Matabeleland South provinces.

Results: The mean age was 37 years and almost all ASMs were exposed to silica dust (95%), and just above a quarter (27%) had a duration of employment of at least 10 years. Fifty-two (11.2%) of the 464 miners were diagnosed with silicosis while 17(4%) of the 422 ASMs were diagnosed with TB. Of the 383 ASMs who were tested for HIV, 90 (23.5%) were HIV positive. HIV infection was associated with a diagnosis of silicosis.

Conclusion: The prevalence of TB and silicosis is very high in Zimbabwe. Targeted screening for silicosis and TB in ASMs and reduction of silica dust exposures are urgently needed.

Sp12-3

Business Continuity amidst COVID-19 Pandemic, Experience on Mining Sector in Indonesia

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Introduction: The National Economic Recovery and COVID-19 Control Committee prioritize Healthy Indonesia, Working Indonesia, and Growing Indonesia activities. Working Indonesia is a control measure to keep business activities in Indonesia running and prevent a significant decline in productivity. The mining sector has contributed significantly to the Indonesian economy, and special efforts were held to keep it running. Objectives: This study aims to document mining occupational safety and health in the Indonesian mining sector to control COVID-19 spreading.

Methods: The study used the literature and documents of Occupational Health and Safety (OHS) related to the mining and COVID-19 pandemic. Data were analyzed narratively to find the terms of law and regulation, occupational health and safety services, covid 19 test, tracing and treatment, and documentation of best practices in mining to prevent spreading COVID 19 on mining in Indonesia.

Results: The mining sector is one of the essential businesses in Indonesia that is continuously active during the COVID-19 pandemic. Indonesia has a plethora laws covering mining OHS, COVID-19 prevention and control guidelines in the enterprises, national and company COVID-19 vaccination program, and best practices of COVID-19 prevention program at the workplace.

Conclusion: The study concludes that mining in Indonesia continuous to be active during the COVID-19 pandemic. OHS activities shifted to the COVID-19 prevention and control through regulations, guidelines, and best practices to continuously run the mining activities.

Sp12-4

Reaching industry milestones on noise induced hearing loss in the South African Mining Industry

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Introduction: Noise induced hearing loss (NIHL) continues to be a significant occupational disease in South African mines, accounting for 23.7% and 29% of all diseases in 2008 and 2019 respectively.

Interventions: Through the tripartite Mine Health and Safety Council, the industry has since 2003 utilised the setting and monitoring of aspirational milestones to eliminate occupational diseases, injuries and deaths. For noise, the milestones were: by December 2024, the total operational or process noise emitted by any equipment must not exceed a milestone sound pressure level of 107 dB(A); by December 2016, no employee's standard threshold shift (STS) will exceed 25dB from the baseline when averaged at 2000, 3000 and 4000 Hz in one or both ears. These milestones were bolstered with interventions and monitoring by the Minerals Council South Africa and individual companies. Promotion and adoption of leading practices by the Minerals Council MOSH Learning Hub was implemented. The elimination of noisy equipment through the Industry Buy and Maintain Quiet (IBMQI) by eliminating noise at source was the mainstay of the industry's response.

Results: By the end of 2020, the number of pieces of equipment emitting more than 107 dB (A) in the industry had fallen to 318, from 3221 in 2015. Cases of STS exceeding 25 dB had been reported in 2020.

Conclusion: Progress is being made with elimination of NIHL in the South African mining industry but more still needs to be done.

Sp12-5

Reducing disease and death from Artisanal and Small-scale Mining (ASM) – Collegium Ramazzini Statement

Stephan Bose-O'Reilly, Philip Landrigan, Johanna Elbel, Gunnar Nordberg, Roberto Lucchini, Casey Bartrem, Philippe Grandjean, Donna Mergler, Dingani Moyo, Benoit Nemery, Margrit von Braun and Dennis Nowak, and the Collegium Ramazzini

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Artisanal and Small-Scale Mining (ASM) is one of the world's most dangerous occupations. The World Bank estimates that 100 million children, women and men work in ASM worldwide, mostly in remote rural areas of Low-income and Lower-middle-income countries. There is an urgent need for responsible mining in the context of growing global demand for minerals and metals for

climate change mitigation. ASM is increasing rapidly. Paradoxically, a key driver of this growth is climate change mitigation. Climate change mitigation drives ASM because ASM is a major source of minerals and metals. The World Bank projects that renewable energy systems will require significantly more minerals and metals than current fossil-fuel-based energy supply systems and that global demand for minerals and metals will continue to increase for many decades. The Collegium Ramazzini notes the gross injustice of ASM. While most ASM takes place in the Global South, in the same countries already suffering the most serious consequences of climate change, most who benefit from ASM are in the Global North and thus have a shared responsibility to encourage their governments to contribute to reducing ASM hazards. We cannot achieve climate change mitigation through the use of "blood minerals". Reference to the full statement: <https://www.collegiumramazzini.org/news>.

Special Session 13 Preventing Tuberculosis and Lung Disease with Silica Dust Controls: The Case for Primary Prevention

Chair: Perry Gottesfeld and Marilyn Fingerhut

Session introduction

There is a Tuberculosis (TB) crisis in low- and middle-income countries that has only worsened since the Covid pandemic. This session will focus on the use of dust control measures in mining to reduce respirable silica dust exposures to prevent TB and lung disease. We will cover low-cost methods implemented in informal sector mining, controls applied to large-scale mining and examine the potential for dust controls to prevent TB in high-risk environments. This Session will illustrate examples of solutions and challenges in addressing TB and silicosis in formal and informal mining and stone carving.

Sp13-1

What Does Reduction of Silica Mean in Terms of Preventing TB?

Nil David Rees

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Introduction: Silica exposure is a substantial risk factor for TB disease: a recent systematic review¹ found a pooled relative risk for TB in those with silicosis of 4.01 (95% CI 2.88 – 5.58). The TB risk was lower when silicosis was excluded. Infected workers can spread the disease to the general population; silica associated TB is thus a public health issue. This paper aimed to describe the burden of TB due to silica.

Materials and Methods: Literature was searched on excess TB burden due to silica exposure and on dust controls sufficient to reduce the TB risk to that of the general population.

Results: There is scant data on excess in TB cases due to silica. Reasons may be that numerator data are difficult to find as cases accumulate over the lifetime of the exposed subjects. The link to silica exposure may be missed and cases that arise in the community through contact with silica-associated patients are difficult to measure. The duration, nature and intensity of silica exposure that materially increases TB risk is unknown: for example, is

cumulative exposure or short duration of intense exposure important, or both? Does the physical or chemical form of the silica moderate risk? No occupational exposure limits have formally considered TB in determining safe workplace concentrations.

Conclusions: The silica TB case burden is unknown. Numerous research questions exist, but the duration, nature and intensity of silica exposure that materially increases TB risk is key.

Sp13-2

Implementing Silica Dust Controls in the Informal Sector to Prevent Tuberculosis (TB)

Perry Gottesfeld and Manti Nota

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Introduction: For more than 100 years silica dust exposure has been recognized as a significant risk factor for Tuberculosis (TB) and efforts to implement dust controls in formal sector reduced incidence of TB and lung disease. More than 230 million people are exposed to silica in the workplace with the highest exposures occurring in the informal sector in high burden countries.

Materials and Methods: We summarize successful pilot projects to reduce silica dust exposures in informal mining and stone crushing. We worked cooperatively with stone crusher mill owners and artisanal miners to introduce wet methods to reduce respirable silica dust. Following extensive outreach and training, wet spray misting and other controls were implemented to reduce exposures. Air samples were collected to quantify silica exposures.

Results: Air monitoring indicated an 80% reduction in respirable silica dust exposures could be achieved with low-cost wet spray misting. We found consistent results in diverse worksites in India and Nigeria. These projects demonstrated that by working cooperatively with the informal sector, we can help reduce silica dust exposures to protect workers and their communities.

Conclusions: Dust controls to prevent TB and other lung disease are feasible with low cost initiatives and more cost effective than programs to identify and treat cases of TB. Efforts to encourage dust controls should be incorporated into other workplace interventions in the informal sector. Our findings demonstrate that there are significant opportunities to prevent TB in high-burden countries with investments in workplace dust controls.

Sp13-3

The Cost of Building Monuments: Morbidity and Mortality among Stone Carving Workers

Nil Prahlad Sishodiya

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Introduction: Silicosis is an ancient occupational disease. The state of Rajasthan in India is famous for sandstone deposits and more than 50,000 workers are employed in stone carving under primitive working conditions mostly in self-employed informal and small-scale units. High prevalence of silicosis has been reported in stone carving.

Materials and Methods: On evaluation of 1198 stone carving workers based on medical examination and chest radiography, 316 (26.3%) showed small opacities of type "q" or "r" suggestive of silicosis, 225 (19.0%) showed opacities with radiological evidence of tuberculosis associated with silicosis and 46 (3.8%) showed large

opacities of type B or C. The overall prevalence of pulmonary tuberculosis was 26.7%

Results: Under relief scheme of Building and Other Construction Workers Welfare Board, analysis of 4341 cases of silicosis given relief between August 2015 and September 2019 including 599 deaths, 2482 (47.4%) including 484 (80.8%) were from stone carving units. Most affected age group due to silicosis and death was 31 to 40 years. The median age for occurrence of silicosis and death due to silicosis was 40 and 38 years with mean age of 40.7 years and 39.6 years respectively. Of the total amount of relief INR 7,158,000,000 (US\$ 10.23 Million) disbursed, 58.7% was disbursed to silicosis victims in stone carving industry.

Conclusions: There is very high prevalence of silicosis, silico-tuberculosis and pulmonary tuberculosis in stone carving with high human cost. There is urgent need for adoption of dust control measures for prevention of dust related diseases.

Sp13-4

Prevalence of Silicosis and Pulmonary Tuberculosis among Formal and Informal Sector Miners in Southern Africa

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Introduction: Mining in Southern Africa forms a critical role in employment creation, has a positive influence on the gross national product and enables earnings in foreign exchange. Formal mining is conducted by governments or established multinational companies while informal mining is carried out by individuals or groups that operate generally without regulation.

Materials and Methods: Data from the Tuberculosis in the Mining Sector In Southern Africa Project – a Global-Fund Multinational Project - from 2018 to 2020 was reviewed. Data was sourced from monthly reports compiled by eleven (11) Occupational Health Service Centres (OHSCs) across 10 countries in Southern Africa. Pulmonary tuberculosis (PTB) was diagnosed via a Chest X-ray and/or a positive GeneXpert test while Silicosis was diagnosed via a Chest X-ray. Credits to Wits Health Consortium for the data.

Results: 43,618 miners and ex-miners were attended at the OHSCs. There were 3,067 PTB cases diagnosed with an average yield of 5.6% (range was 0.5% to 14.4%). Yields above 10% were noted in countries that have higher informal mining activities. This rate is compared to a prevalence of less than 1% in the general population. Prevalence of Silicosis alone was 13% while those that had both Silicosis and PTB was 9%. These rates are more than double for the informal miners and ex-miners- 28% and 23% respectively.

Conclusions: There is a higher prevalence of Silicosis and PTB in miners and ex-miners from informal mines than formal mines. There is a need to implement controls that reduce silica dust as well as early screening, diagnosis and management of PTB.

Special Session 14 Preventing and Managing Occupational Shoulder Disorders

Chair: David Rempel and Stefania Curti

Session introduction

Shoulder disorders are a common occupational health problem and are associated with prolonged disability periods and reduced functional capacity especially in the older worker. This Special Session will provide updates on recent studies that address

prevention, disability and return to work in patients with shoulder disorders.

Sp14-1

A Systematic Review and Meta-Analysis of Occupational Factors Related to Rotator Cuff Disorders

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Background: Several epidemiological studies have found an association between shoulder-loaded work activities and specific shoulder diseases. No study has derived a dose-response relationship and the resulting doubling dose.

Objectives: The aim of this systematic review is to derive the dose-response relationship between physical workload and lesions of the shoulder rotator cuff. The results of this systematic review have been published by Seidler et al. (2020).

Methods: Using methods of a previous review (van der Molen et al. 2017), we added more recent studies. The dose-response relationship between physical occupational demands (hands at/above shoulder level, repetitive movements, forceful work, hand-arm vibrations) and specific shoulder diseases (ICD-10 M 75.1-5: rotator cuff syndrome, bicipital tendinitis, calcific tendinitis, impingement, and bursitis) was derived.

Findings: No evidence for sex-specific differences of the dose-response relationship was found. If there were at least two studies with comparable exposures, a meta-analysis was carried out. The pooled analysis resulted in a 21% risk increase (95% CI 4-41%) per 1000 hours of work with hands above shoulder level, leading to a doubling dose of 3636 hours. A meta-analysis was not possible for other diseases due to the low number of studies and differing exposure measurements. The estimate of the doubling dose was based on Dalbøge et al. (2014).

Conclusions: This systematic review with meta-analysis contributes to knowledge of the exposure level at which specific shoulder diseases, e.g., rotator cuff lesions, should be recognized as an occupational disease.

Sp14-2

Disability and physical examination signs among workers with shoulder pain

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Introduction: The study investigated shoulder pain, physical examination and disability among workers from different occupations.

Materials and Methods: The study group consisted of 3,480 office and production workers from meat and garment industry, automobile and retail grocery stores. Personal characteristics, health and working history, musculoskeletal symptoms and disability were collected. Physical examination, job title and workers' reported exposure to occupational factors known or suspected to be related to shoulder disorders were recorded.

Results: Among 2,275 males and 1,203 females (mean age 43.5±9.8 and 43.5±8.3 yrs) the lifetime shoulder pain prevalence was

24.3%; 17.3 % reported pain in the last 12 months, 8.3% in the last 7 days. Using a case definition which included pain and positive physical examination, the overall prevalence was 4.8% (1.3% among automobile workers, 8% in the meat industry and 13% in the garment sector). Mean QuickDASH values ranged from 24.2 among symptomatic workers to 30.5 in the shoulder impingement syndrome group. Multivariate logistic regression analysis showed more than a twofold increased risk for both shoulder pain and shoulder impingement syndrome among females and production workers, if compared to non-production staff.

Conclusions: The prevalence rates of shoulder pain and shoulder impingement syndrome varied among different occupational groups. Production workers are at increased risk of shoulder disorders. Age and being female are also associated with the outcomes. Cases confirmed by physical examination reported higher subjective outcome measures of disability.

Sp14-3

Return to work for the worker with a surgically treated shoulder injury

Karen Walker-Bone

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Introduction: The shoulder is capable of an extraordinary range of motion facilitated by a shallow gleno-humeral joint and stabilised by a complex system of ligaments. However, because of its mobility, it is prone to pain and injury. More than 30% of the population have shoulder pain at any point in time. There are a growing range of surgical procedures, designed to reduce pain and where possible maximise function, and these are being performed more commonly and increasingly at younger ages. As workers are encouraged to work to older ages, a growing number of patients will seek to return to work (RTW) after shoulder surgery.

Methods: This systematic review evaluated RTW in different occupations after shoulder surgery including arthroplasty, hemiarthroplasty and rotator cuff repair.

Findings: The literature is limited and heterogeneous. RTW is usually either not considered as an outcome or is a secondary outcome. Method of measurement is varied with reports of % returned by a time point, mean or median time to RTW presented. In many cases, RTW is based upon recall and not measured systematically. Few studies consider the nature of the work to which the patient needs to return and when they do so, the distinction of types of occupations is crude (e.g. heavy vs light). Return to full vs amended duties is also rarely reported.

Conclusions: There is limited evidence upon which to base recommendations to patients as to when they can safely RTW after shoulder surgery and whether or not any particular types of occupation or occupational exposure (e.g. heavy lifting, working above shoulder height) should be regarded with caution.

Sp14-4

Workplace Risk Assessment Tools for Preventing Shoulder Disorders

David Rempel and Sean Gallagher

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Introduction: The presentation reviews tools for assessing risk for shoulder disorders and fatigue related to over-shoulder work.

Materials and Methods: The literature was searched to identify tools that estimate risk of shoulder injury or fatigue and reviewed on input and output factors and usability for design.

Results: The tools identified were RULA, OCRA, The Shoulder Tool, and a new design tool to estimate maximum acceptable arm forces based on hand location. The first 2 tools provide generic cautionary outputs for above shoulder work, e.g., “change may be needed”. The 2 later tools provided more detailed design-oriented output with hand force limitations based on 3D hand posture above the shoulder. The Shoulder Tool estimates risk using a fatigue failure model using the shoulder load moment for a single hand location for a 50th% male and incorporates the effect of repetition. The tool provides cumulative exposure estimates for multiple tasks, and has been validated against physician-diagnosed shoulder tendinitis and other shoulder outcomes. The design tool is based on 25th % female strength at 3D hand locations above the shoulder and considers supraspinatus tendon impingement and shoulder muscle fatigue.

Conclusions: The risk assessment tools reviewed were designed for different purposes and each has their own limitations. Risk assessment tools that provide specific hand force limits relative to repetition rate and hand location may be the most useful for workstation and task design.

Special Session 15 Occupational safety and health strategies for engineered nanomaterials: a model for emerging technologies

Chair: Ivo Iavicoli

Session introduction

It will be tracked the history of Occupational Safety and Health activities and nanomaterials, the actions with the current evolution (additive manufacturing advanced materials and manufacturing), then it will be described how the approach could be generalized. The idea is to have a session that looks at how the occupational safety and health community addressed nanotechnology and discuss how that might be a prototype for dealing with other emerging technologies.

Sp16-1

Improving human control of hazards in industry

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Introduction: Hazards are the things that can cause harm to people, the environment and organisations. The production of nanomaterials entails hazards but nanomaterials can also be a hazard. The management of industrial hazards, such as those associated with nanomaterials, is an important and challenging human endeavour.

Materials and Methods: The control of hazards is usually done by identifying, assessing and treating risks as per ISO31000. Contemporary processes for determining the assessment and treatment of hazards followed a semi-structured brainstorming analysis approach that is recorded in simple/unintelligent software.

Results: Inadequate hazard analysis has been found to be a direct or contributing factor in over half major oil and gas incidents. In addition, the failure to implement and/or maintain well known controls for well known hazards that also been a significant factor

in most major accidents. Thus more could be done to improve human control of hazards in industry.

Conclusions: To improve the control of hazards, the ISO31000 framework should be extended to put equal emphasis on risk treatment as it does on risk analysis and management. In addition, hazard identification, assessment and control requires human decisions and actions. Thus, improving human control of hazards requires the adoption of human-centred design approaches in hazard management systems. In doing so, the opportunity exists to enhance human’s control of hazards with the smart use of Industry 4.0 technologies. However, these technologies can also introduce new, and emergent hazards so applications need to be well thought through and managed.

Sp15-2

OSH strategies to Industry 4.0: the example of risk assessment and management of nanomaterials

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Introduction: Industry 4.0 refers to new developments in automation and data exchange in manufacturing technologies. Its pillars include internet of things, big data, augmented reality, cybersecurity, collaborative robots, additive manufacturing, cloud computing, artificial intelligence, and nanotechnology. Although providing great solutions, industry 4.0 can also lead to new occupational health and safety risks, requiring suitable risk assessment and management. We aimed to extrapolate, from the nanotechnology areas, issues useful to inform such processes.

Materials and Methods: Pubmed, Scopus and ISI Web of Knowledge databases were searched through the terms “industry 4.0” and “nanotechnology or nanomaterial*” and “risk assessment or risk management”, to capture relevant papers published in 2011–2021.

Results: Nanotechnology support industry 4.0 in the aerospace, automobile, construction, manufacturing, food processing, packaging and medical fields. High-tech uses include new materials for batteries, sensors and 3D printing. However, these innovations may lead to emerging occupational chemical and physical risks, and psychological risks due to mental overload and work density due to such flexible and dynamic smart nano-manufacturing activities.

Conclusions: Operational risks related to all stages of the 4.0 manufacturing processes should be identified. Safe and sustainable by design products and processes should be developed to “design out” or minimize hazards and risks for the workforce. Broad-based training and continuous professional development, including also occupational health and safety issues, should be encouraged.

Sp15-3

Implementation of a harmonized approach for monitoring exposure to engineered and incidental nanoparticles and their potential health effects: First results from the EU-LIFE project NanoExplore

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Introduction: We aimed at validating a harmonized protocol for monitoring occupational exposure to engineered/incidental nanoparticles (EINP) and to assess their health effects.

Materials and Methods: A multicentric prospective cohort study was designed involving repeated field campaigns of 4-day exposure monitoring and two biological samplings, at the beginning (T1) and at the end (T2) of working week. To detect a significant difference in effect biomarkers of at least 25%, a sample size of 120 workers (60 exposed, 60 non-exposed) was determined, along with two control groups, internal and external to company. The protocol feasibility was tested in three countries: Switzerland, Spain, and Italy. Number and mass concentration, morphology, size distribution and surface area of EINP were measured, and effect biomarkers (oxidative stress and inflammation) were assessed in exhaled breath condensate (EBC) and/or urine samples.

Results: The preliminary results of 42 external controls showed no significant change in effect biomarker levels between T1 and T2, with the exception of malondialdehyde and 8-Isoprostane in EBC. The biomarkers levels were within the ranges reported in healthy adults. The analysis of data and samples collected in 60 exposed workers and 36 internal controls recruited at six EINP-handling facilities are ongoing.

Conclusions: These findings confirm the feasibility of the harmonized protocol. For its implementation, a particular effort on organization, coordination and communication between each team was mandatory, particularly during COVID time.

Sp15-4

Ethics and Scientific Issues of New Technologies: Lessons from Nanotechnology

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Introduction: In the absence of scientific clarity about the health effects of occupational exposure to new technologies it is useful to study the ethical and scientific issues that arose with the emergence of nanotechnology. In the early 2000's, nanotechnology generally entered commerce. Workers were the first to be exposed to nanomaterials in the laboratory, in production, distribution, utilization, and end of life activities.

Materials and Methods: Five criterion actions were proposed that should be practiced by decision-makers at business and societal levels if nanotechnology was to be developed responsibly (which chiefly means workers and consumers are not harmed). These could be applied to new technologies and include: (1) anticipate, identify and track potentially hazardous nanomaterials in the workplace; (2) assess workers' exposures to new technologies; (3) assess and communicate hazards and risks to workers; (4) manage occupational safety and health risks; and (5) foster the safe development of new technologies and realization of its societal and commercial benefits. **Results:** All these criteria are necessary for responsible development of a new technology to occur.

Conclusions: In the emergent period for new technologies there are many unknowns about hazards so it is prudent to treat them all as potentially hazardous until adequate response can be provided for the 5 criterion actions.

Special Session 16 Pesticide Exposure: Understanding Pathways of Exposure and Health Outcomes to Develop Interventions to Reduce Exposure and Improve Safety

Chair: Diane Rohlman

Session introduction

Environmental and occupational exposure to pesticides is common and agricultural workers and their families are at risk. Furthermore, many children and adolescents throughout the world are engaged in agricultural work, either for pay or on family farms. Understanding the pathways and magnitude of exposure is essential to develop methods to reduce exposure and to inform regulators and policy. This session will examine the association between exposure and behavioral outcomes associated with organophosphate exposure, describe a tool to examine exposure-related risk to pesticides, and apply theoretically-based tools and interventions targeted at changing workplace behaviors and hygiene practices associated with pesticide exposure.

Sp16-1

Residential proximity to crops in relation to pesticide exposure and mental health in Ecuadorian children and adolescents: The ESPINA study

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Introduction: Children living near agricultural crops have increased risk of chronic exposure to pesticides, which may affect neuro-behavior. We characterized these associations among children and adolescents living in agricultural settings.

Materials and Methods: We examined 623 participants across 3 times between 2008-2016 (Ages: 4-9y in 2008 and 11-17y in 2016) in Ecuador. Generalized linear mixed models estimated longitudinal and cross-sectional associations of residential proximity to floricultural greenhouses with urinary pesticide metabolites, erythrocytic acetylcholinesterase (AChE), and neurobehavior (NEPSY-2), adjusting for hemoglobin, creatinine, demographic and anthropometric covariates.

Results: Residential proximity to greenhouse crops was associated with lower AChE activity (reflecting greater cholinesterase inhibitor pesticide exposure) in children living within 275 m of crops (AChE difference per 100 m of proximity [95% CI] = -0.10 U/mL [-0.20, -0.006]). Residence within 300m of crops was associated with higher urinary concentrations of para-nitrophenol (PNP), a metabolite of parathion (% difference per 100m of proximity = 8.5% [95%CI: 1.8, 14.7]), and with other pesticide metabolites. Living within 100m (vs. >500m) of crops was associated with increased odds (OR [95% CI]) of low scores for Memory/Learning (1.24 [1.05, 1.46]) and Language (1.09 [1.00, 1.19]) domains.

Conclusions: Children living near floricultural greenhouse crops had greater biomarkers of organophosphate exposures and lower neurobehavioral performance. Mitigation of off-target drift of pesticides from crops onto nearby homes is recommended.

Sp16-2**The PESTIRISK tool for personal planning of pesticide safe use by field users: concept and development**

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Introduction: The professional use of pesticides in agriculture entails exposure for the operator, with possible short- and long-term effects if suitable protection is not adequately employed. Risk Assessment is a compulsory activity of the farmer, however, necessary expert opinion and field measurements can be unavailable or unacceptably expensive. There is a strong need to give farmers a calculation tool to perform their own RA and to plan the safe use of pesticides at their premises.

Material and Methods: The PESTIRISK tool is a model for relating personal exposure to its determinants and for evaluating exposure-related occupational risk. Algorithms are established to calculate the effect of determinants on exposure, based on pesticide use according to the EU-Good Agricultural Practices as applied in real-life scenarios of the Italian agricultural countryside. The determinants of exposure and their influence on exposure levels derive from the results of published studies. Systematic literature search with automated data-mining and expert opinion extracts meaningful quantitative and semi-quantitative information.

Results and Conclusion: The initial data mining in Pubmed and Scopus and retrieved 332 articles, of which 42 were used for data extraction. The starting algorithms use a multi-step contamination-transport model with linear and non-linear coefficients and factors that depend on the different agricultural equipment and protective devices available, while, in the first instance, the chemical properties of the active ingredient will only influence mass-transport coefficients across barriers and safe exposure levels.

Sp16-3**So did I pass the assessment? Following farm safety checklists to understand pesticide risk reduction using an actor-network theory approach**

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Introduction: Farmers are responsible for workplace safety which includes family, employees, contactors, visitors and themselves. Tragically farming injuries, illness and fatalities continue to occur in Australia. Despite a plethora of accessible farm safety self-assessment checklists that are designed to support farmers to achieve a safe workplace the rate of on farm fatalities has remained consistently unchanged over the last decade. Little is known about how farm safety checklists are used by farmers and remains allusive to those who create and make them available.

Materials and Methods: Using an actor-network theory informed ethnography, a farm safety self-assessment checklist is traced to a cropping farm where a range of herbicides are used including diquat dibromide and paraquat, and insecticides including chlorpyrifos and fipronil. The purpose is to understand the checklists'

role in influencing farm safety culture, specifically around the use of these pesticides and pesticide application, storage and PPE.

Results: Considering the origin of the checklist and how it crosses a university, workplace regulators, farm machinery, and legislation, this method shows where power and authority is held amongst these unrelated groups. Checklists are designed as farm safety culture mediators but this depends on the farmer who holds power until a fatality or severe injury occurs shifting this power to law and legislation.

Conclusions: So did I pass? Maybe, but there's no grade. The checklist mediates safer pesticide practices when it is used by farmers to exert control over the health and safety of every person on the farm.

Sp16-4**Pesticide Risk Perception and Safety Behavior among Adolescent Pesticide Applicators in Egypt**

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Introduction: Adolescents working in agriculture frequently apply pesticides and have high exposure to pesticides. Low-cost interventions are needed to reduce exposure. A theoretically-based intervention was developed to increase perceptions of risk and promote behaviors to reduce pesticide exposure. It was evaluated among adolescent and young adult pesticide applicators in Egypt. **Methods:** A one-hour educational intervention was administered to adolescent and young adult male pesticide applicators. Questionnaires were used to assess changes in perceived susceptibility and effectiveness prior to and immediately following the intervention and again 8-months postintervention. Field observations, before and after the intervention, were used to assess safety behaviors. **Results:** Perception of risk associated with pesticide application increased from pre- to post-intervention (74.7% pre-intervention to 97.9% post-intervention, McNemar test $p < 0.001$) and remained at the 8-month follow-up (90.5%, $p < 0.001$). A similar increase in recognition of hygiene practices to reduce exposure was also found. Field observations found an increase in the use of personal protective equipment (goggles, masks, and shoes) following the intervention.

Conclusion: This theoretically-based intervention led to greater perception of risk and increases in safety behaviors while applying pesticides. This low-cost intervention can be applied in other countries with similar safety culture surrounding pesticide application.

Special Session 17 Is dermatitis the most frequent occupational disease? Epidemiology and prevention

Chair: Swen Malte John

Session introduction

OSD represent up to 35% of notified occupational illnesses. Prolonged absence from work due to OSD jeopardizes competitiveness especially of small and medium sized enterprises, where OSD-incidence peaks. For affected individuals, the chronic course of OD may result in job loss, precarious or unemployment. A joint

coordinated approach to patient management as well as standardization of diagnostics, therapy, protective equipment as well as workers' education is lacking in Europe and other parts of the World. Important sustainable prevention strategies applied in various countries will be presented during this session.

Sp17-1

Skin care program for the prevention of contact dermatitis in health care workers: results from a randomized controlled trial

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Introduction: Contact dermatitis (CD) is a highly prevalent inflammatory skin disease in health care workers (HCW). Gradual damage of the skin barrier e.g. due to wet work activities has an etiological role in development of CD in HCW. Therefore, protection and repair of the skin barrier are central in development of prevention strategies in health care setting. The objective of this randomised control trial was to assess the effectiveness of a skin care program in prevention of hand dermatitis in HCW.

Materials and Methods: The study was carried out on 19 wards; 9 wards were allocated to an intervention group (IG), and 10 wards to the control group (CG). The intervention consisted of the provision of hand cream dispensers with continuous registration of cream consumption and regular communication about the use of creams to the HCWs. At baseline and after 12 months, clinical examination of the skin was done and the dermatitis symptoms were assessed by using the Hand Eczema Severity Index (HECSI score).

Results: Both, IG and CG showed decrease in the HECSI score for respectively 6.2 and 4.2 points. There was no significant difference in the changes in HECSI between the groups. However, relative improvement in the HECSI score was significantly higher in the IG than in the CG. Furthermore, self-reported cream use was significantly higher in the IG than in the CG at different time-points.

Conclusions: The intervention showed overall positive effects on the severity of HD symptoms, supporting the benefits of skin care in HCW.

Sp17-2

Occupational Dermatitis, learnings from Australia

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Introduction: Over 4,000 patients have been assessed with patch testing at our Occupational Dermatology Clinic in Melbourne, Australia since 1993.

Materials and Methods: Our experience has led to us to highlight aspects of the assessment and diagnosis of suspected occupational dermatitis.

Results: 1. Make a diagnosis.

2. Multiple contributing factors. There may be multiple contributing factors to a worker's skin condition, and all may play a role.

3. The accuracy of clinical diagnosis in our clinic is only 67%, even for an experienced practitioner.

4. It is important to patch test with an appropriate regional and comprehensive baseline series of allergens, requiring a working system of data collection.

5. Important relevant occupational allergens (in declining order) include preservatives especially methylisothiazolinone; rubber chemicals; potassium dichromate especially present in cement; fragrance allergens; hairdressing chemicals; epoxy resins; other preservatives including formaldehyde; the surfactant coconut diethanolamide; nickel and acrylates.

6. Immediate hypersensitivity reactions may cause protein contact dermatitis.

7. Declining manufacturing has meant more healthcare workers proportionately attend our clinic.

8. Explanation and education regarding the final diagnosis and the sources of exposure of any identified allergens are important.

9. Adequate treatment is important and may be impacted by steroid phobia.

10. Time off work can be instructive in understanding work relatedness.

Conclusions: 10 tips for patch testing and making a diagnosis in a worker with suspected occupational dermatitis are presented.

Sp17-3

Skin diseases of frontline health workers in China: from perspectives of occupational protection against COVID-19

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Introduction: Occupational protection for skin diseases among frontline health workers (HWs) has not received adequate attention during COVID-19 pandemic. Aim: To discuss the systematic measures to skin disease of HWs during emergency response to COVID-19, to promote long-term occupational health protection for them.

Materials and Methods: Based on the reports about the skin diseases of frontline HWs during COVID-19 in China, we analyzed the situation within the framework of occupational diseases prevention and control, provided suggestions by professional principles.

Results: 1. Little academic literature about dermatitis issue of HWs during COVID-19 in China, while several news were reported by media.

2. Physical and mechanical injuries in the face of HWs due to long-time pressure of face mask and respirator. Allergic contact dermatoses/contact urticaria caused by disinfectant, latex-containing products (e.g glove). Dermatophytes caused by long-time humid working environment when wearing gown, glove, goggles, face shield, rubber boots.

3. Skin diseases need to be addressed during emergency response to COVID-19.

4. Skin disease relevant to HWs should be integrated into the system of occupational disease prevention and control, and to be included in the national occupational diseases list, health surveillance and monitoring among HWs ought to be conducted.

Conclusions: Occupational health of HWs and patient safety are 2 sides of the same coin of medical quality and safety. Skin diseases of HWs who fight against COVID-19 need to be tackled, experiences and lessons from China could be shared with the counterparts worldwide.

Sp17-4**The Burden of COVID-19 in Health Workers**Albert Nienhaus¹ and Claudia Westermann²¹ Institute for Health Service Research in Dermatology and Nursing, University Clinics Hamburg Eppendorf, Hamburg, Germany,² Department for Occupational Medicine, Hazardous Substances and Health Sciences, Statutory Accident Insurance and Prevention in the Health and Welfare Services, Hamburg, Germany

Introduction: Health Workers (HW) have an increased risk for SARS-CoV-2 infection. With effective vaccines available since the end of 2020 and most HW in Germany vaccinated by now, this burden is mitigated but does still exist. In particular, high hygiene standards need to remain implemented to protect HW and patients. The increased use of hand washing, disinfections, and personal protective equipment (PPE) might increase the risk for skin diseases in HW. For this presentation, we analysed claims for occupational diseases (OD) concerning COVID-19 and skin diseases and we report results of a survey on skin irritation because of PPE during the pandemic in HW in Germany.

Materials and Methods: The BGW is a compensation board for work related diseases in HW. Claims of ODs of the BGW concerning SARS-CoV-2 infections were analysed since the beginning of the pandemic in March 2020. An online survey concerning skins irritation was carried out with the support of a professional nursing association. The survey was completed by 1.500 nurses or 10 % of those invited.

Results: About 80.000 COVID-19 cases are confirmed as OD. About 100 HW died because of COVID-19 and about 1.500 were hospitalized or need long-term rehabilitation. The number of ODs because of skin diseases did not increase during the pandemic. However, 280 claims because of skin irritations of the face or head were filled. Irritation of the skin because of wearing masks was reported by 60 % of the survey participants.

Conclusions: The burden of COVID-19 in HW is high. Protection of HW is important but might cause skin irritation, which also need to be taken care of.

Special Session 18 Strategies to address the increasing burden of Occupational skin cancer

Chair: Patricia Weinert

Session introduction

Solar Radiation (SR) is associated to various skin cancers: actinic keratosis (AK), squamous cell carcinoma (SCC) basal cell carcinoma (BCC), and malignant melanoma (MM). Occupational activity is one of the most relevant factors influencing SR exposure. Alone in Europe about 14.5 million outdoor workers (OW) are exposed to SR for at least 75 % of their working time. Primary prevention is thus essential to avoid longer-term costs and decrease the disease burden. In professions with increased sun exposure, specific measures of awareness, protection and systematic dermatological screening provide value for money in terms of a healthy work environment.

Sp18-1**UV radiation exposure in occupation and leisure time - detailed knowledge for holistic prevention**

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Introduction: We are exposed to solar ultraviolet radiation (UVR) every day, during work and leisure time. There is little knowledge about the level of irradiance, both in occupation and leisure time. In an ageing society, along with an ideal of a brown skin, non-melanoma skin cancer incidence rates rapidly increase.

Materials and Methods: For risk assessment and deduction of protective measures, measured data serve best. Regarding solar UVR exposure, long-term personal dosimetry measurements has been conducted. Since 2014, about 1000 test persons delivered data points representing about 45000 days of high quality data in more than 250 occupational settings. Since 2019, leisure time data from 600 test persons has been added in virtually all relevant activities. **Results:** The irradiance values for the occupations cover a very wide range. Going deeper into the occupational activities, prevention-relevant information could be obtained. With the data, a new definition of “outdoor workers” has been achieved, as well as prevalence estimates on limit value exceedance. On the basis of the time-use records of the German Federal Statistical Office, it was possible to derive mean values for the population as well as individual lifetime exposures.

Conclusions: These data can and are used to support prevention concepts or to decide whether employees are subject to occupational health screening with regard to UV radiation. Ultimately, the correlations found there are a plea for employees to be protected much earlier and better from long-term skin damage in the future. However, UV protection remains a challenge for society as a whole.

Sp18-2**UV radiation exposure in occupation and leisure time - detailed knowledge for holistic prevention**

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Introduction: Solar Ultraviolet radiation (sUVR), classified as a carcinogen agent from IARC, NTP and all major agencies, is the main occupational carcinogenic factor in terms of number of workers exposed worldwide. UVR induced Keratinocytes cancers (KCs) are expected to be the most frequent occupational neoplasms in Caucasian individuals, but their reporting to the workers' compensation authorities is still scant in Italy, as in several Countries.

Materials and Methods: The number of KCs and Actinic Keratoses reported to the Italian workers' compensation authority (INAIL) in the period 2012-2020 was collected. Then, the expected number of sUVR related occupational KCs, based on the number of workers exposed in Italy according to CAREX and to the incidence in the

population from the Italian national association of cancers' registries (AIRTUM), was calculated. The results were compared.

Results/Discussion: According to our analysis the total number of solar UVR related KCs reported in Italy in the observed period is less than the 10% of the cases expected, showing a large underreporting, but with a trend to an increase of the cases since 2015. A similar problem of underreporting was observed also in other Countries, as in Denmark, while in countries as UK and Germany the number of notifications is significantly higher.

Conclusions: Our study shows that occupational KCs are still largely under-reported in Italy. Nevertheless, a trend to an increase in the notification in recent years suggest a raise of the attention to the problem.

Sp18-3

Disease burden of occupational skin cancer and global Call to Action

Swen Malte John

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Introduction: Skin cancer is one of the most frequent and by incidence and prevalence fastest growing occupational malignancy. Alone in Europe, more than 14.5 million workers are regularly working outdoors by even $\geq 75\%$ of their daily working hrs. Around the globe, there is a lack of legislative protection to ensure adequate prevention measures, early diagnosis and effective treatment as well as compensation, adding up to substantial health inequalities.

Materials and Methods: Outdoor workers are exposed to an UVR dose at least 2 to 3 times higher than indoor workers and often to daily UVR doses even 5 times above internationally recommended limits as shown unanimously by numerous dosimetric studies.

Results: Specific recommendations entailed in a position statement signed by health professionals, patient advocacy groups and worker representatives (SM John et al., Nov. 2020) have been developed to address the unmet needs of NMSC patients, including improved legislation for outdoor workers, accessibility for regular screenings and earlier treatments; standardised registration of NMSC, reporting of occupational NMSC (including actinic keratosis) to population based cancer registries; enhancing collaboration between doctors, employers and patient groups to promote skin cancer prevention.

Conclusions: Governments across the world are called upon to take action and work towards the implementation of these recommendations. A coordinated response is needed to ensure that outdoor workers are better informed as well as motivated, and thus better protected from major skin cancer risk factors such as the sun.

Special Session 19 Sharing Solutions in Occupational Health: Best Practices from LMIC countries

Chair: Diana Gagliardi

Session introduction

OSH professionals in LMIC often experience difficulties in delivering good OSH at the workplace due to limited access to information, tools and good practices. Nevertheless many tools and good

practices already exist that can be adapted and adopted also in LMIC. What is really needed is to improve connections among OSH professionals and to support them in sharing their practical experience and knowledge and in making available practices and tools that proved to be effective.

Participants will learn about available practices and tools from experts representing different regions in the world, who will share experiences and present good practices that resulted to be effective in improving occupational health at the workplace

Sp19-1

Gamification and benchmarking to achieve occupational health at workplace - Tools and good practices to improve OSH at the workplace, examples from India

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Introduction: Occupational health has a strong focus on prevention. Basic occupational health services are aimed at a) protection of health at work, b) promotion of health, wellbeing, work ability and c) prevention of occupational diseases and accidents. These can be achieved by involving various stake holders in identification of health risks, reviewing work practices and taking preventive actions at the workplace.

Materials and Methods: Author has worked in multiple organizations in India and was involved in the implementation of health and safety programs to improve workplace health, lifestyle health factors and mental health. Employees at the ground level suggested and implemented workplace changes to reduce health risks. Introducing team spirit, gamification and adding fun element to personal and occupational health initiatives helped achieve the results.

Results: Outcome reduced the health and safety risks and also added to the bottom line with significant financial savings. The process was replicated in various units & corporations with positive results. There are multiple examples exhibiting the improvement of processes and reduction of health risks in both work environment and personal health. Sustainability was achieved in many initiatives. Occupational health department played the role of facilitator. **Conclusions:** Visible commitment of top management, empowerment of line managers, recognition of employees, involvement of all levels of workforce, change through people-oriented projects were common elements across organizations and units. Gamification and benchmarking raised the level of engagement and overall gains

Sp19-2

Participatory approaches to improving safety and health in small and informal economy workplace in South Asia

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Introduction: More than 80% of workers in South Asia are engaged in informal employment (ILO, 2018). Occupational health services seldom reach them and they need practical support.

Materials and Methods: Workers and employers in small manufacturing enterprises, home-based workplaces, electronic waste (e-waste) dismantling workplaces, small construction sites and tea farms were reached in India, Nepal, Pakistan, and Sri Lanka. Participatory training methodologies known as WISE (Work Improvements in Small Enterprises) were applied. Training contents comprised an action-checklist exercise with workplace walk-through, presentations of photos and illustrations showing local good practices, and group discussions. Many training activities were conducted in workers' own workplaces.

Results: The participating workers and employers identified practical points for improving their safety and health. Home-based workers in Nepal identified placing materials in good order and clean drinking water in the workplace as their priorities. Workers in the tea farm in Sri Lanka proposed a better basket for collecting tea leaves, clear passageways, and regular short breaks. Local tripartite trainers were trained, and they disseminated the participatory training activities. During the COVID-19 pandemic period, webinars were carried out for promoting workplace preventive measures using the established networks.

Conclusions: The participatory approaches effectively assisted workers and employers in small and informal economy workplaces in identifying practical solutions. Photos and illustrations showing local good practices played a key role.

Sp19-3

Challenges Towards OSH Growth and Workplace Improvement Implementation in Africa

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Introduction: Occupational Safety & Health (OSH) experts in Africa have long advocated for OSH development & recognition across country & enterprise levels but this has been difficult to realise for many reasons, e.g., inadequate OSH legislation & poor OSH knowledge & competencies across the continent. Accidents & occupational illnesses are on the rise in African workplaces because of OSH inadequacies.

Materials & Methods: To address these gaps, OSHAfrica set up two scientific committees: OSH Legislation & Policy Improvement, & OSH Education & Competency Improvement, which, respectively, have reviewed existing OSH legislation across 54 countries in Africa (75% completed) & solicited for partnerships across the world in support towards OSH education in Africa.

Results: The African Union Development Agency (AU-DA) has collaborated with OSHAfrica in getting the African Union to review the final work on OSH Legislation & Policy Improvement & adopting it as the 'African Union Protocol on OSH'. The OSH Education & Competency Improvement endeavours include various virtual webinars at regional & country levels. Since inception, the OSHiversity TDC has offered free online OSH training across LMICs, & OSHAfrica-focused training on African OSH for labour inspectors. OSHiversity has trained more than 150 people across 17 countries, by focussing on a 'learn-&-apply' approach to improve workplaces.

Conclusions: Across the continent, we need more leadership discussion, commitment & action to improve OSH legislation, education & enforcement. Support is urgently needed towards sustaining existing OSH efforts to make a difference in Africa.

Sp19-4

Compassion Fatigue: The Other Pandemic. Situation in health care workers in Latin America

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Introduction: By the end of the COVID-19 pandemic, the prevalence of mental and emotional disorders among health professionals will double. With the exception of palliative care units, health professionals have been prepared to heal but may still lack of personal tools for managing their own emotions when the therapeutic objective must focus on caring, instead of "fighting" against a disease, with the patient being the battlefield.

Materials and Methods: The COVID-19 pandemic imposed health teams to make hard decisions between the duty of care and self-protection. Exposure to patients in situations of trauma, suffering an emotional distress demanding help can represent an emotional fracture that is difficult for healthcare personnel to manage. This situation, known as compassion fatigue or empathy burnout, is a secondary form of stress occurring when the health worker's emotional capacity to cope with the empathic commitment to the suffering of the patient is overwhelmed.

Results: Compassion fatigue syndrome affects health workers on the "front line" of care, who have more human contact with patients who suffer or fear for their life due to a disease. The health system, strained beyond its limits by the pandemic, has had to put aside caring for health professionals themselves.

Conclusions: We will review risk factors and conditions triggering compassion fatigue and affecting lifestyles and resilience of health professionals in Latin America and we will analyse how occupational health can help develop prevention strategies and propose recommendations that can contribute to improving and managing workers' health.

Special Session 20 The other pandemic: Mental Health Issues facing HWs during the Covid-19 crisis

Chair: Igor Bello

Session introduction

This is a joint session developed between the Women, Health and Work SC and the Occupational Health for health workers SC.

In this session we address the problem of the health of workers in the health sector, within the context of the COVID-19 pandemic from a gender perspective.

In particular, we focus on aspects related to the mental health, one of the most relevant problems suffered by workers in the post-pandemic, through a vision of ergonomic and psychosocial risks.

Sp20-1

Gender Ergonomics in Healthcare: Preventing disparities by promoting inclusive designs

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Introduction: Healthcare is a feminized sector where approx. 80% of the global workforce and 83% of the 11.5 million low skilled migrant workers performing health domestic service 4D Jobs "difficult,

dangerous, dirty and discriminatory” are women. Addressing occupational and ergonomic hazards is very important, especially when designing inclusive workplaces.

Materials and Methods: Data was collected by a systematic review of the literature in the past 30 years and retrospectively from our 30 years of practice our Occupational Medicine Clinic at Bellevue Hospital in New York City.

Results: Although ergonomics and human factors is an anthropocentric science, workplace design in most health sectors have an androcentric tendency excluding women’s needs while at work.

Conclusions: Gender disparity is common when designing workplaces. For men, mainly due to social pressure by a “macho man” culture forcing inappropriate manual handling. For women, who are the most affected, is a combination of neglecting the pregnant workers, lower salaries, double shift and other organizational factors. Our workplace design should be inclusive and participatory in order to prevent occupational diseases and injuries.

Sp20-2

Psychosocial factors and mental health in Mexican women healthcare workers during the COVID-19 pandemic

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Introduction: WHO has estimated a significant increase in mental disorders due to COVID-19 pandemic and has identified women healthcare workers as a vulnerable group. In Mexico, the impact of this pandemic on the mental health of healthcare workers and the psychosocial factors associated with it remain unknown. The objective of this work is to identify levels of stress, burnout, anxiety, and depression and their relationship with negative psychosocial stressors and positive psychosocial resources in women healthcare workers in Mexico during the COVID-19 pandemic

Materials and Methods: 203-woman health workers from various Mexican clinics and hospital centers initially participated in a non-experimental, cross-sectional correlational design. Participants were recruited by targeted sampling. Various ultra-brief measures were used to measure symptoms of depression, anxiety, burnout, and stress and a mixed-methods exploration technique was used to identify associated psychosocial factors

Results: We found high levels of depressive and anxiety symptoms (56.9% and 74.7%), as well as burnout and stress (49.8% and 46.8%). Although the stressors “infection of self” and “family infection” (38.3% and 30.9%) and the resources “family” and “personal protective equipment” (34.6% and 24.5%) were the most frequent, there were more than 20 factors in each category differentially associated with mental health

Conclusions: The increased risk in mental health for women health care workers is confirmed in a preliminary way and the stressors and resources to be considered in preventive strategies to address COVID-19 pandemic are identified.

Sp20-3

Ergonomic redesigning the Radiologists Workstation at De La Salle University Medical Center (DLSUMC)

Alma Jennifer Gutierrez, Arah Asensi, Denise Chua and Charlene Sayson

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Introduction: Six ultrasound workstations were evaluated in order to verify and validate whether the Radiologic Technologists are comfortable and satisfied with their working environment. Symptoms associated with LongCOVID have increased the rate of use.

Materials and Methods: The physical components of the workstation include the ultrasound machine, bed, chair, monitor, and keyboard. The environmental components that could also affect their work performance are illumination and noise. A total of 7 radiologic technologists were studied; 6 female and 1 male which constitutes the population of the radiologic technologists. Their posture while performing the ultrasound procedure were observed and captured using RULA.

Results: Illumination measurements averages from 25-63 lux. The average noise level for all the ultrasound workstations ranges from 58-60 dbA. It was found that the grand RULA scores while performing the abdomen and thyroid procedure are 5.43 and 4.86. Based on the results of the Nordic Questionnaire, female participants experienced discomfort on their neck, shoulders, wrists, upper back, and lower back.

Conclusions: Based on the ergonomic assessment, the current ultrasound workstation does not comply with the ergonomic standards obtaining a RULA score of 5.43 (abdomen procedure) and 4.86 (thyroid procedure). These results to pain and discomfort on their upper limbs and lower back which were being experienced by the participants based on the Nordic Questionnaire. The study aims to improve the existing workstation being used by the radiologic technologists.

Special Session 21 Updates on Protections against Infectious Agents in Health Care

Chair: Gwen Brachman

Session introduction

A major risk to health workers is exposure to infectious agents. Use of engineering, administrative and personal protective controls for airborne, droplet spread and blood borne pathogens will be reviewed. PPE inequalities will be discussed.

Controversies regarding particular vaccinations will be discussed: booster vaccines for Hepatitis B, mandatory versus non-mandatory annual influenza vaccination, update regarding the development and dosing of COVID-19 vaccines. Particular issues re: Covid-19 vaccination will include vaccination inequities and covid vaccine mandates

Work restrictions for health workers infected with active Hepatitis B, Hepatitis

C and HIV and the acceptance of certain diseases and/or vaccine side effects as occupational (workers comp) will be discussed

Sp21-1

Review of Respiratory Protections for Health Workers: Environmental, Administrative and Personal Protective Measures and the Controversies Surrounding These

Sophia Kisting-Cairncross

School of Public Health and Family Medicine Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

Introduction: The advent of the Covid-19 pandemic has increased the longstanding need for adequate protection of health workers from respiratory infectious agents such as tuberculosis. This is more evident in resource poor countries where the inconsistencies in the recommendations of guidelines between different countries and different organizations may result in greater stress and uncertainty for health about the efficacy of available respiratory protection. Similarly, the unequal access to appropriate PPE exacerbates the uncertainties.

Materials and Methods: Various national and international guidelines for respiratory protection will be reviewed. The appropriate use of engineering, administrative and personal protective controls for airborne and droplet spread of different infectious agents will be reviewed. The need for a risk-based approach and adequate scientific information to help inform recommendations will be assessed. More equal access to appropriate PPE will be discussed. **Results and Conclusions:** Health workers face an enormous risk of acquiring preventable respiratory diseases. This potentially impacts both their physical and mental health. Greater collaboration and a quest for greater equity should facilitate greater consistency with regards to the effective implementation of protective recommendations and guidelines.

Sp21-2

Protections against Blood Borne Pathogens

Gwen Brachman

Scientific Committee for Occupational Health for Health Workers, International Commission on Occupational Health, Westfield NJ, USA

Introduction: There are 16 billion injections worldwide annually. There is an increased burden of Hepatitis B, Hepatitis C and HIV through exposures to blood borne pathogens (BBPs). The main causes of blood borne pathogen exposures are the reuse of injection equipment, accidental needle-stick injuries (NSIs) in health care providers (about 3 million annually), overuse of injections and unsafe sharps waste disposal. The institutional and individual causes leading to BBP exposures will be discussed. Remediations including the standard protections, the use of safety injections, decreasing the number of injections and waste management programs (following WHO and ILO guidelines) will be discussed.

Materials and Methods: Data from WHO on BBP exposures/infections in health workers and WHO and ILO guidelines will be presented

Conclusions: There is a huge global burden of BBP infections from occupational exposures in health workers which can be greatly decreased if appropriate workplace education and conditions were instituted.

Sp21-3

Long-term vaccine immunity against Hepatitis B virus in Health workers: issues and proposed solutions

Antoon De Schryver¹ and Wim Van Hooste²

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Introduction: A major risk to health workers is exposure to infectious agents, including Hepatitis B virus (HBV). For prevention of HBV, vaccination is the key. HBV vaccines have been commercially available since 1982, and many HWS may have received their primary HBV vaccine series 20-25 years ago. With the introduction of universal

vaccination, large cohorts of youngsters vaccinated against HBV at birth or adolescence are currently entering healthcare training, not knowing their immunity status to HBV. Two main questions appear on the horizon. First, how long does the immune memory last? Second, is a booster dose necessary and if yes for which groups?

Material and methods: Current national and international guidelines for HBV vaccination as well as the relevant literature on long-term immunity will be reviewed. The role of pre-vaccination testing of student HWS as well as the role and significance of an anamnestic response will be discussed. Strategies to detect HWS with persistent HBV infection will be discussed.

Results and conclusions: Duration of effective long-term protection against acute disease and development of HBsAg carriage will be discussed. Current recommendations state that a booster is not needed in healthy, fully vaccinated, immunocompetent adults, but, as HWS have a high risk of HB exposure, special recommendations may be necessary. Additional long-term follow up studies are needed to explore life-long protection conferred by HBV vaccine, moreover, the need for a booster after a number of years should also be evaluated.

Sp21-4

Consensus and Controversies: Managing Vaccine Preventable Respiratory Diseases for Healthcare Personnel in the Era of COVID-19

Amy Behrman

Perelman School of Medicine - Occupational Medicine, University of Pennsylvania, Philadelphia, USA

Introduction: In many countries, illness and deaths from vaccine-preventable infections are now more common in adults than children. Healthcare personnel (HCP) comprise an adult population at particular risk of occupational exposure and nosocomial transmission if they are not immunized to an array of respiratory pathogens. There is broad consensus nationally and internationally on which vaccines are appropriate for HCP, but substantial controversy on how to provide them and whether to mandate them. In addition, there are ongoing inequities in burden of illnesses, vaccine access, and vaccine mandate impacts between groups of HCP. COVID-19 has hugely exacerbated all these concerns.

Materials and Methods: Current recommendations for immunizing HCP will be reviewed including national and WHO guidelines, and evidence for their impact on worker and patient safety. Interventions to optimize vaccine safety and effectiveness for HCP will be reviewed. Experience and ethical controversies related to vaccine mandates will be discussed with particular attention to COVID-19 vaccines.

Results and Conclusions: There is a huge global burden of community-acquired and occupational infections from vaccine-preventable infections among HCP. This requires on-going efforts to provide equitable, ethical and effective remediation. Workplace vaccine programs and vaccine mandates are crucial interventions to control current and future epidemics.

Special Session 22 Responsible Care and Corporate Citizenship

Chair: Murray Coombs and Steffen Hitzeroth

Session introduction

The Chemical Industry's support for Sustainability - a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity will be enhanced if we build onto the successes of the Responsible Care and Corporate

Citizenship (RCCC) programmes within the governance structures of the chemical industry. Ultimately for the chemical sector to flourish it must balance social, economic and environmental sustainability.

Sp22-1

Will sustainability drive improvements in RCCC - Green Chemistry?

Tee Guidotti

Private OEM, OEM, Delaware, USA

Occupational health does not just have a “role” in sustainable development. The 17 Sustainable Development Goals (SDGs) of the United Nations interconnect and are grounded on tangible physical and chemical principles just as they are on social justice and human rights. Protection of the health, capacity, ableness of workers (SDG 5, 8, the security of their families (SDG 2, 3), the economic productivity they generate (SDG 1, 8), and the roles that they fill in their communities (SDG 11, is a key and necessary component for sustainable development at all levels of income, economic status and social development (SDG 10, 16) and facilitates future growth (SDG 8, 9, 10). By ensuring protection against desperate conditions, effective health protection takes pressure off resources and reduces incentives for human exploitation and resource overutilization under desperate conditions (SDG 10, 11, 12, 13, 14). In so doing, effective occupational health services help to create frameworks for prevention, health evaluation, and compensation across sectors, often across borders (SDG 9, 11, 16) which may have positive spillover effects in sectors far beyond the labour sector (SDG 4, 5, 7, 8, 17) and the worker’s community and the built environment of the workplace (SDG 6, 8, 10). The chemical sector is critical to the modern world both in its economic importance and as an essential builder and provider of materials to the modern world. Control of chemical exposure in the workplace and community, throughout the life cycle, is fundamental to achieving the SDGs. A set of guiding principles is needed for the chemical sector going forward

Sp22-2

COVID-19 Response and Health and Safety Challenges / Solutions in the Agriscience Sector

Paul Gannon

Integrated Health Services, Corteva, Geneva, Switzerland

Introduction: Corteva is an Agriscience company with 21,000 employee in more than 140 countries producing both crop protection chemicals, seeds, and digital agriscience solutions. The global COVID-19 pandemic posed some unique issues, requiring some novel solutions, given the rural, remote and seasonal nature of the workforce.

Materials & Methods: A case study of how a large global Agriscience company managed through a coronavirus pandemic to maintain the health & safety of employees and maintain business continuity. **Results:** Corteva had a multidisciplinary Pandemic and Infectious Disease Planning Team in place since the inception of the company in 2019. This team had produced plans and guidelines in anticipation of an influenza pandemic. This meant when the COVID-19 pandemic started Corteva was able to quickly modify these materials for use in a coronavirus pandemic.

Workers who could work from home were quickly allowed to do so and only those who were required to work from site eg operators at production facilities, were allowed on site and followed strict infection control measures.

Conclusion: Pre-pandemic planning was essential to being able to respond to a pandemic rapidly to protect worker health and business continuity. Some unique challenges required some novel solutions and these were worked out in a process that included health, safety, managers and workers.

Sp22-3

Handling of highly active pharmaceutical ingredients and intermediates in the pharmaceutical industry

David Miedinger

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Introduction: In pharmaceutical production, the health protection of workers is of utmost importance. The increasing potency of compounds requires to control exposure to very low concentrations.

Materials and Methods: Review of best practices on the handling of highly active pharmaceutical ingredients (APIs).

Results: Health based exposure limits are established that allow the safe handling of APIs and intermediates during production. A categorical approach is taken to classify the hazard of an early drug candidate with limited toxicological information, whereas a more refined health based exposure level (eg. internal occupational exposure limit (IOEL)) can be set once a more robust dataset from animal and human studies becomes available. Control of worker exposure to these compounds is adequate if exposures are reduced as far as reasonably practical and in any case below the IOEL.

The prevention of occupational overexposure is ensured primarily by collective protection measures (i.e., technical measures, engineering controls) and not simply by the provision of personal protective equipment. Technical measures and engineering controls can involve fixed or flexible containment solutions, with special emphasis placed on the interfaces between the manufacturing equipment and the storage and transport containers. Containment efficacy must be verified by performing occupational hygiene monitoring not limited to processing operations, but also including sampling, cleaning and disassembly tasks.

Conclusions: State of the art containment and its verification allow the safe handling of APIs in the pharmaceutical industry.

Sp22-4

Occupational health challenges in developing countries in the chemical and other sectors and opportunity for OH capacity building using e-learning

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Introduction: In developing countries, occupational health (OH) remains at the backburner when governments set priorities in the economic development agendas given the vast array of social, economic, and political challenges. E-learning may provide a golden opportunity to build capacity in OH.

Materials and Methods: Research articles pertaining to “OH” and “developing countries” in online public health search engines, such as PubMed, Medline, Highwire, and others yielded various studies on the

subjects. While recent articles written during COVID-19 pandemic provide some optimism that resulted from the use of e-learning that helped build OH capacity when dealing with the pandemic. The older articles, going back to 1950 gave important insight into the intractable challenges of OH in the chemical sector and other sectors.

Results: OH must focus less on the workplace and more on the worker and the worker's social context in which workplace practices are rooted. In developed countries, a socio-political will/mechanism facilitated the translation of scientific data into policies and regulations that are enforced by specialized agencies. OH regulations cover only 10% of the population in developing countries. The laws omit many major hazardous sectors like agriculture and domestic work that are increasingly using chemicals.

Conclusions: Studies have brought light to some of the challenges and the use of e-learning coupled with capacity building/training of local OH specialists who may have a voice in their respective countries.

Sp22-5

Overview on OH surveillance in the chemical industry supporting RCCC

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Occupational epidemiological surveillance (OES) is a powerful integrative scientific and management tool that leverages ongoing data collection, evaluation and reporting. Early assessment of potential occupational health risks facilitates the design and implementation of effective preventive interventions. While sharing elements with formal epidemiological studies, OES allows a broader perspective for detecting changes in exposures and early disease responses, as well as more rapid response. OES objectives may include 1) establishing a “background” health profile against which health trends may be tracked; 2) ongoing characterization of worker health; 3) identifying early changes in biological markers that might reflect potential occupational health risks; 4) providing objective support for worker health communications and reporting of group-level trends; and 5) developing a scientific database on which more formal occupational health programs can be based. Reports based on the OES database can be generated periodically or as need in “near real-time,” and provide information for management reports, communications, as well as addressing employees' and community members' health inquiries. Ancillary benefits include 1) an established framework (i.e., an enumerated cohort) for ad hoc epidemiological studies; and 2) the identification of lifestyle risk factors (e.g., smoking, sedentary lifestyle, alcohol abuse) that can have serious health consequences and impact worker productivity and well-being. All of these support and advance the Responsible Care and Corporate Citizen initiative.

Special Session 23 Occupational Health in Construction Industry

Chair: Krishna Nirmalya Sen

Session introduction

This session highlights OSH Challenges and solutions with experiences from USA and India including response during COVID 19 Pandemic

Sp23-1

OSH Challenges in Construction – Providing Practical OSH Tools for Small and Medium Sized Employers

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¹ CPWR, Seattle WA USA, ² CPWR, Cincinnati, OH, USA, ³ CPWR, Silver Spring, MD, USA, ⁴ L&T, Calcutta, India

Introduction: Construction is a high-risk industry for OSH, and the bulk of the risk resides with small and medium sized (<100 employees) employers who work in residential and light commercial construction, renovation and demolition. These employers are typically resource poor with limited technical expertise in occupational safety and health.

Materials and Methods: We will describe four resources that are designed to help construction contractors create a strong positive safety culture and jobsite safety climate. The first three of these tools address the most basic requirements for safety, which aim to create a favourable workplace culture and climate. The fourth provides a tool to address health risks encountered in construction, which is an underdeveloped area of OSH in construction. These tools are available free of charge, and do not require large investments.

- ISSA Vision Zero for Construction
- CPWR S-CAT and FSL for small and medium sized employers
- ISSA Prevention through Pictures
- CPWR Exposure Data Base

Results: Employers who use these tools will experience significant reductions in work-related injuries, illnesses and near misses.

Conclusions: Simple tools exist which, with little additional investment, will provide employers of small, medium, and large the opportunity to improve safety culture and climate and reduce adverse safety and health outcomes.

Sp23-2

OSH Challenges in Construction–Mitigation through Digital Technology & Innovative Approach in India

Krishna Nirmalya Sen and Gollapalli Muralidhar

EHS, L&T Construction MMH SBG, Kolkata, India

Introduction: In India, construction sector considered the largest sector after agriculture in terms of employment, contributing to 9 to 11% of GDP. However, construction industry's rate of occupational accidents, injuries and ill health is high due to several reasons. Typical constituents of construction involve high risk, such as working at height, work with heavy machinery, deployment of unskilled workmen, presence of sub-contractors, high rate of workmen turnover etc.

Materials and Methods: Glimpses of innovative methods and application of digital tools which can effectively reduce safety incidents and improve culture of compliance at construction sites.

Digital EHS Observation App

IB4U Inspection before use App

WISA – EHS Training Management App

AI based Safety Surveillance

Virtual Reality Trainings etc.

Results: Effective monitoring of OSH parameters at construction site on a regular basis and subsequent improvement of compliance levels

Conclusions: Innovative application of digital technologies in construction safety found to be highly beneficial and helpful. With

leadership commitment and adoption of enhanced digital applications, higher level of compliance on occupational health and safety can be achieved.

Sp23-3

Response to COVID 19 Challenges in Construction Sector - Experiences from USA

Sathyarayanan Rajendran

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Introduction: Construction employee safety and health continue to be a concern for construction contractors who experience high injury rates. The COVID-19 pandemic added a layer of challenge to the already hazardous industry. It is critical to understand the challenges the construction industry stakeholders encountered and how they responded.

Materials and Methods: Several rounds of informal interviews and surveys were conducted with construction safety professionals to identify the COVID-19 challenges faced and understand the construction contractors' responses in the Pacific Northwest of the USA.

Results: Contractors' responses included Covid-19 Safety policies and procedures, 100% mask policy, employee outreach and training, infection control plan, vaccination requirement, etc. The results indicated that contractors' common challenges included compliance and enforcement of mask mandates, maintaining social and physical distances for specific tasks, eye protection fog-up due to masks, hot weather-related issues, and so forth.

Conclusions: Contractors adapted to the challenges by treating COVID-19 as a hazard and ensuring proper control measures to protect the workers. Contractors are well-prepared for future outbreaks.

Special Session 24 The work of an occupational health nurse in various countries during COVID-19

Chair: Kim Davies and Kirsi Lappalainen

Session introduction

How did COVID - 19 affect the work of Occupational Health nursing in various countries around the world

Sp24-1

The work of an occupational health nurse in Finland during COVID-19

Kirsi Lappalainen

Finnish Institute of Occupational Health, Kuopio, Finland

Introduction: The OHN has an important role in coordinating the services and cooperating with the client organizations and enterprises. The main tasks of OHN are promotion of health and wellbeing at work and prevention of work-related ill-health and disability OHNs do health surveillance and counselling. Assess working environments and communities and their impact on health in liaison with the other experts in the occupational health care team

Materials and Methods: Some of the Finnish Occupational Health Nurses' efforts and practices during Covid-19.

Results and Conclusions: In Finland Covid-19 accelerated telecommuting and chat with contacts. Covid- 19 caused changes in the work of occupational health nurses. Health examinations and

workplace visits have been conducted remotely. Similarly, work ability negotiations have been conducted remotely. Medical treatment has also been accustomed remotely. The cleaning of stations have further been enhanced. The reimbursement of remote medical care in occupational health care has changed. In the future, The Social Insurance Institution of Finland may reimburse the costs of remote services even more extensively when remote services no longer require the use of a video connection. Once Covid-19 vaccinations have started, occupational health nurses have joined the vaccination process. The vaccination schedule is defined in accordance with the Finnish COVID-19 vaccine strategy, with social and health care professionals caring for COVID-19 patients and those working in nursing homes being the first to be vaccinated

Sp24-2

Fostering healthy workplaces in the aging society Japan

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Introduction: Japan's population aging is accelerated at an extremely rapid rate: 17.4% in 2000, 28.4% in 2019, and projected to reach 38.4% by 2065. Accordingly, the workforce is aging as well. In 2020, 13.6% of workers were over 65 years old.

Materials and Methods: Some of the Japanese Occupational Health Nurses' efforts and practices in the face of this aging society are overviewed.

Results and Conclusions: Countermeasures for Non-Communicable Diseases

Japan has been making efforts to combat lifestyle-related diseases - the implementation of health checkups is mandatory- meanwhile, subsequent health guidance is still required as 'obligation to make effort'. Most small companies do not have access to OHNs. To implement health guidance in all companies, OHNs need to build a stronger cooperative system with public health nurses and enhance involvement of hospital or clinic nurses.

Balancing of treatment and work

As the workforce ages, percentage of workers with some forms of illnesses or disabilities would be increased. OHNs are expected to support the balancing of treatment and work, and to help the elderly to continue working.

Fostering Healthy Workplaces

It's very important in the aging society to prevent a loss of productivity by encouraging acceptance of aging and promoting health among workers. OHNs are concerned about the workers' life satisfaction, work motivation, and job satisfaction, and grasp their job content, work environment as well as their lifestyle, in the aim to support workers to have healthier lifestyle and to foster good organizational climate.

Sp27-3

Are Occupational Health Nurses keeping up with our changing world of work?

Janice Riegen

Independent Healthy Workplaces, Auckland, New Zealand (NZ)

Introduction: Occupational Health Nurses (OHN), have been part of workplaces for decades, with similarities and differences in how we practice. Are we keeping up in the changing world of work? Health, safety, wellbeing and work are inextricably linked, it is about how work impacts on health and health impacts on work. The World

Health Organization (WHO) was ahead of their time with the Healthy Workplace definition and action model (2010). This quality improvement model aligns well with Te Whare Tapa Wha a Maori model of health. Does Total Worker Health align?

Materials and Methods: Opinions have been formed through many years of OHN practice. Through executive membership of the NZOHNA, academic study, ongoing learning and global networking have guided practice.

Results: A growing evidence base shows challenges and opportunities. The global pandemic has shown how workplaces play a critical role on the wider influence of health and wellbeing of individuals, organisations, societies, economies and sustainability.

Conclusions: Multiple factors are influencing and impacting workplaces. Adaptability, agility, flexibility, collaboration, innovation and creative ways of working are needed. An evidence-informed, practical strategic approach is essential, using a common language and sharing experiences. Psychosocial risks are critical to workers health and wellbeing, we need to focus more on these. It is time to stand up, have a stronger voice, so let's do this and embrace our changing world of work. Our future is in our hands.

Sp27-4

The work of an occupational health nurse in South Africa during COVID-19

Kim Davies

Department of Defence, Occupational Health Nurse, Pretoria, South Africa

Introduction: Occupational Health by advanced nurse practitioners is the backbone of health within Industry, even more so during the CoVid19 pandemic. This was further propelled to the forefront when the WHO recognised 2020 as the year of the Nurse and Midwife. It was imperative to explore how OHNs in a developing country had risen to the challenge of this new landscape in order to refine national workplace guidelines.

Materials and Methods: Semi-structured interviews were conducted with (15) Occupational Health Nurses based in Gauteng on how they experienced the work within their clinics over the last year and a half, and what they recommend with regards to managing return to work and/or managing prolonged COVID in the changing workplace approaches. Thematic analysis using Clarke and X is still underway.

Results: Participants felt that initial workplace guidelines needed to be implemented by skilled professionals to address the considerable gaps from primary health care at the centre to higher care in hospital settings. There has been a growing acceptance of flexi hours and working in an office as we know might be a thing of the past.

Conclusions: The interviews added valuable lessons learnt and how health should be delivered to all workers within Industry. The speed at which legislation was developed to include COVID-19 as a compensable Occupational disease shows that changes do not have to be slow and cumbersome.

Special Session 25 Benzene: toward a lowering of occupational limit values and its impact on risk assessment and biomonitoring

Chair: Silvia Fustinoni

Session introduction

Benzene is among the most produced chemicals around the world and it is classified as a known human carcinogen, recently reviewed

also by the International Agency for Research on Cancer (monograph 120, 2018). To deal with the risk for workers, new regulations tend to decrease occupational limit values. Understanding the rationale for setting new limits and the possibility to apply bio-monitoring for risk assessment is relevant for those practitioners who deal with chemical risk assessment and medical surveillance of benzene exposed workers.

Sp25-1

Increasingly lower Occupational Limit Values (OELs) for benzene: what do they mean and what are the implications for exposure assessment?

Peter Boogaard

Division of Toxicology, Wageningen University, Wageningen, The Netherlands

Background: The first OEL of 100 ppm was set in 1947, soon lowered to 50 ppm, and then to values of 10 to 25 ppm, until in 1982 the International Agency for Research on Cancer confirmed that benzene was a human carcinogen. This led to lower OELs in most countries and in the European Union an OEL of 1 ppm was set.

Material and Methods: Benzene was evaluated under the Existing Substances Regulation and a final risk assessment report was issued in 2008 concluding that the OEL of 1 ppm is not sufficiently protective.

Results: In 2014 the Dutch Expert Committee on Occupational Safety advised an OEL of 0.2 ppm based on epidemiology and mechanistic information. This value was accepted as a national OEL in 2017 and is considered a safe value: exposures below this value are not considered to invoke any additional cancer risk. This is a fundamental change from previous OELs which are essentially risk numbers assuming no safe level for benzene exposure. In 2019, the Risk Assessment Committee proposed an OEL of 50 ppb, considering no additional risk of exposures below this value.

Conclusions: The most recent scientific assessment, based on a thorough quality evaluation of the available human studies, concludes that an OEL of 0.25 ppm is sufficiently protective (Schnatter et al., 2020). Human biomonitoring is the best way to assess current exposures to benzene. However, most available methodologies cannot be applied as there is interference from backgrounds or because the methods have not been validated for these concentration ranges. The most promising methods are urinary benzene and S-phenylmercapturic acid.

Sp25-2

Overview on biomarkers of exposure useful for risk assessment

Silvia Fustinoni

Clinical Sciences and Community Health, University of Milan, Milano, Italy

Background: Until 1980, urinary phenol was used as biomarker of benzene exposure, as the major metabolite of benzene (~ 70% of the adsorbed dose). Later on, the lowering of occupational limit values prompted to identify new biomarkers with higher specificity.

Material and Methods: The urinary metabolite t,t-muconic acid (MA; accounting for 3-18% of the adsorbed benzene) was first introduced. Then, the urinary metabolite S-phenylmercapturic acid (SPMA; < 1% of the adsorbed dose), and urinary benzene (< 0.1% of the adsorbed dose) were adopted and proved to be specific biomarkers of benzene exposure.

Results: Today, MA and SPMA are listed as biological determinants by the American Conference of Governmental Industrial Hygienists, and biological limit value (BEI) are recommended. Moreover, for MA, SPMA and urinary benzene, the MAK Commission of the German Research association proposes exposure equivalents for carcinogenic substances (EKA). These are suitable to investigate exposure in the range of the EU actual limit value of 1 ppm; however, for lower exposures, such as those documented in most occupational settings, MA is not useful as interfered by diet.

Conclusion: In 2018, the Risk Assessment Committee of the European Chemical Agency, recommend a health based occupation limit value for benzene of 50 ppb; SPMA and urinary benzene are identified as suitable exposure indices, with biological limit values of 0.7 µg/L and 2 µg/g creatinine for urinary benzene and SPMA, in end of shift or end of exposure samples.

Sp25-3

Novel biomonitoring of early biological effects upon benzene low-level exposure

Radu Corneliu Duca

Department Health Protection, Unit Environmental Hygiene and Human Biological Monitoring, Laboratoire National de Santé, Dudelange, Luxembourg

Introduction: Occupational exposure to benzene was reduced by several orders of magnitude as compared to the past. Exposure biomarkers (e.g. tt-MA and SPMA) might not be sufficient to fully characterize the risks related to benzene low-level exposure. Effect biomarkers could be more suitable but still challenging, as a number of critical aspects are not fully understood.

Materials and Methods: Early effect biomarkers and personal susceptibility were evaluated in recent studies related to workers exposed to low levels of benzene (e.g. taxi and bus drivers, traffic police officer, refinery and gasoline station workers).

Results: Rapidly growing evidences concerning the toxicity of benzene have shown that the biological response may be different function of exposure levels. Toxic effects at low doses are higher than expected, particularly in susceptible individuals (e.g. with genetic polymorphisms). Besides genetic mechanisms, benzene low-level exposure was linked to epigenetic variations, oxidative stress and even DNA damage. Also, was hypothesized that there is a link between GSH metabolism, the control of DNA adducts formation and epigenetic mechanisms (e.g. DNA methylation). Integrating effect biomarkers into human biomonitoring programs as occupational risk assessment tools, can directly quantify the effects of benzene low-level exposure.

Conclusions: Effect biomarkers might be more suitable for quantitative risk assessment of benzene low-level exposure by identifying early effects in humans, establishing dose-response relationships, and to further explore mechanisms and biological plausibility of exposure associations.

Special Session 26 Prevention of the electromagnetic fields exposure risk in the workplaces and the issue of the workers at particular risk

Chair: Marc Wittlich

Session introduction

Electromagnetic fields (EMF) exposure is almost ubiquitous in all workplaces: risk varies according to the type of EMFs and their intensity. Risk evaluation poses some issues, as it can be difficult to perform adequate measurements, and, moreover, for an appropriate risk assessment it is important to recognize whether there are exposed workers with conditions possibly determining a particular susceptibility (e.g. workers with implanted medical devices) to the EMF risk. Considering health surveillance, currently there aren't shared practices and criteria available. Aim of the session is to give an overlook of occupational EMF risk, including risk evaluation, health effects and the preventive measures, in particular health surveillance and the recognition of the "workers at particular risk".

Sp26-1

Risk assessment for employees with CIEDs exposed by electromagnetic fields

Carsten Alteköster and Marc Wittlich

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Introduction: Industrial applications can generate electromagnetic fields (EMFs) that are significantly stronger than those that occur in everyday applications. To protect employees from risks arising from exposure to EMF it must be ensured that the requirements of the applicable regulations are fulfilled. For Europe this is the EMF-Directive 2013/35/EU and its national implementations. A particular challenge is the assessment of the risk to employees with cardiovascular implanted medical devices (CIEDs), such as cardiac pacemakers (PMs) and implantable cardiac defibrillators (ICDs) since it is well known that CIEDs are susceptible to strong EMFs.

Methods: The EMF-Directive as well as the German EMF-Ordinance call for the protection of employees wearing CIEDs but do not provide a detailed procedure for the risk assessment of those. For this reason, technical rules have been developed to improve the usability of the EMF- Ordinance in Germany and to make it easier for employers to comply with the requirements. In addition, the research report FB 451 has been published by the German Federal Ministry of Labour and Social Affairs (BMAS), which contains further important information regarding the protection of employees wearing implants.

Results: A procedure could be established for conducting a general risk assessment, but also, if the necessary information is available, an individual risk assessment for employees with CIEDs. The latter means that individual factors, e.g. individual implant settings, are considered.

Conclusions: In most cases, it is thus possible to determine the framework conditions for continued employment.

Sp26-2**Biological effects induced by EMF exposure and conditions determining a particular risk for the exposed workers.**

Alberto Modenese, Marc Wittlich and Fabriziomaria Gobba

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Introduction: The recognition of electromagnetic fields (EMF) exposure related effects is fundamental for an appropriate prevention of the occupational risk.

Materials and Methods: Based on current scientific literature, an outline of the main health effects induced by EMF, and of the conditions determining a particular risk for the exposed workers, is provided.

Results: Occupational EMF exposure can induce both direct short-term and indirect effects. Considering long-term effects, the evidence of a causal relationship is currently evaluated as not adequate from the main authoritative institutions (e.g. IARC, FDA, ICNIRP, ARPANSA, etc). Direct effects are related to thermal mechanisms in case of high frequency EMF exposure and to the induction of currents in stimutable tissues in case of static magnetic fields, low frequency electric and magnetic fields exposure. The indirect effects of main relevance for the prevention of the occupational risk are the possible interference with the functioning of active medical devices. Interactions with the metal parts of implanted devices, including passive, and foreign bodies are also of interest. Workers with these conditions, and first of all subjects with pacemakers and ICD, should be regarded as “at particular risk”. No other conditions, with the possible exception of pregnancy, have been currently considered.

Conclusions: Up to date, EMF effects recognized as relevant for the prevention of the occupational risk can be direct short-term and indirect effects. Workers with active medical devices are the main group of subjects to be considered at particular risk.

Sp26-3**The ARPANSA indications for the prevention of the occupational risk related to EMF exposure**

Ken Karipidis

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Introduction: The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection for people and the environment including the protection of workers.

Methods: To protect workers from the harmful effects of radio-frequency (RF) electromagnetic fields (EMF), ARPANSA has published a national RF exposure standard, which was updated in February 2021. The ARPANSA RF Standard is aligned with international RF guidelines by the International Commission on Non-ionizing Radiation Protection (ICNIRP). For the protection of workers to low frequency (LF) EMF, ARPANSA recommends the ICNIRP LF guidelines. ARPANSA also supports research on occupational EMF exposure and health, and it assesses EMF exposure in different occupational settings.

Results: The ARPANSA RF Standard and the ICNIRP LF Guidelines can be applied by Work Health and Safety Regulations in different jurisdictions across Australia. Epidemiological studies conducted in

Australia to date have not found consistent evidence of a causal association between occupational EMF exposure and long-term health effects such as cancer. A key concern across all previous studies is the quality of the EMF exposure assessment.

Conclusions: ARPANSA is currently supporting a measurement program in high EMF exposure occupations and further epidemiological studies investigating cancer with improved exposure assessment methods. ARPANSA also continues to collaborate with international authorities and experts on the issue of occupational EMF exposure and health and provides information and advice to Australian workers.

Sp26-4**The health surveillance of workers exposed to EMF: an outline of criteria**

Fabriziomaria Gobba and Alberto Modenese

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Introduction: Electromagnetic fields (EMF) exposure is a recognized occupational risk, potentially involving a huge number of workers. The need of an effective Health Surveillance (HS) of such workers is unquestionable, and in some Countries is indeed mandatory, but specific health based criteria for HS of EMF exposed workers are hitherto scarcely defined.

Materials and Methods: In the European Union a specific Directive, the 2013/35/EU, provides exposure limits (ELV) for EMF occupational exposure, and lay down an obligation for the HS of exposed workers. Considering this Directive, an outline of the main criteria to be considered in the HS of EMF exposed workers in EU is discussed. These may be of interest to other Countries too.

Results: The EU Directive specifically addresses to the prevention of EMF adverse effects due to known direct biophysical effects, as stimulation of muscles, nerves or sensory organs or thermal effects, and to indirect effects as interference. Occupational EMF-exposures below the ELVs can be considered usually adequately protective against the direct effects, while for some indirect ones, e.g. interference in workers with active medical devices as pacemakers, a health risk cannot be neglected. No laboratory tests or medical investigations adequate for HS in terms of validity and performance are available.

Conclusions: The HS of occupational EMF exposed workers is mainly aimed to look up to the occurrence of any direct biophysical and indirect effects of EMF, and to screen the development of conditions possibly inducing an increased susceptibility (“workers at particular risk”).

Special Session 27 Reproductive hazard in the workplace and environment

Chair: Hsiao-Yu Yang

Session introduction

Women during pregnancy exposed to a variety of chemical, physical and psychosocial factors at work have raised concerns about their potential effects on pregnancy outcomes and birth defects in offspring. The special issue aims to conduct updated extensive reviews on (1) the effects of specific occupations on the reproductive system; (2) effects of occupational, physical exposure on the reproductive system; (3) effects of occupational psychosocial

exposure on the reproductive system; (4) effects of occupational chemical exposure on the reproductive system. The ICOH scientific committee of the Reproductive Hazards in the Workplace will summarize the core findings and derive practical implications for research and practice in occupational health.

Sp27-1

Effects of specific occupations on the reproductive system

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Introduction: Workers in specific occupations may be exposed to unknown, unspecified, or mixed factors, which could not be classified into a single hazard category. The current review aims to summarize and interpret updated epidemiologic evidence on the relationship between specific occupations and adverse reproductive outcomes among workers during 2006–2021.

Materials and Methods: Relevant studies published during 2006–2021 were identified through the search of PubMed database using "Reproduction"[MeSH Terms] AND ("occupation" OR "Occupational Exposure"[MeSH Terms]) as keywords. Only human epidemiologic studies that address specific occupations were included.

Results: Among 5,441 searched articles, 116 articles were included. For farmers, agricultural workers, and greenhouse workers (28 articles), exposure to chemical agents (pesticides) was deemed to be a significant contributor, while physical load (heavy lifting) may also have some roles. For cosmetologists and hairdressers (13 articles), chemical agents (endocrine-disrupting chemicals in hair dyes, cosmetics, or other products) appeared to be crucial risk factors, while psychosocial factors (work stress) were also mentioned. For healthcare workers, primarily nurses, mixed exposure to psychosocial factors (workloads and irregular work hours), chemical agents (sterilizing agents), physical load (heavy lifting), and physical factors (radiation) were all important themes.

Conclusions: Preventive interventions are suggested for precautionous protection of reproductive health of both women and men, and more evidence is needed to conclude.

Sp27-2

Effects of occupational physical exposure on the reproductive system

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Introduction: In 2006, a series of in-depth reviews was made to present a comprehensive picture of the role of occupational risk factors in reproductive health. The current review aims to summarize and interpret updated epidemiologic evidence on the relationship between occupational physical exposures and adverse reproductive outcomes among workers during 2006–2021.

Materials and Methods: Relevant studies published during 2006–2021 were identified through the search of Pubmed database using "Reproduction"[MeSH Terms] AND ("occupation" OR "Occupational Exposure"[MeSH Terms]) as keywords. Only human epidemiologic studies that address occupational chemical exposures were included.

Results: Among 5,441 searched articles, 59 articles were included. As with the above-mentioned reviews, radiation (23 articles) and physical workloads (25 articles) remained the mainstay of occupational reproductive hazards. Reported effects of ionizing (e.g., Gamma radiation) and non-ionizing (e.g., electromagnetic fields) radiation included adverse pregnancy outcomes, birth defects, and malignancies in the offspring. Heavy physical workloads, including heavy lifting, prolonged standing/walking, and strenuous manual jobs, were associated with adverse pregnancy outcomes. Whole-body vibration (2 articles) and noise (1 article) are also linked to adverse pregnancy outcomes.

Conclusions: Although there is only limited epidemiological evidence with mixed results, preventive interventions are suggested for precautionous protection of reproductive health of both women and men, and more evidence is needed to conclude.

Sp27-3**Effects of occupational psychosocial exposure on the reproductive system**

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⁶ Institute of Environmental and Occupational Health Sciences, National Taiwan University, Taipei, Taiwan; National Institute of Environmental Health Sciences, National Health Research Institutes, Miaoli, Taiwan

Introduction: The current review aims to summarize and interpret updated epidemiologic evidence on the relationship between occupational psychosocial exposures and adverse reproductive outcomes among workers during 2006-2021.

Materials and Methods: Relevant studies published during 2006-2021 were identified through the search of PubMed database using "Reproduction"[MeSH Terms] AND ("occupation*"OR "Occupational Exposure"[MeSH Terms] as keywords. Only human epidemiologic studies that address occupational psychosocial exposures were included.

Results: Among 5,441 searched articles, 44 articles were included. In addition to irregular work hours (17 articles, including shift works, night works, irregularities, and quick returns) and work stress (13 articles, including perceived work stress, demand-control, and effort-reward), there are also 13 articles addressing workload as an independent psychosocial factor, manifested by part-time/full-time, working hours, and consecutive workdays. Other factors like work characteristics, atypical workers, and supervisor support have also been discussed. Health effects other than pregnancy outcomes have also been addressed, including gynecological disease, menstrual problems, infertility, hypertensive disorders during pregnancy, temporal work disability during pregnancy, child atopic diseases, and child neurobehavioral development.

Conclusions: Although there is only limited epidemiological evidence with mixed results, preventive interventions are suggested for precautionary protection of reproductive health of both women and men, and more evidence is needed to conclude.

Sp27-4**Effects of occupational chemical exposure on the reproductive system**

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Introduction: The current review aims to summarize and interpret updated epidemiologic evidence on the relationship between occupational chemical exposures and adverse reproductive outcomes among workers during 2006-2021.

Materials and Methods: Relevant studies published during 2006-2021 were identified through the search of PubMed database using "Reproduction"[MeSH Terms] AND ("occupation*"OR "Occupational Exposure"[MeSH Terms] as keywords. Only human epidemiologic studies that address occupational chemical exposures were included.

Results: Among 5,441 searched articles, 212 articles were included. The importance of major findings of the above-mentioned reviews, including metals (52 articles, including lead, mercury, nickel, manganese, cadmium, aluminum, selenium, and metal welding fumes), organic solvents (26 articles, including methanol, formaldehyde, aromatic hydrocarbon solvents, toluene, and cleaning agents), pesticides (56 articles), and medications (9 articles, including antineoplastics and anesthetics), did not diminish during the last 15 years. In addition, evidence for emerging chemical agents was also noted, including bisphenol-A and phthalate (14 articles), PFAS (11 articles), PAH (8 articles), inorganic and organic particles (8 articles), disinfectants (5 articles), and VOC (4 articles).

Conclusions: Although there is only limited epidemiological evidence with mixed results, preventive interventions are suggested for precautionary protection of reproductive health of both women and men, and more evidence is needed to conclude.

Special Session 28 Occupational Health in Disaster Management, Response, Research and Preparedness

Chair: Max Lum, Rafael de la Hoz and Susanne Schunder-Tatzber

Session introduction

Experience with disaster management strategies and related research can help drive preparedness for future events. In this session, we combine the experiences of two such disasters, and summarize management, surveillance, and/or research initiatives to propose models for the role that occupational health plays in disaster preparedness.

Occupational health professionals participate in the management, outreach, surveillance, and research activities, and have a role to

play in preparedness and/or disaster planning. A review and sharing of existing experiences is key to the critical evaluation of those activities, the delineation of OH roles in the prevention and management of future disasters, and contribute to prevention and mitigation of adverse effects on populations at a global level.

Sp28-1

Integrating Medical Monitoring and Research Findings to Optimize Care for Those Responding to the September 11 (2001) Terrorist Attacks in the U.S.

Kristi Anderson and Dori B. Reissman

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Introduction: The World Trade Center Health Program's (WTCHP) mission is to optimize health and well-being for 9/11 Responders and Survivors through excellence in health surveillance, WTC-related healthcare, and research. The WTCHP provides medical monitoring and treatment for workers who responded to the 9/11 terrorist attacks, as well as for people living, schooling, or working in the NYC disaster area. The WTCHP also funds a disaster registry and portfolio of research to better understand 9/11-related health conditions and explore diagnostic and treatment uncertainties. The presentation will describe how medical surveillance, research, and healthcare can be integrated to improve clinical outcomes of those impacted by disaster, and to iteratively inform research, policy, and surveillance needs.

Materials and Methods: A Research-to-Care framework was used in program planning and evaluation to purposefully integrate new knowledge to inform high quality healthcare for members.

Results: By June 2021, over 1,000 publications were funded by the WTCHP. The registry provided valuable infrastructure to track the long-term health status of members. Innovative collaboration with the NIH led to a joint solicitation to reach new researcher pools and address emerging medical concerns.

Conclusions: Future directions include continued characterization of causal determinates and disease progression, and identification of more effective medical monitoring approaches. Additional research is needed to examine prevention and mitigation strategies intended to reduce adverse health effects in populations affected by future disasters.

Sp28-2

Unique Enhanced Outreach Initiatives of the World Trade Center Health (WTCHP) Program

Max Lum

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Introduction: The 9/11/2001 attacks on the World Trade Center in New York City (NYC), the Pentagon in Arlington, Virginia, and the plane crash in Shanksville, Pennsylvania resulted in nearly 3,000 deaths and thousands of injuries. This presentation presents

reflections and supporting data on the importance of a structured outreach program to inform members and the larger clinical emergency response community of important research findings which enhance clinical care.

Materials and Methods: The data presented in this field study were collected through an extensive self-reported health provider posttest analysis by the WebMD organization under contract provided by the National Institute for Occupational Health and data collected from a variety of social media platforms at the conclusion of a member focused outreach event.

Results: Data indicate that a structured educational program (CME/CEUs) for health professionals can result in their willingness to positively modify their practice to support improved care for their patients. Further field notes suggest a structured community outreach initiative provided in an open forum can be greatly enhanced by the appropriate use of digital platforms.

Conclusions: This presentation concludes that outreach initiatives are not based on a single event or process but a system, a suite of services that work together to support the multi-directional connection of researchers, clinicians with decision makers to better serve clinical care.

Sp28-3

Cognitive Impact of Exposure to Neurotoxicants and Psychological Trauma among the 9/11 Responders

Roberto Lucchini, Benjamin Luft, Sean Clouston, Alison Pellecchia, Evelyn Bromet, Megan Horton, Cheuk Tang, Samuel Gandy and Mary Sano

Environmental Health Sciences, Florida International University, Miami, United States of America

Introduction: Exposure to psychological trauma and fine particulate matter may increase the risk of dementia in traumatized populations including military veterans and World Trade Center responders. WTC responders were exposed to neurotoxicants including metals, PCBs, dioxins, and PAHs. Ultrafine particles can reach the brain through the olfactory pathway causing oxidative stress and chronic inflammation.

Materials and Methods: In the Stony Brook WTC cohort, 20% of responders developed PTSD since 9/11. In 2,400 responders screened with the Montreal Cognitive Assessment, the rate of Cognitive Impairment (scores <20) was 2.6%, and the association with PTSD was highly statistically significant. Aim of this study was to assess brain atrophy and dysfunction among responders with CI and PTSD. PET/MRI imaging were used to examine the structural brain patterns associated with CI in WTC responders.

Results: Several unique brain patterns of CI resulted among WTC responders compared to other signatures, such as AD. Diffuse brain atrophy, reduced cortical thickness and hippocampal sub-field volume analysis suggested that reductions in specific subregions are associated with duration of WTC exposure.

Conclusions: These findings support the hypothesis that WTC exposure is causing long term neurodegenerative impacts. The neuro-phenotype of this impairment is different from the AD, and inconsistent with signatures developed for known neurodegenerative diseases. Our work supports the view that WTC-CI may be a WTC-specific encephalopathy with an unknown etiology characterized by widespread cortical atrophy.

Sp28-4**Terrorist Paris Attack: Lessons in Occupational Health**

Alexis Descatha

Angers University Hospital Center, Institut national de la santé et de la recherche médicale, University of Angers, Angers, France

Introduction: We aim to describe the multiple aspects of the role that occupational health practitioners might play, by focusing on the recent example of the Paris terrorist attack of November 2015. **Materials and Methods:** During and after the Paris attack, occupational practitioners, in collaboration with emergency and security professionals, were involved in psychological care, assembling information, follow-up, return-to-work, and improving in-company safety plans.

Results: In the critical phase, the occupational practitioner cares for patients before the emergency professionals take charge, initiates the psychological management, and may also play an organizational role for company health aspects. In the post-critical phase, he or she would be involved in monitoring those affected by the events and participate in preventing, to the extent possible, posttraumatic stress disorder, helping victims in the return-to-work process, and improving procedures and organizing drills. In addition to their usual work of primary prevention, occupational practitioners should endeavor to improve preparedness in the anticipation phase, by taking part in contingency planning, training in first aid, and defining immediately applicable protocols.

Conclusions: In conclusion, in massive catastrophic events, occupational health practitioners are more and more frequently involved in the management of such situations.

Special Session 29 Pesticides Issue with a Focus on Glyphosate

Chair: Claudio Colosio

Session introduction

This Session deals with different aspects of the widely used pesticide, Glyphosate, its toxicological profile and carcinogenic potential. Glyphosate-based herbicides have effects on occupationally exposed persons and general population. Global studies with experimental evidence and developments in evaluation of carcinogenicity of Glyphosate, its toxic effects and current risk-assessment will be presented. Whether the classification of chemicals under carcinogenic effects should be continued or not will be discussed.

Sp29-1**The Global Glyphosate Study: experimental evidence on the most widely used herbicide worldwide**

Daniele Mandrioli, Simona Panzacchi, Eva Tibaldi, Federica Gnudi, Andrea Vornoli, Laura Falcioni, Luciano Bua and Fiorella Belpoggi

Ramazzini Institute, Cesare Maltoni Cancer Research Center, Bologna, Italy

Introduction: The Ramazzini Institute, together with an international group of independent Institutes and Universities, has launched in 2017 a pilot study and in 2019 started the most

comprehensive study (long-term integrated study) ever on glyphosate-based herbicides (GBHs), world's most used weedkiller. The study is named Global Glyphosate Study

Materials and Methods: In the pilot study, pure glyphosate or Roundup Bioflow, were administered to SD rats in drinking water at 1.75 mg/kg bw/day to F0 dams starting from the gestational day (GD) 6 (in utero) up to postnatal day (PND) 120. In the long-term integrated study, animals were divided in ten study groups: control (drinking water), pure glyphosate (at 0.5, 5 and 50 mg/Kg/bw/day), Roundup Bioflow (0.5, 5 and 50 mg/Kg/bw/day glyphosate equivalent), and Ranger Pro (0.5, 5 and 50 mg/Kg/ bw/day glyphosate equivalent)

Results: The full results of the pilot study on genotoxicity and pathology will be presented. The study first results of the long-term integrated phase will be presented and its multiple arms include: genotoxicity, prenatal-developmental toxicity, neurotoxicity, multi-generational effects, endocrine disruption and microbiome effects, and, in the long term perspective, carcinogenicity, on SD rats

Conclusions: Results on the Pilot Phase of Global Glyphosate Study showed adverse effects on reproduction-development, microbiome and genotoxicity at exposure levels that are currently considered safe and legally acceptable (US ADI 1,75mg/Kg/bw). The long-term effects and the possible endocrine disruptive effects of GBHs are one of the main focuses of the integrated study.

Sp29-2**Glyphosate-Based Herbicides and Risk for Haematological Malignancy in Exposed Humans: An updated overview**

Luoping Zhang

University of California at Berkeley, School of Public Health, Berkeley, USA

Introduction: The carcinogenic potential of glyphosate-based herbicides (GBH), is largely debated. Whether exposure to GBH is linked to haematological cancers warrants major concern among the public and scientific community

Methods: Based on our previously conducted systematic review and meta-analysis on GBH and non-Hodgkin lymphoma (NHL), recently published epidemiological studies of all types are included in this overview

Results: The 41% increased NHL risk reported previously (Zhang 2019) is confirmed by a new meta-analysis (Kabat 2021). Donato (2020) reported increased meta-risk at 31% (95%CI: 0.93-1.7) for DLBCL, similar to 29% (1.02-1.63) reported by Boffetta (2021). A pooled analysis (Pahwa 2019) of two case-control studies demonstrated GBH exposure is linked to both NHL and DLBCL. Leon (2019) pooled 3 cohorts and reported a positive association to DLBCL with 36% increased risk (1.00-1.85). A new case-control study (Meloni 2021) showed that follicular lymphoma (FL) risk was elevated 7-fold in subjects with medium-high confidence of ever exposure (OR=7.1, 1.57-31.9). An updated AHS (Andreotti 2018) reported GBH-increased AML risks at Q1 and Q4 as RR=1.62 (0.60-4.38) and 2.44 (0.94-6.32), respectively. After subjects with assigned alternative imputation estimates were removed, the AML risk was increased to 2.65 at Q1 or 3.87 at Q4.

Conclusions: The results from current studies published after IARC's original evaluation indicate GBH are associated with increased risks of haematological malignance, either NHL or its subtype (DLBCL or FL) or AML. The existing human evidence of this link is compelling rather than suggestive.

Sp29-3**Evaluation of the Carcinogenicity of Glyphosate by the IARC Monographs Programme and New Developments.**

Kurt Straif

IS Global, Barcelona, Spain, and Boston College, MA, USA, Boston College, Boston, USA

Introduction: Glyphosate is the most heavily used herbicide, used in more than 750 different products. Its use has increased substantially with the marketing of genetically modified glyphosate-resistant crop varieties.

Materials and Methods: The IARC Monographs programme convenes international expert groups to systematically review and evaluate the carcinogenic hazard to humans of environmental agents. The Preamble to the IARC Monographs defines selection of experts (with consideration of conflict of interests), eligibility of data, and provides guidance on review of published data and evaluation of carcinogenicity.

Results and Conclusions: In humans, there was limited evidence for the carcinogenicity of glyphosate. Case-control studies of occupational exposure in the USA, Canada, and Sweden reported increased risks for non-Hodgkin lymphoma that persisted after adjustment for other pesticides. In experimental animals, in male CD-1 mice, glyphosate induced a positive trend in the incidence of renal tubule carcinoma, a rare tumour. Another study reported a positive trend for haemangiosarcoma in male mice. Glyphosate has been detected in the blood and urine of agricultural workers. Glyphosate and glyphosate-based (GBF) formulations induced DNA and chromosomal damage in mammals, and in human and animal cells in vitro. One study reported increases in micronuclei in residents of several communities after spraying of GBF. Based on limited evidence in humans, sufficient evidence in experimental animals, and corroborated by strong mechanistic evidence the Working Group classified glyphosate as "probably carcinogenic to humans".

Sp29-4**Classification of chemicals for carcinogenic effects: why it is time to abandon it**

Angelo Moretto

University of Padova, Department of Cardio-Thoraco-Vascular and Public Health Sciences, Padua, Italy

Introduction: Classification schemes for carcinogenicity are based on hazard-identification without characterization of dose-response, duration of exposure and mode of action.

Materials and Methods: This approach is adopted by the International Agency for Research on Cancer in its monograph program, by the UN global harmonized system for classification, adopted among others, by the EU. This scheme is based on a concept, developed in the 1970s, that chemicals could be divided in just two classes: carcinogens and noncarcinogens.

Results: As a consequence of this criterion of categorization, agents with up to seven orders of magnitude differences in potencies, and different modes of action are put into same category, e.g. eating processed meat is in same category as asbestos. However, more modern strategies as e.g. those described by the US EPA, the UK Committee on Carcinogenicity, and the former EU SCOEL propose approaches that, once carcinogenic potential has been identified, on one hand, hazard should be characterized with respect to dose

response and mode of action, on the other hand, exposure should be considered in order to carry out an informed risk assessment. At this point risk management actions can be taken.

Conclusions: This risk-based decision framework avoids unintended downsides of a hazard only approach, e.g. health scares, unnecessary economic costs, loss of beneficial products, adoption of strategies with greater health costs, and the diversion of public funds into unnecessary research. An initiative to agree upon a standardized, internationally acceptable methodology for carcinogen assessment is needed now.

Special Session 30 Rural Health: Effects of Pesticides and Dust

Chair: Sashi Chandrasekar

Session introduction

This Session deals with the agricultural exposure to pesticides and organic dust in the work environment and its health effects in the rural workers. The recent research on pesticide exposure and effects of dust on lung function will be presented. Airborne exposures are recognized as risk factors for accelerated decline in lung function leading to severe health effects like COPD and cancer. Learning outcomes from this session are - Neurobehavioral effects, cancer and chronic degenerative disorders of pesticides exposure and Effects of organic dust and pesticides and the associated respiratory symptoms and risk factors in agricultural workers.

Sp30-1**Neurobehavioral effects of low-dose chronic exposure to pesticides: which evidence from epidemiological studies?**Claudio Colosio¹, Lidia Guerrieri², Senid Kenjebekova³ and E.M. Rubino³¹ Department of Health Sciences, University of Milano, Milan, Italy,² Post graduate school of Occupational Health of the University of Milano, ³ Department of Health Sciences of the University of Milano, Occupational Health Unit and International Centre for Rural Health of the SS, Paolo and Carlo Hospitals, Milano, Italy

Introduction: The human population, including vulnerable subgroups such as children and pregnant women, is occupationally or environmentally exposed to pesticides. Most insecticides use a neurotoxic mechanism of action, with observed neurobehavioral changes in exposed subjects. Therefore, evaluating possible neurobehavioral effects is an important issue.

Materials and Methods: A custom Pubmed search string identified 550 articles between May 2008 and July 2019, of which only 76 were pertinent. Studies were classified by target population (occupational, non-occupational) and pesticides. Investigated neurobehavioral effects were sorted into 4 domains: cognitive, psychomotor, sensorimotor and psychosocial functions. Study strength was ranked.

Results: More non-occupational than occupational exposure studies were published. Of the 76 selected studies, 13 (17%) ranked as high quality. 36 (48%) appraised only one neurobehavioral domain, mostly cognitive or psychosocial, using >20 different panels of tests. Mother-child studies with pre-and postnatal exposure assessment often yield inconsistent results. Pre or postnatal exposure was associated with neurobehavioral impairment; with cognitive decrement, but not psychomotor or psychosocial;

problems with attention, but not cognitive; some neurobehavioral effects change as the children grew; gender, race and socioeconomic status significantly affect the results.

Conclusions: Occupational exposure studies commonly included past acute pesticide poisoning cases or highly exposed participants, though a trend in cognitive and psychosocial domain was observed.

Sp30-2

Cancer risk and pesticide use in agricultural settings

Pierluigi Cocco

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Introduction: The International Agency for Research on Cancer (IARC) classifies for four obsolete agrochemicals, namely arsenic compounds, lindane, 1,2-dichloropropane, and pentachlorophenol, as Group 1 human carcinogens. Most of the nine classified as probable human carcinogens (Group 2A) have been phased out. Possible human carcinogens (Group 2B) include 21 pesticides, and for 32 the evidence appears inadequate to classify their potential human carcinogenicity (Group 3).

Materials and Methods: An extensive review of the literature and of the IARC Monographs 1-128 was conducted.

Results: Cancer sites associated with IARC Group 1 and 2A pesticides include NHL (DDT, diazinon, glyphosate, lindane, malathion, and pentachlorophenol), leukaemia (diazinon), breast (dieldrin), liver (DDT), and lung cancer (diazinon), and cancer of the prostate (malathion), and the testis (DDT). No human studies were available for 3,3',4,4'tetrachloroazobenzene. In some instances, the summary evaluations of the IARC Working Groups did not exactly correspond to the evaluation criteria. The cases of DDT and mancozeb are two examples of opposite sign. The inadequacy of exposure assessment of agricultural exposures might have contributed to the uncertainty in interpreting epidemiological results of pesticide use.

Conclusions: U.S. and European experiences linking monitoring data of pesticide exposure with comprehensive cancer registration among farmers have allowed advances in the research on the potential human carcinogenicity of specific agrochemicals. Further such attempts need to be pursued worldwide.

Sp30-3

Respiratory symptoms among farmers in Victoria and reducing exposures

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Introduction: Farmers are exposed to significant sources of respiratory irritants and allergens. These include organic dusts, moulds and pesticides. Farm work activities such as handling of animals, harvesting, feeding of grains, hay and cleaning pens, generates significant amounts of dusts.

Materials and Methods: This respiratory study was undertaken as part of the Sustainable Farm Families (SFF) program, undertaken across 54 sites and included the major agricultural industries of

dairy, cropping, beef, sheep and horticulture. It involved farm men and women in health, wellbeing and safety interventions and included a survey for respiratory symptoms and screening for Chronic Obstructive Pulmonary Disease (COPD) using the Piko-6. Results: Of the 1028 farmers included in the study, 688 reported one or more respiratory symptoms over the past 12 months, including nasal congestion (30.4%), cough with phlegm (19.4%), frequent cough 142 (9.8%), wheeziness and shortness of breath. 7.6% of the farmers were current smokers. 310 (30.15%) farmers reported respiratory symptoms after working with livestock, chemicals, grains and dust. Farmers (n=197) recording a FEV1/FEV6 < .75 were recommended for further follow up.

Conclusions: The study shows different respiratory symptoms amongst farmers, with different farming enterprises and in non-smokers. Increased knowledge of exposures, prevention and treatment were recommended and followed up.

Sp30-4

Agricultural exposure and COPD – an update

Vivi Schlünssen and Anne Vested

Department of Public Health, Danish Ramazzini Centre Aarhus University, Copenhagen, Denmark

Introduction: COPD, a leading cause of death worldwide, is defined as the presence of a relevant respiratory symptom plus spirometrically proven irreversible airways obstruction in the absence of other diseases. Key exposures in agriculture related to the development of COPD are pesticides and organic dust, a mixture of particles originating from plants, animals, and microorganisms. The objective of the presentation is to provide an update of the associations between pesticide and organic dust exposure and development/severity of COPD.

Materials and Methods: A narrative review on the association between pesticides or organic dust and COPD served as the basis for this presentation.

Results: Studies point towards a detrimental effect of occupational pesticide exposure on lung function and COPD, but the evidence is still relatively sparse. Occupational organic dust exposure is overall a well-established risk factor for accelerated decline in lung function and COPD development. How occupational pesticide and organic dust exposure impacts severity of COPD is barely studied. Early life exposure to organic dust might predict a higher lung function in adulthood.

Conclusions: Based on the current knowledge on occupational pesticide and organic dust exposure in agriculture preventive measures are justified to avoid work related COPD (and other outcomes) among exposed workers. The impact of timing of organic exposure as well as the relation between occupational and environmental exposure to organic dust (levels as well as diversity of microorganisms) has to be further investigated.

Special Session 31 Recovery from Shiftwork: Approaches and Experience

Chair: Stephen Popkin

Session introduction

Shiftwork is known to lead to unintended, negative outcomes, if not managed. These outcomes span sleep deprivation and its constellation of problems; family and social issues, and organizational

productivity and safety concerns. Recovery is a key concept that gets lost as it is often falls outside of rules and regulations, which typically focus on developing better scheduling practices and related technologies. This session will focus on the latest thinking regarding work schedule recovery methods and related training paradigms.

Sp31-1

Scheduling of night shift work

Anne Helene Garde

National Research Centre for the Working Environment, Copenhagen, Denmark

Introduction: After the evaluation by IARC on night shift work and cancer in 2019, we experienced several requests from occupational health professionals and authorities on how to organize night shift work. In response, the aim was to provide scientifically based recommendations on night shift schedules that reduce risk of cancer, cardio-metabolic disease and injuries.

Materials and Methods: At a workshop in 2020, acute physiological effects and associations between night shift schedules were discussed. The 15 participants each identified the most relevant scientific literature within their main research area. A supplementary literature search was performed to identify cohort and case-control studies and meta-analysis that assessed at least two or more categories of a night shift scheduling.

Results: The consensus was that schedules, which reduce circadian disruption, may reduce cancer risk, particularly for breast cancer, and schedules that optimize sleep and reduce fatigue may reduce the occurrence of injuries. This is generally achieved with fewer consecutive night shifts, sufficient shift intervals, and shorter night shift duration

Conclusions: Based on the limited, existing literature, we recommended that in order to reduce the risk of injuries and possibly breast cancer, night shift schedules have:

- =3 consecutive night shifts;
- shift intervals of =11 hours; and
- =9 hours shift duration.

In special cases – eg, oil rigs and other isolated workplaces with better possibilities to adapt to daytime sleep – additional or other recommendations may apply.

Sp31-2

Implementation of the scientific research on shift work, recovery and health in the social and health care sector of Finland

Mikko Härmä

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Introduction: Shift scheduling with computerized methods is common. FIOH has produced Traffic Light Recommendations for the length, timing, recovery and social life -related characteristics of the working hours since 2015. The recommendations are based on Scandinavian payroll-based data on working hour characteristics supporting health and recovery in the social and health care (SHC) sector. In Finland, the Working Hours in the Finnish Public Sector

(WHFPS) study of over 205 000 employees since 2000 has contributed mostly to the production of the recommendations. WHFPS is based on data from Titania® (CGI Finland) shift scheduling software used by the majority of the SHC sector in Finland. Results: FIOH Traffic light recommendations have been implemented to the Titania® shift scheduling apps including the basic shift planning, optimization and self-scheduling tools. They evaluate or optimize the new schedules against the FIOH traffic light recommendations. Secondly, FIOH gives direct feedback to the SHC organizations on their annual trends in working hours characteristics (“Shift Work Report”).

Conclusions: Based on the detailed data on the use of the FIOH recommendations in shift scheduling during the last 6 years, we are currently evaluating the effectiveness of our recommendations in relation to changes in working hours characteristics, sickness absence and occupational injuries. Based on the preliminary historical data, the FIOH recommendations were used by 22% of the shift planners. In general, the use of quick returns and several consecutive night shifts has decreased in the SHC sector.

Sp31-3

Shared Responsibility: a legal framework for managing the risks associated with non-work related activities

Drew Dawson

Central Queensland University, Appleton Institute, Adelaide, Australia

Recovery from sleep and social disruption of shift work has typically relied on prescriptive working time arrangements. Break minima and work hour limits worked are the most common ways of doing this. From this perspective, employees are ‘released’ from work in order to rest and recover. Fitness-for-work (FFW) is inferred on the basis of compliance with the defined working time arrangement. However, the experience of many shift workers and a significant body of research indicates that employees are sometimes unable to recover sufficiently despite an adequate sleep opportunity.

To address this concern some regulators and organisations are now developing policies that formally address,

- (1) the reasonably foreseeable effects of non-work activities on FFW and
- (2) extend employee workplace safety obligations to cover the risks associated with an unsafe return-to-work due to non-work activities.

Broadly, employees are provided with guidance on how to determine FFW based on prior sleep/wake behaviour. The employer also assigns formal responsibility for determining FFW to the employee and reporting this to the organisation. In low risk settings this is more typically done using an exception reporting model. That is, unless otherwise indicated, the employer assumes the employee is fit-for work. In higher risk settings this is more typically done by documenting FFW. Given the likely increase in employees reporting unfit for work, organisations will also typically develop ‘just culture’ procedures for managing and mitigating the risk associated with employees reporting unfit for work due to non-work activities.

Sp31-4**Sleep and task related fatigue in automated vehicles: Measures and countermeasures**

Stephen Popkin and Donald Fisher

US Department of Transportation, Volpe National Transportation Systems Center, Cambridge, USA

Introduction: Fatigue is a major cause of injuries and death, especially in transportation. FRMS exist to address this problem, often using a defenses in depth model focused primarily on increasing opportunities for sleep as well as sleep itself. However, it is critical to address the problem in real time, identifying the antecedent behaviors before fatigue related error and, where possible, selecting appropriate countermeasures that reduce or mitigate fatigue. The problem has become more complicated with the development and deployment of the six different levels of automated driving systems. **Materials and Methods:** Relevant research was retrieved using both Boolean and snowball searches. Datasets included TRID, PubMed, and Google.

Results: A careful review of the literature indicates that drivers' task related active and passive fatigue differ in kind and amount at each of the four lower levels of automation (L0 – L3), each type of task fatigue interacting with sleep related fatigue. A conceptual framework is developed that can be used to identify what additional research is needed at each of the four lower levels of automation to advance our understanding of the reliable and valid measures of sleep and task related fatigue as well as efficient and effective countermeasures to recover from, reduce, or mitigate fatigue in the vehicle.

Conclusions: Given the increasing prevalence of automation, it is critical to understand at each level of automation what research is needed in order best to measure fatigue and to implement successful countermeasures that reduce, mitigate or potentially allow recovery from fatigue.

Sp31-5**Working 5(pm) to 9(am), What a way to make a living: Strategies for shift workers to recover during their time off**

Imelda Wong¹ and Anna Arlinghaus²

¹ CDC/NIOSH, Division of Science Integration, Cincinnati, United States, ² XIMES GmbH, Austria

Shift work, defined as work schedules outside of traditional daytime hours, can require workers to work during normal sleep times and sleep during daylight, contributing to poor or insufficient sleep with adverse health and safety outcomes. Working unsocial hours also encroaches on time for family, social and leisure activity, resulting in further negative ramifications for family and personal lives. For married parents working night shifts, the risk of separation or divorce is increased. Studies have also reported that children of shift working parents have poorer emotional and developmental outcomes, and a greater likelihood of risky behavior in adolescence. This presentation, as part of the ICOH 2022 session

“Recovery from Shiftwork: Approaches and Experience”, will provide an overview of strategies workers can adopt to reduce the adverse health and safety effects associated with shift work. We will build upon other presentations during this session that discuss organizational strategies to provide workers with opportunities for rest and recovery, as mitigating work-related fatigue risk is a shared responsibility. Individual-level strategies to be discussed include good sleep hygiene, napping, strategic caffeine use, phase shifting sleep schedules and restrictions on diet and exercise before bedtime. In addition, we will provide an overview of the current evidence surrounding working time arrangements in relation to social and family variables, and suggestions to improve work-life balance and social well-being at societal, organizational, and individual levels.

Special Session 32 Migrant Workers' Health: Solutions to empower and inspire change

Chair: Mahinda Seneviratne

Session introduction

Images of thousands of migrant workers trekking to distant home villages in India and of Venezuelan migrants walking an entire continent to find dignifying work gave a glimpse of the unequal impact of the Covid-19 pandemic. Migrant workers, from construction sites in the Gulf States or farms in California to hospitality venues in any major city, are a major component of the global workforce. Why is their health & well-being grossly overlooked or ignored? Speakers share insights from different continents to explore factors that contribute to this neglect. This session will draw attention to the historic inequities and social determinants being exacerbated by the pandemic and provide avenues for action to exhort host countries and empower migrant workers to improve their working conditions.

Sp32-1**Health outcomes in low-skilled labour migrants**

Sally Hargreaves

University of London, The Migrant Health Research Group, Institute for Infection and Immunity, St George's, London, United Kingdom (UK)

Introduction: Globally, there are more than 150 million international migrant workers—individuals who are employed outside of their country of origin—comprising the largest international migrant group. A substantial number of low-skilled labour migrants work in hazardous and exploitative environments, where they might be at considerable risk of injury and ill health.

Materials and Methods: Data suggest this group may have been disproportionately impacted by the COVID-19 pandemic, due to increased workplace exposure and other risk factors and vulnerabilities they face in the host country.

Results: However, little data exist with which to inform global policy making and delivery of health services.

Conclusions: Dr Hargreaves will explore the health datasets that exist, current gaps, and next steps towards improving the health of this under-researched group.

Sp32-2

Health vulnerabilities of cross-border migrants in Nepal, a cross-sectional mix-method study

KC Radheshyam Krishna¹ and Koliitha Prabhash Wickramage²

¹UN Migration Agency, International Organization for Migration, Kathmandu, Nepal, ²International Organization for Migration, UN Migration Agency, Migration Health Division, Geneva

Introduction: Migration from Nepal to India has a long history with the free-movement treaty galvanized in the 1950's, facilitating travel, trade, and migration. Labor migration is a prominent feature of this cross-border movement, with an estimated number ranging between 0.5 to 3 million. This study aimed at exploring various health issues and barriers faced by migrants in India.

Materials and Methods: A community-based cross-sectional study was conducted in six districts of Nepal in 2018 among 751 participants with at least six months of work history in India. The information was collected from 24 randomly selected clusters, using a tool adopted utilizing already validated survey questionnaires.

Results: The study revealed that vector-borne illnesses (malaria and dengue) were the primary concerns of all study participants, followed by work-related accidents, non-communicable diseases (hypertension and diabetes), and mental health issues. The prevalence of tobacco and alcohol use was high. Due to the lack of migrant-sensitive health services in India, many migrants face discrimination in accessing health services. The living and working condition further make them vulnerable to diseases, including occupational health issues.

Conclusions: The study's findings aim to provide evidence for the policymakers for formulating policies to address various health vulnerabilities of migrant workers in India. Cross-country collaboration with the initiation of health insurance schemes and information sharing platforms would capacitate migrants with the correct health information to minimize health risks and improve access to services.

Sp32-3

Preventing Work-Related Musculoskeletal Disorders (WMSDs) in New York City Informal Migrant Workers

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Introduction: WMSDs are among the most frequent causes of lost or restricted work time. Historic barriers have made it very difficult to access workplaces and perform onsite interventions, in part due to adversarial labor (unions) management relations, liability concerns and the absence of an ergonomics standard relying solely on vague and unspecific General Duty Clause. This historic footprint has increased the health disparity among certain working populations e.g. ethnic/racial, informal and migrant workers.

Materials and Methods: We found that community-based and culturally sensitive cooperation between community health and

occupational health clinics sought to address this issue with better success, especially among the most vulnerable occupations.

Results: This experience has allowed us to build evidence which will be used to expand the program to other industries with essential vulnerable occupations, without requiring on-site evaluations of every workplace.

Conclusions: The EEU is novel in concept, because it integrates different health services into one program that are commonly performed by multiple health professionals. We are able to perform workplace ergonomic evaluations that mimic and measure physical motions employed during work, in a safe and controlled setting, without the need to gain access to their workplace. This project has an important significance by its participatory approach based on the principles of participatory ergonomics where employers, workers and community advocacy groups are part of the process to provide high quality service to the most vulnerable workers of New York City.

Sp32-4

Migrant Workers and Covid-19

Barry Kistnasamy

Department of Health, South Africa

Migrant workers, including internal migrants who move from rural to urban areas searching for employment, face multiple barriers in accessing health and other services, in particular occupational health. The Covid-19 pandemic highlighted the need for coordinated responses by countries and regions that include pandemic preparedness, public health interventions, lockdowns, economic support (food relief, etc) and vaccinations. Disease transmission controls and restrictions due to stringent border management, vaccination certificates and testing have hit migrant workers hard. The health, economic needs and mobility of migrants due to the pandemic may be overlooked in the overall Covid-19 response. The social and working conditions of migrants make them vulnerable to Covid-19. The decline in remittances and lack of employment has negative consequences for their families and communities. Interventions, with Covid-19 messaging appropriately to migrant worker needs, access to health services including vaccinations, and accommodation and food security assistance are important. Mental health needs are crucial due to their precarious work, living conditions and lack of family support. Trade unions and large employers may support workers through workplace Covid-19 interventions. Migrant workers in SMEs and domestic workers are at risk of unemployment due to their employers becoming unemployed or transmission risk fears. Multilateral instruments to protect migrant worker rights should be incorporated into country responses to Covid-19 and future epidemics and disasters to save lives and livelihoods including those of migrant workers.

Special Session 33 Preventing occupational respiratory disease in SMEs: Sharing solutions from silicosis experiences

Chair: Rafael de la Hoz

Session introduction

Silicosis remains the leading occupational respiratory disease in the world. Several obstacles interfere with its control, including ubiquitous exposures in both traditional and new economic activities,

insufficient exposure controls or its weak enforcement, and economic structures favoring intense mineral resource exploitation. Those barriers are even more limiting in small enterprises and the informal sector, that constitute a substantial proportion of many countries' economy. While economic development, political will and regulatory enforcement align themselves to implement effective occupational disease prevention, several partial or palliative solutions have been proposed in different regions globally to achieve some level of exposure control, surveillance and possibly prevention.

Sp33-1

Silica Exposure Appears Causal in Resurgent Severe Coal Workers' Pneumoconiosis

Robert Cohen¹, Cecile Rose², Leonard Go³, Lauren Zell-Baran², Kirsten Almberg³, Emily Sarver⁴, Heather Lowers⁵, Cayla Iwaniuk³, Sidney Clingerman², Diane Richardson⁶, Jerrold Abraham⁷, Carlyne Cool², Angela Franko⁸, Ann Hubbs⁶, Jill Murray⁹, Marlene Orandle⁶, Soma Sanyal⁷, Naseema Vorajee¹⁰, Edward Petsonk¹¹, Rafia Zulfikar¹¹ and Francis Green⁸

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Introduction: There has been an alarming increase in the prevalence of coal workers' pneumoconiosis (CWP) and its most severe forms, including progressive massive fibrosis (PMF), in the United States. Several lines of evidence point to excessive respirable crystalline silica (RCS) exposure as the main driving force behind this resurgent epidemic.

Materials and Methods: Pathology and mineralogy in lung specimens with PMF from US coal miners born after 1930 (contemporary) were compared to those born before 1930 (historical). Continuous variables were examined by pathologic feature type using t-tests with pooled or Satterthwaite results as appropriate. ANOVA Tukey's pairwise comparisons were used to compare mean differences in continuous variables across multiple groups. A p-value = 0.05 was considered significant.

Findings: A significantly higher prevalence of silica-type PMF (57% vs. 18%, p<0.001) was found among contemporary miners compared to their historical counterparts. Mineral dust alveolar proteinosis (MDAP) was also more prevalent in contemporary miners (70% vs. 37%, p<0.01). In situ mineralogic analysis showed the mean percentage and concentration of silica particles was significantly greater in specimens from contemporary miners. Silica concentration was significantly greater when silica-type PMF, MDAP, silicotic nodules or immature silicotic nodules were present (p<0.05).

Conclusions: RCS exposure appears causal in the unexpected surge in severe CWP in contemporary US coal miners. These findings underscore the importance of controlling workplace silica exposure to prevent such disabling and untreatable disease.

Sp33-2

Exposure prevention and health surveillance of low-income workers in small rural enterprises in India

Ashish Mittal

OHS-MCS, Occupational Health, New Delhi, India

Introduction: In India, an estimated 3 million workers are at high risk of exposure to silica; 1.7 million work in mining or quarrying activity, 0.6 million in the manufacture of non-metallic products (refractory, clay, glass and mica) and 0.7 million in the metals industry. Around 5.3 million construction workers are also at risk of silica exposure. There is high incidence of silicosis with high mortality among these workers, mainly in SME and rural enterprises. **Materials and Methods:** Secondary literature review.

Results: India has about 63 million MSMEs contributing about 29% towards the GDP through its national and international trade. Small scale mines, ceramics, potteries, refractories, foundries, metal grinding units, stone crushers, agate grinding, slate pencil industry and construction etc. are the major industries reporting highest number of silicosis e.g. slate pencil industry 54%, agate industry 19-22%, quartz grinding 12%, stone quarries 22%, mica processing industry 6%. The preventive control mechanism in these enterprises is non-existing. Wet method technologies are not practical for scarcity of water. Engineering controls require additional investments and maintenance. Prescribed annual medical examination are not undertaken by these enterprises. A worker is diagnosed only after he is symptomatic for long time or disabled or have tuberculosis as main presenting ailment.

Conclusions: Reported cases of silicosis are only the tip of the iceberg. Millions of silica exposed workers need robust exposure control program at workplace and medical surveillance for early diagnosis, rehabilitation and treatment.

Sp33-3

Improving Occupational Health of Artisanal Mining Communities in Northern Nigeria

Manti Michael¹ and Perry Gottesfeld²

¹ Occupational Knowledge International, Industrial Hygiene Project Coordinator, Dar es Salaam, Tanzania, ² Occupational Knowledge International, San Francisco, USA

Introduction: Artisanal small-scale gold and lead mining communities in Northern Nigeria are faced with kidnappings, violence, and rising numbers of internally displaced people due to insecurity. People generally depend on mining activities to supplement farming. An ongoing lead poisoning crisis across this region has resulted in hundreds of deaths among children and thousands of adults are over-exposed to lead from the ore. In response, Occupational Knowledge International and Doctors Without Borders formed a partnership to conduct a pilot project to introduce safer mining practices in select communities to reduce lead poisoning and silica dust exposures.

Materials and Methods: Earning trust and cooperation of miners, village chiefs, religious authorities and state level staff through outreach and training were key to addressing health and introducing safer practices. To install low-cost water spray misting, miners contributed labor, equipment, and limited financial investments. The establishment of Health & safety committees helped build capacity to sustain and take on oversight responsibility. **Results:** We trained over 4,000 miners and 40 State and local government officers. Trainings were well received as miners expressed appreciation and changed work practices over time. Respirable silica exposures were reduced by 80%.

Conclusions: We have successfully proven a model approach to working with miners to reduce silica dust, lead exposures and raise awareness of occupational health risks under challenging conditions. Similar programs should be taken to scale throughout Nigeria and other countries.

Sp33-4

Advice and assistance on dust exposure controls: An effective regulatory approach at micro-small enterprises in Australia

Mahinda Seneviratne

SafeWork NSW, Hygiene & Toxicology, Sydney, Australia

Introduction: Accelerated silicosis among engineered stone fabrication workers renewed attention on the oldest known occupational lung disease which kills several thousand workers globally each year. Most workers diagnosed in Spain, Israel, Italy and then in the US, China and Australia had no knowledge of the health hazards and were precariously employed in micro-small enterprises without occupational health risk management capability. Can regulatory intervention assist such enterprises and ensure their workers are protected?

Materials and Methods: Published literature on this 'epidemic' of silicosis in different countries was reviewed. Regulatory experiences with the stone fabrication industry in Australia are described, with focus on advice & assistance on preventing silicosis.

Results: Crystalline silica exposure in fabrication tasks exceeded the Australian Exposure Standard of 0.1 mg/m³ prior to regulatory intervention. Wet methods, dust extraction and fitted respiratory protection were implemented through enforcement action combined with technical advice & assistance. Health literacy on silicosis was raised through various hazard communication material and modes of dissemination.

Conclusions: Regulatory interventions with targeted advice & assistance had a rapid impact on improving exposure control in micro-small enterprises. With global expansion of engineered stone manufacturing and its use, more workers in several countries are increasingly at risk of silicosis. With well-resourced regulatory agencies a major challenge for low-middle income countries, a multi-agency, interdisciplinary approach is urgently needed.

Special Session 34 Climate change, workplace heat and occupational health and productivity

Chair: Jason Lee

Session introduction

This session will highlight the many features of climate change that challenge health and productivity of working people. Excessive climate conditions also can increase workplace injury rates. The

direct effects of heat on working people are well established in physiological science, but there are important gaps in the evidence underpinning quantitative occupational health impact assessments. Problems associated on working people in harsh conditions and practical solutions will be presented. Often overlooked, the social impacts of heat at and off workplaces are equally important and therefore must also be considered. Economically, we seek to ensure the resultant benefits of any heat management strategy should outweigh the implementation cost.

Sp34-1

Workers' health and work productivity - accounting for their physiology

Jason Lee

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Occupational heat stress can induce heat illnesses and accidents, and degrade work productivity. Heat stress is mainly dependent on environmental factors, metabolic heat production and type of clothing. The overall physiological responses from heat stress determines heat strain. Environmental determinants alone are therefore insufficient to quantify heat strain. To fully understand the impact of heat on individuals, both behavioural and physiological responses are important. Behavioural thermoregulation should first be considered such as providing work-rest cycles, allowing self-pacing during work etc., coupled with other physiological interventions to reduce heat strain. High heat stress can also worsen existing health conditions and there is therefore a need to understand the specific physiological pathways for the increased heat sensitivity of workers with diseases to allow the correct heat mitigation strategy to be employed. Understanding the biophysiological aspects of heat exchange between the worker and the surrounding environment is essential to determine the efficacy of various cooling strategies under different conditions. In conclusion, guidelines to augment workers' health and safety that are solely based on climatic conditions have limited efficacy. The "one size fits all" approach will incur productivity losses for heat-tolerant individuals while compromising heat-intolerant workers.

Sp34-2

Impacts and implications of heat exposure in the Australian workplaces

Matt Brearley

National Critical Care and Trauma Response Centre, Darwin, Australia

Introduction: Performing physical work while exposed to Australia's harsh climatic conditions challenges thermoregulation, and potentially impairs worker health, safety and productivity.

Materials and Methods: A series of research studies examining the perceived heat stress symptoms and related impacts, workplace injury rates and physiological responses of heat-exposed Australian workers were reviewed. Data is derived from cross-sectional workforce surveys, workers compensation statistics and analysis of worker core temperature from recent years.

Results: Heat stress symptoms were frequently reported during the hotter months. For workers based in a subtropical region, fatigue (43% on a daily/weekly basis), irritability (33%) and headaches

(33%) were the most frequently reported symptoms, with perceived negative impact on productivity reported by 50% of workers on a daily or weekly basis. Worker injuries rose during hot weather, with a 45% increase in workers compensation claims during severe and extreme heatwaves. While 'spot' core temperature responses of heat-exposed workers are generally within prescribed limits, the cumulative core temperature across the work shift likely contributes to the high frequency of symptoms and impacts, including perceived loss of productivity.

Conclusions: With widespread prevalence of heat-related symptoms, increased injury rates and perceived productivity impairment, implementation of evidence-based controls are warranted to maximise the health, safety and performance of workers in an evolving climate.

Sp34-3

Climate change, heat exposure and social impacts in and beyond the workplace: a systematic review and development of a cross domain framework for analysis and assessment

Elsbeth Oppermann, Glenn Tan, Nicholas Goh, Glenn McGregor and Jason Lee

National University of Singapore, Yong Loo Lin School of Medicine, Singapore

Introduction: Heat exposure in the workplace is known to affect health, productivity and wellbeing at the individual and societal level. However, exposure to heat is not confined to the workplace; workers are also exposed to environmental and exertional heat stress at home, during travel and leisure activities. Climate change will dramatically magnify heat exposure across all these domains, simultaneously reducing opportunities for recovery, and adding to the likelihood of knock-on and cumulative effects within and between domains. This paper considers whether our contemporary understanding of the 'social impacts' of heat sufficiently identifies, describes, quantifies and enables us to monitor such pervasive and profound effects.

Materials and Methods: The paper draws on a systematic review of the last ten years of peer-reviewed literature. Inclusion criteria required content on the direct or indirect impacts of heat stress on human individuals and social groups. Over 9,500 papers a wide range of disciplines were considered, with approximately 150 reviewed in depth.

Results: A wide range of social and societal impacts were identified from the literature. Significant variation was observed in the level of detail in which each impact was described and quantified, with implications for the ability to develop practical risk assessment and monitoring programmes.

Conclusions: Based on the review, a new, cross-domain framework accounting for the individual and collective 'social impacts' of heat stress was developed. Levels of readiness in monitoring impacts and priority areas for further research are also identified.

Sp34-4

Assessment of the economic impact of heat-related labour productivity loss: A systematic review

Wenjia Cai, Mengzhen Zhao, Jason Lee and Tord Kjellstrom

Tsinghua University, Department of Earth System Science, Beijing, China

Introduction: Heat stress caused by climate change and heat-related labor productivity losses have become global concerns.

Estimating the economic impacts of heat stress is of great significance for employers, as well as sectoral and national policy makers who are searching for solutions to reduce productivity losses.

Materials and Methods: A systematic review of 26 articles and four reports on the methodologies and results of economic impacts of heat on labour productivity was conducted.

Results: Various economic assessment methods were summarised. The choice of methods should depend on the research scope and research objectives. Considering adaptation measures, global economic losses due to heat-related labour productivity losses are projected to range from 0.31% (0.14%-0.5%, RCP2.6) to 2.6% (1.4%-4%, RCP8.5) of global GDP in 2100. Large economic losses occurred mainly in South and Southeast Asia, Sub-Saharan Africa and Central America. Due to different methodologies and considerations of adaptation measures, disparities in results within the same area at a given time can reach 7.4-fold.

Conclusions: Research on long-term sub-national/sub-regional analysis is needed as policies are usually implemented at these levels. Future research should estimate the lower and upper bounds of costs to understand the uncertainties of the results as multiple factors can affect estimates of economic impacts of heat-related labour productivity loss. For targeted interventions, more knowledge on economic cost bearers is needed.

Special ++Session 35 Emerging conditions of metal exposure: implications for occupational risk assessment and management strategies

Chair: Natalia Pawlas

Session introduction

The "Toxicology of Metals" Special Session will focus on innovative results in the field of human biomonitoring of metal exposure. These will regard biological monitoring of metal-oxide nanoparticle exposure during welding activities, the applicability of different biomonitoring methods in the assessment of occupational exposure to hexavalent Chromium in welding and surface treatment activities, possible early biomarkers of effect in cases of Manganese exposure. The aim of the Special Session is to provide inputs, starting from specific biological monitoring information, to inform updated risk assessment and management strategies in emerging conditions of general living and occupational metal exposure, in order to protect the health of general populations and involved workers.

Sp35-1

Assessment of occupational exposure to hexavalent chromium – recommendations from HBM4EU chromates study

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Introduction: Hexavalent chromium (Cr(VI)) is an important occupational carcinogen. In addition to air monitoring, bio-monitoring is commonly applied to monitor exposure to Cr(VI). Within the EU human biomonitoring initiative, HBM4EU, we explored the applicability of different biomonitoring methods in the assessment of occupational exposure to Cr(VI) in welding and surface treatment activities.

Materials and Methods: A multi-center cross-sectional study was performed in Belgium, Finland, France, Italy, Poland, Portugal, the Netherlands, Luxembourg and United Kingdom. Harmonized procedures were used to collect biological and industrial hygiene samples. Contextual information was collected using questionnaires. Altogether 602 exposed workers and controls were included in the study. Exposure biomarkers studied included Cr in urine, red blood cells (RBC), plasma (P) and Cr(III)/Cr(VI) in exhaled breath condensate (EBC). In addition, a number of effect biomarkers were studied.

Results: Among chrome plating workers exposures were the highest. Cr in urine was highly correlated with air Cr(VI) in bath platers and welders. Observed low correlations between different exposure biomarkers suggest that these approaches are not interchangeable but rather complementary.

Conclusions: Cr in urine showed its value as the first approach for the assessment of internal exposure to Cr(VI). We recommend pre- and post-shift samples for low exposure levels. RBC/P-Cr and EBC-Cr(VI)/Cr(III) provide additional information when more specific information on exposure is needed. The current exposure levels require analytical methods with high sensitivity

Sp35-2

Biomonitoring of metal oxide nanoparticles in stainless steel welders

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Introduction: Welding can cause worker exposure to metal oxide nanoparticles (MO-NPs), including Cr₂O₃, Mn₃O₄ and NiO NPs. Our aim was to assess MO-NP exposure in welders through biological monitoring.

Materials and Methods: Welders (n. 18), from 2 Italian welding companies, provided exhaled breath condensate (EBC) and urine samples at the beginning and at the end of the shift on the 1st and 5th day of the workweek, and plasma samples at this latter time-point. Unexposed controls (n. 15) provided only one sample for each biological matrix. Single Particle Mass Spectrometry (SP-ICP-MS) technique was used to assess MO-NPs exposure in terms of particle concentration (p/mL) and size (nm).

Results: In welder EBC, Cr₂O₃ NPs showed a significantly higher median concentration at the post-shift of the 5th day of the week (64645 p/mL; 55.1 nm) compared to the pre-shift of the 1st day (15836 p/mL; 57.7 nm). The median Cr₂O₃ NP plasma concentration and size were significantly lower than in EBC (7762 p/mL; 44.3 nm), while no Cr₂O₃ NPs were determined in urine. Welders from one of the two companies showed NiO NPs in EBC of the 5th day (median 22000 p/mL; 64.8 nm) and plasma (8248 p/mL; 37.4 nm), although not in EBC of the 1st day and in urine. Cr₂O₃ and NiO NPs were not determined in controls. Mn₃O₄ NPs were not detected in any samples of welders and controls.

Conclusions: Although promising, the usefulness of EBC biomarkers of MO-NP exposure needs confirmation on a greater number of workers, under different quantitative and qualitative exposure conditions in order to inform risk assessment and management in welding operations

Sp35-3

Diffuse brain deposition of beta-amyloid among italian ferroalloy workers

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Introduction: Occupational manganese (Mn) exposure is associated with cognitive impairment and memory dysfunction. A potential neurotoxic mechanism leading to cognitive dysfunction is increased formation of β -amyloid, a marker of cognitive decline and dementia.

Materials and Methods: We examined differences in cognitive functioning and β -amyloid brain deposition in 6 ferroalloy workers (average age 64 and average Mn exposure duration 31 years) and 5 historical sex- and age-matched control workers (average age 63), not exposed to metals. Cognitive function was assessed with a battery of neuropsychological tests including the Montreal Cognitive Assessment (MOCA). Mn exposure was based on the 25-years annual assessment of workplace air monitoring

and biological monitoring. The presence of β -amyloid deposition was assessed with a General Electric Discovery 690 PET-CT scanner after the injection of 185 MBq of [^{18}F]flutemamol (Vizamyl, GE Healthcare, Marlborough, MA, USA) through a catheter placed in an intravenous line in an antecubital vein. PET acquisition was carried out for 20 minutes, starting 90 minutes after injection. We performed t-tests to compare the Mn exposed workers and the controls.

Results: β -amyloid deposition in the ferroalloy workers was more diffuse than controls ($p,0.05$). Cognitive function did not differ between the two groups.

Conclusions: To our knowledge this is the first study showing increased β -amyloid brain deposition in manganese exposed individuals. Further research is warranted to test the hypothesis of β -amyloid as a predictor of Mn-induced cognitive decline.

Special Session 36 Unemployment, Job Insecurity and Health for Vulnerable Workers Pre, During and Post Pandemic

Chair: Minha Rajput-Ray

Session introduction

Workers can be more vulnerable because of their social conditions, their health, and disabilities, and/or being in higher-risk jobs. The Covid-19 pandemic has brought about an unprecedented level of uncertainty with loss to lives and livelihoods. This has impacted the health and wellbeing of populations directly through infection, as well as through societal factors made worse by chronic disease and economic factors. Furthermore, there is evidence that vulnerable populations are disproportionately affected in terms of both their health and the socio-economic impact. UJIH-SC aims to share the evaluation of the effects of this pandemic on vulnerable workers in the context of health and work. We explore the challenges facing the global workforce during the COVID-19 pandemic.

Sp36-1

Chronic Disease Burden - Nutrition and Lifestyle affecting Lives and Livelihoods in the Covid-19 Pandemic

Minha Rajput-Ray

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Introduction: The covid-19 pandemic had widened the health gap, further exposing the challenges that workers face. These individuals are often marginalised by job role, geographical location changes due to migration or societal stigma in terms of ethnic origin, gender and disability. This paper further explores the challenges that vulnerable workers face in terms of nutrition and lifestyle factors (as defined by the United Nations Sustainable Development Goals) that play an important role in disease.

Materials and Methods: A case series of workers globally affected by the above factors were researched and nutritionally relevant health factors analysed. This series covers all continents and was able to cover the burden of poor nutritional status as a contributing factor to covid 19 related mortality and morbidity. In particular, the effects nutrition being of relevance in the management of Long Covid was also flagged.

Results: Poor nutritional status, in particular micronutrient deficiency and the double edged effects of both under and over nutrition have had direct and indirect effects on the susceptibility and

recovery from covid-19. The findings further support that prevention and disease management is noted to be a key variable in the vulnerable worker population.

Conclusions: The implementation of key nutritional parameters as part of the health and economic ecosystem is a significant factor in the saving of Lives and Livelihoods !

Sp36-2

The prevalence and risk factors for common mental disorders in informal economy workers

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Introduction: Informal economy workers are often marginalised with minimal or no benefits from occupational health and safety regulations, labour laws, social protection and/or health care. Awareness and the prevalence of common mental disorders (CMD) is generally low in these workers. The aim of this study was to determine the prevalence and risk factors of CMD in informal economy workers.

Materials and Methods: Data from two primary studies (Informal waste pickers and golf caddies) were analysed. A sample of 332 (73% female and 27% male) waste pickers, 375 make golf course workers (300 caddies and 75 non-caddies). The WHO Self Reporting Questionnaire (SRQ-20) was used to assess self-reported CMD. Logistic regression determined significant risk factors (socio-demographic, substance abuse and work stress-related factors).

Results: The prevalence of CMDs was 37.3% in waste pickers, 35.3% in golf caddies and 24.3% in non-caddies. The majority in both groups had Income levels of <\$300 per month and had secondary level education. Both groups had poor working conditions and job insecurity. The results showed significantly higher odds for CMDs among caddies that had high intake of alcohol, were intimidated at work, and had existing comorbidities. In addition, for waste pickers the odds of having CMD were >2 higher in females and smokers.

Conclusions: The prevalence of CMD in both caddies and waste pickers is higher compared to the general population. A comprehensive approach is required, including increased awareness of CMD, decreasing job insecurity and provision of occupational health services to address these challenges.

Sp36-3

Implementing the OH guide in Indonesia for Creating and Safe and Healthy Workplace

Anna Suraya

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Introduction: The Covid-19 pandemic highlighted the ever increasing importance of Occupational Health and Safety issues at work. Lack of resources in the local language is a barrier to effect awareness and communication.

Materials and Methods: The relevant permissions were sought and colleagues came together at Binawan University were able to

Materials and Methods: The relevant permissions were sought and colleagues came together at Binawan University were able to come together in the translation of the Occupational Health and Safety Guide (Creating a Safe and Healthy Workplace. A Guide to Occupational Health and safety for Entrepreneurs, Owners, and Managers). guidance book into Bahasa Indonesia.

Results: Representative of Ministry of Health of Indonesia, Ministry of Labor of Indonesia, National Social Security Agency, and Indonesian Union workers conveyed positive feedbacks on the book and the launching.

Conclusion: This process has facilitated a unified learning tool for Indonesian managers, owners, and entrepreneurs to be exposed to OSH. It is hoped that this process can encourage this OH guide to be translated into other locally accessible languages.

Special Session 37 Noise and ototoxicants exposure induced hearing loss: surveillance, epidemiology and prevention

Chair: Renata Sisto

Session introduction

The scientific evidence of the synergistic effects of noise and other ototoxic factors in inducing damage to the hearing function has increased in the last decade. Epidemiological studies and animal studies demonstrated that the risk factors do not act in an additive but synergistic way. This occurrence requires an updating of the guidelines to prevent and manage the risk. The scientific community, involved in the field of the multiple exposure scenario, has reached awareness that the time is mature for such an updating. We propose a session in which the scientific results about the multiple exposure scenario in the case of the ototoxic factors are summarized.

Sp37-1

Recent collaborative initiatives to expedite progress in the risk assessment and management of ototoxic exposures at work

Thais Morata

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Introduction: Several common chemicals can damage hearing. Chemicals identified as ototoxic include solvents, metals, asphyxiants, carbon monoxide, organotin, polychlorinated biphenyls, and certain pesticides.

Materials and Methods: A review of animal experiments demonstrate that chemicals can interact synergistically with noise or potentiate its effects. The interaction is modified by several factors, including the temporal distribution of the noise exposure. A review of human studies show that some ototoxic chemicals can affect hearing even with low or no exposure to excessive noise.

Results and Conclusions: Evidence has prompted the proposal of new guidelines on hearing loss prevention in the US and abroad. In 2018, the Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) jointly published the Safety and Health Information Bulletin Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure. In 2020, the American Conference of Governmental Industrial Hygienists' Threshold Limit Values® publication for the

first time included an ototoxicity notation to alert the safety and health community about the risk. In 2020, NIOSH joined the International Ototoxicity Management Group to develop guidelines on ototoxicants in the workplace. NIOSH also joined the Collaboration on Ototoxicity Risk Assessment initiative by the Health and Environmental Sciences Institute (HESI) focused on the mechanisms of toxicity. This presentation will describe these developments and current recommendations for preventing auditory effects of exposure to ototoxicants.

Sp37-2

The effects of jet fuel exposure on the auditory system of air force personnel exposed to noise Adrian Fuente¹, Thais Morata² and Louise Hickson³

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Introduction: Jet fuel exposure has been associated with adverse auditory effects in the animal model. The aim of this study was to investigate both the cochlear and retrocochlear effects of jet fuels on the human auditory system when co-exposure with noise occurs.

Materials and Methods: Fifty-seven members of the Royal Australian Air Force were selected. Participants were assigned into one of three jet fuel exposure groups based on their occupational history and current duties. Similarly, they were classified into one of three noise exposure categories. Participants were evaluated with an audiological test battery including tests of both peripheral and central auditory function. Participants were evaluated twice, during a regular working day and before returning to work from their annual leave with at least two weeks without being exposed to jet fuels and noise.

Results: An association between jet fuel exposure and poorer hearing thresholds was found. In addition, jet fuel exposure was significantly associated with lower otoacoustic emission amplitudes, longer latencies of the auditory brainstem response wave V and poorer results for a speech perception in noise task (i.e. words in noise). The latter along with left ear pure-tone thresholds significantly improved when participants were not exposed to jet fuels and noise.

Conclusions: Jet fuel exposure was significantly associated with poorer auditory outcomes suggesting adverse cochlear effects induced by jet fuels. Pure-tone audiometry and a speech perception in noise task may be used to early detect auditory effects induced by jet fuel exposure.

Sp37-3

Update of NIOSH Noise Exposure Guidelines

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Introduction: The U.S. Occupational Safety and Health Act of 1970, which established the National Institute for Occupational Safety and Health (NIOSH), specifically directed the new Institute to "develop and establish recommended occupational safety and health standards". The NIOSH criteria document regarding occupational noise exposure was originally published in 1972 and

revised in 1998. Based on the best available knowledge at the time, each document provided the basis for a recommended standard to reduce the risk of developing permanent hearing loss from occupational noise exposure.

Materials and Methods: The 1998 criteria document identified several areas in which additional research was needed in order to clarify the risks associated various noise exposure scenarios as well as to develop appropriate recommendations to protect workers against the effects of these exposures. NIOSH and the scientific community have conducted research addressing these and other areas.

Results: Results indicate that some of the previous recommendations should be updated. Data point to three main topic areas in need of updated recommendations – hearing protector fit-testing, improved age adjustment tables, and assessment of complex noise exposures. Updates could be disseminated in a revised criteria document and/or through other communication channels.

Conclusions: This presentation will highlight the latest research and the three main topic areas that are under consideration, and provide an update on the current efforts taken by NIOSH scientists and external collaborators to update occupational noise exposure guidelines in the U.S.

Sp37-4

Hearing outcome analyses in mice and humans with exposures to mixtures of metals with noise

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Introduction: Evidence shows that metals such as lead and cadmium are ototoxic. However, metal ototoxicity in the presence of noise or concurrent exposures to multiple metals is not well understood. This research uses both a toxicological and epidemiological approach to explore metal ototoxicity in the context of (1) a mouse model and (2) in a cohort of young adults in an occupational setting.

Materials and Methods: In the toxicology study, CBA/CaJ mice were exposed to lead, cadmium, and noise to evaluate alterations in hearing. Mice were tested using ABR, DPOAE, and cochlear cell counts. In the epidemiological study, noise dosimetry, blood metal levels, and health history information was collected from electronic waste workers in Ghana then analysed with linear regression.

Results: Only noise exposures of 105 dB were associated with significant changes to ABR, cochlear cell counts and DPOAE in mice. In humans, sixty percent of electronic waste workers were found to have audiometric notches indicative of noise-induced hearing loss and this was supported by high levels of noise exposures.

Conclusions: While these studies did not provide evidence of lead and cadmium ototoxicity, more research is necessary to understand ototoxic properties of metals in real world settings with mixed exposures. Stronger study designs and more nuanced hearing tests may better capture metal ototoxicity. For risk assessments, thorough noise, chemical, and outcome measurements are needed. Metals, noise, and hearing are often ignored, however the importance of these on our lives and wellbeing should not be minimized.

Sp37-5

Combined effects of low exposure levels of noise and solvents on hearing among printing workers

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Introduction: There is no consensus on the approaches of clinical audiology to identify cases and provide hearing care to those who present hearing difficulties associated with combined exposure to noise and solvents.

Objectives: To assess temporary and permanent auditory effects associated with occupational co-exposure to low levels of solvents and noise.

Methods: Cross-sectional study with 25 printing industry workers simultaneously exposed to low noise (<80 dBA TWA) and low levels of solvents. The control group consisted of 29 industry workers without exposure to noise and/or solvents. Participants answered a questionnaire and underwent an auditory test battery. Auditory fatigue was also examined by measuring the acoustic reflex threshold before and after the workday.

Results: The exposed group had poorer thresholds bilaterally at 6kHz and 4kHz than the control group. Ipsilateral acoustic reflex thresholds were different between groups at the frequencies of 500 Hz and 1 kHz. Brainstem auditory evoked potential results showed differences in the III-V interpeak interval. Echoscan detected a significant difference ($p=0.0317$) between the exposed (4.58 ± 6.8) and the control (0 ± 4.62) group.

Conclusions: Each hearing test indicated significant differences between groups. The temporary effect of the exposure was characterized by an increase of the threshold of the acoustic reflex. Measuring the shift in the acoustic reflex (EchoScan test) can identify work-related exposures that create auditory fatigue and help prevent hearing impairments possibly before they become permanent.

Special Session 38 New realities for the health of working women in the new normal

Chair: Igor Bello

Session introduction

The crisis unleashed by the COVID-19 pandemic has disrupted the world of work, asymmetrically affecting men and women. Women have had a special impact by having the highest participation in the prioritized sectors of the economy (health, education, food) and this has had an influence on further widening inequities between genders, and especially in terms of their health. In this session we will address some of these aspects from a sectorized and global perspective.

Sp38-1

Warrior Women of the 21st Century: The Role of Female First Responders in the COVID-19 Crisis

Claudia de Hoyos and Igor Bello

Occupational Medicine Society of Buenos Aires Province, Buenos Aires, Argentina

Occupational Medicine Society of Buenos Aires Province, Buenos Aires, Argentina

Millions of women around the world are part of the essential workforce on the front lines of COVID-19. Globally, women constitute the majority of health and social sector workers who have not stopped their work due to the pandemic. From agriculture to first responders and everything in between, women are playing a huge role in keeping their communities safe and resilient against COVID-19. These women face increasing burdens: they are over-represented at work in health systems, they continue to do most of the unpaid care work in the home, they face high risks of economic insecurity, and they face greater risks of violence, exploitation, abuse or harassment during times of crisis and quarantine. In addition, due to the persistent gender inequalities, which have even worsened during the COVI-19 crisis, in many dimensions, the jobs, businesses, income and living standards of women, who may be more exposed than men to the economic consequences and, therefore, they become more vulnerable. The COVID 19 pandemic has prompted immediate public policy responses by governments to support spending needs in the health sector and mitigate economic effects to first responders. In addition to ensuring economic stabilization and adequate support for men and women, where possible a gender lens should be incorporated in the design and implementation of emergency policy responses. To do so, governments benefit from having in place a well-functioning system of gender budgeting and gender impact assessments, ready access to quality sex-disaggregated data and gender indicators, and skills and expertise on how to provide a swift response.

Sp38-2

Advances and setbacks in health gender gaps and the respective SDGs in the postpandemic

Igor Bello

Venezuelan Society on Occupational Health, President, Valencia, Venezuela

Quarantines implemented to face COVID-19 has affected workers in very different ways, and especially women, who make up the majority of the workforce in health facilities in the world, and their role as health personnel adds a triple burden: longer shifts at work, assistance in the education of children and domestic work in the home; But they are also part of the informal sector of the economy, which has turned out to be one of the most affected by the imposed social quarantine, which has had very negative consequences at the socio-economic level, especially affecting those workers who do not enjoy protection mechanisms. Social. Those women who were able to continue working, in many cases had to improvise a teleworking station at home, which is an unplanned situation, without preparation and for which many countries lack specific regulations. These new teleworkers had not been prepared for this, they had not agreed on this condition with their employers and they do not have optimal working conditions for this modality and although teleworking is considered suitable for women insofar as it could help to reconcile life. The truth is that many women are reluctant to adopt it. Another angle of the problem is constituted by

the indirect effects of quarantine on family life, which presents an unusual increase in domestic violence, with a particular impact on violence against women. gender, finding that 243 million women and girls between 15-49 years of age have been subjected to sexual or psychological violence in the last 12 months.

Sp38-3

Impact of the Pandemic on the Social and Environmental Determinants of the Health of Working Women in the Americas

Julietta Rodriguez-Guzman

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COVID-19 has inflicted disproportionate health and economic risks depending of some social conditions, like gender, age, employment condition, or migrant condition, which are least equipped to withstand these risks. As well as social conditions, inequities between and within countries are exacerbated by COVID-19, and will have long- term negative impacts. In this context, being a woman has determined great differences in the way in which the health risks are faced. This situation caused a regression in general human development, widening the gaps in compliance with several of the SDGs, and especially those related to gender equity (SGD5), poverty reduction (SGD1), good health and well-being (SDG 3), decent work (SDG8) and the reduction of inequities (SDG10). The synergistic effects of social conditions and their effect on the worker's health were also evident, as the situation of women worsened. The crisis produced by COVID-19 has not yet ended, and its effects cannot yet be measurable over time. But we must learn about how to protect working women in times of crisis, where the important, asymmetric and heavy burden that she must face is evident. Strengthen the universality of social protection, connect the primary health care system with the workers' health system and encourage affordable mechanisms for people care are some of the initiatives that many countries have begun to implement to improve this situation, but we are still far from building resilient systems before these types of disruptive situations, which allow us to continue advancing in the construction of a more equitable, just and healthy society for women.

Sp38-4

Health conditions of the most vulnerable female workers and their impact on health systems: Pandemic in South Africa

Saloshni Naidoo

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On March 5th, 2020, the first COVID-19 case was diagnosed in South Africa and the President declared a National State of Disaster. Almost two years later, this State of Disaster persists. More than 2.9 million cases of COVID-19 and 87780 fatalities have been recorded. Most women workers are in vulnerable employment as domestic help, traders in the informal economy,

and small-scale agriculture with no employment contracts or health insurance cover. Women in formal sector work in the services / retail and healthcare, dealing with the vulnerability of their employment and those infected with COVID-19, with the clinical sequelae. Women accounted for more than 55% of the total burden of COVID-19 infections while 82% of infections in healthcare workers were in women. Women reported more anxiety and depressive symptoms post-infection than men, experiencing stress with a reduction of income and caring for ill family members and taking care of children because schools were closed. There was an increase in gender violence reports. Women in the informal sector experienced reduction earnings by 70%; female healthcare workers experienced longer working hours, anguish and burnout. Regulations were implemented to reduce the risk of COVID-19 workplace transmission and identify vulnerable workers. Infections acquired in the workplace were declared compensable. Vaccination roll-out included pregnant and nursing women. In addition, there were financial incentives, but only for formal work. Despite these initiatives, long-term policies aimed at socioeconomic protection and employment creation that focus on women workers are required.

Special Session 40 Engaging workplaces in mental illness-related disability prevention

Chair: Karen Nieuwenhuisen

Session introduction

The high impact of mental ill health on workers and workplaces alike warrants the development, evaluation and implementation of preventive and reintegration strategies. Workplaces are central to these work disability prevention strategies, but problems, needs, and optimal solutions are dependent on the characteristics of the workplace. In this session, strategies for work disability prevention are presented and discussed in light of the specific work context. Next, lessons learned for workers in various contexts will be explored.

Sp40-1

Workplace mental health stigma as a barrier to sustainable employment

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Introduction: Social stigma in the work context is a complex problem, and there is an important knowledge gap especially regarding the (long-term) effects of stigma on unemployment. Here, we present 2 studies.

Materials and Methods:

study 1: We evaluated in a representative sample of 670 Dutch line managers, what their attitudes and hiring intentions were towards job applicants with mental illness. Cross-sectional.

study 2: We conducted a cluster RCT, on the effects of a stigma awareness intervention, in a longitudinal study (12 months). Subjects were unemployed people with mental illness. The experimental group received a written decision aid on workplace mental

health disclosure, and their employment specialists received a 3x2 hrs training in workplace stigma.

Results

study 1: 64% of Dutch line managers were reluctant to hire an applicant with mental illness, whereas only 7% personally had negative experiences with such workers.

study 2: After 6 months, significantly more participants in the experimental group had found paid employment (51% versus 26%). Retaining work was not significant (24% vs 22%).

After 12 months, significantly more experimental group participants (53.8%) found paid work compared to the control group (34.4%). Also, significantly more experimental group participants (49.2%) retained paid work compared to controls (23.4%).

Conclusions: Social stigma is an underestimated problem that hampers sustainable employment of workers with mental illness. If findings of our RCT are replicated in other studies and well implemented, employment rates of people with mental illness might be doubled.

Sp40-2

Beyond Awareness – Teaching Skills to Effectively Support Mental Health in a Non-Traditional Workplace

Carolyn S. Dewa

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Introduction: About 20%–40% of graduate students (GS) have depression and anxiety. GS are in training and often employed to teach. It is important to address GS mental health. However, there are few readily available resources from which to draw. This study's purpose is to examine: (1) what is the effectiveness of a 5-week course teaching evidence-based skills to improve GS mental health? (2) what aspects of the course are critical? and (3) can GS teach the learned skills to their students?

Materials and Methods: A mental and emotional well-being course was developed and piloted during Spring Quarter 2021 with 39 science, technology, engineering and mathematics GS. The content was based on workplace mental promotion and disability prevention research. Participants voluntarily completed pre/post questionnaires and wrote essays about their course experiences and plans to use the material.

Results: Pre-course, 84% of respondents reported most of their days were quite a bit/extremely stressful and 82% indicated they had fair/poor ability to handle stress. Post-course, 86% of respondents (strongly) agreed the course helped them to develop strengths to address stress. They indicated both emotional and problem focused coping skills were important as were peer discussions and offering this as a for credit course. Respondents identified stress reappraisal as an important tool in teaching.

Conclusions: A short course can be effective to teach GS tools to handle stress. These tools should include emotion and problem-focused skills and can in turn be using in their teaching.

Sp40-3

Focus on Work Values in Healthcare: an intervention study to strengthen the wellbeing, mental health and employability in health-care professionals

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Introduction: With the health-care sector facing high sickness absence levels, turnover, and growing personnel shortages, it's crucial to pay attention to retention of health-care professionals. The 'Work Values' intervention aims to provide professionals with opportunities to realize work values that are most important to them. This study investigates: (1) barriers and facilitators for implementing the Work Values intervention, and (2) its effect on wellbeing, mental health and team cohesion of health-care professionals.

Materials and Methods: The 'Work Values' intervention was evaluated in nursing units of a Dutch non-university hospital. Pre-, post-, and follow-up questionnaires among team leaders and team members (i.e. nurses) measured: health (SF-1), mental wellbeing (UBOS), work engagement (UBES), Team climate (Team Climate inventory), supervisory support (POS) and employability self-efficacy. Using face-to-face interviews, implementation barriers and facilitators and impact on work-related well-being, team cohesion and employability were investigated.

Results: Results are available early 2022. Preliminary findings show that the intervention is feasible for the hospital care setting and teamleaders and teammembers are highly satisfied.

Conclusions: The 'Work Values' intervention is one of the few positive psychology interventions to enable personally meaningful work values. This study provides insight into what is needed for health-care professionals to stay engaged and mentally healthy at work and how sustainable employability can be promoted within the health-care sector.

Sp40-4

Prevention of mental health problems in healthcare workers, from a randomized controlled trial to the implementation in workplaces

Karen Nieuwenhuijsen

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Introduction: Healthcare workers have a high risk of developing mental health problems which in turn impact the quality of care provided by them. A workers' health surveillance module targeting the mental health of health care workers was found to improve work functioning and cost-effective from an employers' perspective. This study was conducted to optimise and evaluate the implementation of the module.

Materials and Methods: A pilot implementation in four healthcare organisations was planned, including a context analysis, development of a tailored screening and intervention protocol, training of occupational health professionals, and a helpdesk. The evaluation followed the RE-AIM model, assessing the Reach, Effect, Adoption, Implementation and Maintenance of the workers' health surveillance model.

Results: Of the fifteen organisation interested, a start date for the implementation was planned with only two. After the start of the Covid pandemic, these organisations withdrew from the project. We changed the aim of the project and assessed needs, barriers and facilitators for preventive programs aiming to improve the mental health of healthcare workers. Based on literature review, interviews

and questionnaires, we developed a practical with implementation advice. Advice for employers included i) embed individual interventions in programs targeting the organisational level, ii) train supervisors, and iii) help workers navigate through the range of available preventive interventions.

Conclusions: We were unable to implement workers' health surveillance to improve the mental health of healthcare workers.

Special Session 41 Policy approaches to psychosocial risks at work

Chair: Stavroula Leka

Session introduction

Psychosocial risks represent a key priority in occupational health and safety. Their importance is expected to increase in light of developments concerning the changing nature of work, the use of new technologies and the increased prevalence of atypical work arrangements. This session will present efforts to address psychosocial risks at work at the policy level, including both regulation and other policy initiatives. The first presentation will focus on the policy context in Europe. There will then be two presentations on country level approaches from Italy and Australia. The final presentation will outline the development of ISO 45003, the first international standard in this area. Conclusions will be drawn for the future of policy making in this important area.

Sp41-1

The European policy context for the management of psychosocial risks at work

Stavroula Leka

University College Cork, Cork University Business School, Cork, Ireland

Introduction: Policy plays an important role in fostering good practice for the prevention of occupational risks. One of the most challenging areas to address in recent years has been psychosocial risks at work which is also recognised as a key priority in the future of work. This presentation will present key policy development in relation to psychosocial risks and mental health in Europe.

Materials and Methods: A review of hard and soft law approaches will be presented with special focus on recent developments aimed at addressing the changing context of work. Results. Policy approaches have become more diversified over the past years and with the increased involvement of several stakeholders in the policy making process. A recent example of a soft law approach aiming to address the changing nature of work is the European Social partner agreement on digitalisation (2020). However, the acceleration of trends in working life with the Covid-19 pandemic have resulted in important gaps that need to be addressed in the future.

Conclusions: Policy making needs to become more agile in order to keep at pace with wider technological developments and workforce diversity that have resulted in a more complex landscape in the world of work. There are challenges but also opportunities that need to be urgently considered and addressed in order to engage organisations in good practices going forward.

Sp41-2**The management of psychosocial risks over the last 10 years in Italy: State of art and emerging issues**

Cristina Di Tecco¹ and Sergio Iavicoli²

¹ INAIL, Department of Occupational and Environmental Medicine, Epidemiology and Hygiene, Rome, Italy, ² Italian Ministry of Health, Directorate-General for Communication and European and International Relations, Rome, Italy

Introduction: Psychosocial risk management represents a current challenge in occupational health prevention. In the last decade, INAIL assisted in the progressive increase in awareness of the potential impacts of psychosocial risks on workers' health and well-being, costs and productivity. This contribution analyses the developmental process of psychosocial risk management over time in Italy to offer an update on the state of the art at a national level and insights on future perspectives.

Materials and Methods: Starting from an overview on research developments, we outline the translation process from knowledge to policies that have fostered the implementation of consolidated practices for the management of psychosocial risks in Italy. We also offer a monitoring of the last 10 years to identify main drivers, barriers and emerging needs in this field.

Results: Findings show an overview of the milestones achieved in psychosocial risk management at national level by highlighting the positive impact of a multidisciplinary approach. Moreover, the driving role played by policies in Italy for the implementation of organizational practices is also highlighted.

Conclusions: The management of psychosocial risks has great relevance also in the light of changes in working conditions, as increasing flexibility, technological progress and changes in the workforce are bringing out new emerging psychosocial risks. Lesson learned from the last decade may support the activation of a driving process to translate research findings into policies and actions.

Sp41-3**The Australian policy context for the management of psychosocial risks at work**

Tessa Bailey

The Opus Centre for Psychosocial Risk, The Opus Centre for Psychosocial Risk, Adelaide, Australia

An exponential growth in psychological demands at work is echoed by a decline in Australian worker mental health and rise in costs associated with psychological injury compensation claims (Productivity Commission, 2020). National and regional responses across Australia include a range of policy developments and initiatives in an attempt to better manage these factors, reduce risk and prevent injuries. Safe Work Australia is a national body responsible for development of the model Work Health and Safety (WHS) Act (SWA, 2011) that defines worker health as being both 'psychological' as well as 'physical'. It has also published national guidance on managing work-related psychological health and safety, which includes steps for identifying, assessing and controlling psychosocial risks to worker mental health. A recent white paper by the Black Dog Institute (2021) investigating how modern work impacts mental health in Australia revealed some positive

trends in that an increasing number of employers are taking steps to create more mentally health workplaces. However, despite these initiatives symptoms for mental ill-health continue to rise across the Australian working population. A recent review of WHS laws (Boland, 2019) found that despite acceptance of 'health' to include psychological health, employers are uncertain how to best address psychosocial factors in their organisation. WHS Ministers across Australia have supported the review recommendations that include regulations on the management of psychosocial risk and provision of more prescribed practical steps to better protect worker health and safety.

Sp41-4**ISO 45003: The first international standard on psychosocial risk management at work**

Aditya Jain

University of Nottingham, Nottingham University Business School, Nottingham, UK. The Opus Centre for Psychosocial Risk, The Opus Centre for Psychosocial Risk, Adelaide, Australia

Introduction: ISO 45003 is the first international standard in the area of psychosocial risk management. Launched in 2021, this is a guidance standard that supports the implementation of ISO 45001 in the area of occupational health and safety management. ISO 45003 built on the development of two previous national standards in the UK (2011) and Canada (2013) as well as more recent guidelines in Australia (2019).

Materials and Methods: The presentation will describe the development process of ISO 45003 that began in 2018 and was concluded in 2021.

Results: The standard aims to promote a preventive approach that is systematic at the organisational level and aims at continual improvement. Following the definition of psychosocial risk and the provision of specific examples of psychosocial hazards, the standard focuses on the psychosocial risk assessment and management process. It provides examples of appropriate interventions at primary, secondary and tertiary level and also addresses the area of rehabilitation and return to work. It highlights how relevant policies can be put in place at organisational level, how leaders can show commitment and engagement in this area and highlights the important role of worker participation and consultation.

Conclusions: The standard is available in read-only format free of charge on the ISO website. It is foreseen that an evaluation will be conducted on its uptake across the world with a view to improving it in the future.

Special Session 42 Recovering from work - what to do (and not to) during off-job times?

Chair: Akihito Shimazu

Session introduction

In recent years, scholars have argued that not only on-job experiences (how employees spend their working time) but also off-job experiences (how they spend their private or leisure time) are crucial for understanding employee health and well-being. The aim of this special session is to argue and discuss about off-job

experiences, health, and well-being by focusing on recovery experiences, sleep, and off-job crafting.

This special session is organized by the two scientific committees: Work Organisation and PsychoSocial factors (WOPS) and Shiftwork and Working Time with Dr. Masaya Takahashi (National Institute of Occupational Safety and Health, Japan) as the assistant organizer.

Sp42-1

Prospective and retrospective rest and recovery strategies in 24/7 cargo operations

Hans P.A. Van Dongen

Washington State University, Spokane, USA

Introduction: Cargo delivery often involves night and early morning work to allow for time-critical pick-up and delivery of freight. Truck drivers work at night to avoid busy traffic and meet limited time windows for loading and unloading. Cargo pilots may fly from a hub to an outstation (or vice versa) in the early or late night, and fly back in the early or late morning. Such schedules truncate or displace nighttime sleep, and rest and recovery strategies are needed to maintain optimal alertness during operations.

Materials and Methods: In US-based field studies, we measured sleep using wrist-worn activity monitors in 106 truck drivers, each followed across two duty cycles (12 days on average); and 65 cargo pilots flying night and early morning schedules, each followed for one duty cycle (3 or 4 days).

Results: Truck drivers with nighttime duty schedules slept during the late morning and early afternoon, but not the late afternoon. By contrast, pilots obtained some nighttime sleep before or after their duty periods. They supplemented their daily sleep with catch-up sleep in the afternoon or preparatory sleep in the evening. Furthermore, when the layover period between flights was sufficiently long, pilots took a mid-duty nap. A wake-up call program placed the responsibility for waking up the pilot with the ramp manager. Both truck drivers and pilots reverted to nighttime sleep during the break after a duty cycle.

Conclusions: Best practices for prospectively and retrospectively managing sleep and alertness in 24/7 operations include preparatory (pre-duty), mitigation (mid-duty), and catch-up (post-duty) sleep strategies.

Sp42-2

The timing of daytime sleep, and thus the timing of daytime light exposure/avoidance, affects the response of the internal body clock to night work

Greg Roach, Drew Dawson and Charli Sargent

CQUniversity, The Sleep Lab @ Appleton Institute, Adelaide, Australia

Introduction: The aim of this study was to examine the influence of the timing of sleep, and thus the timing of daytime light exposure/avoidance, on circadian adaptation to a week of night work.

Materials and Methods: Forty-three adults (21F, 22M) were randomised to one of four conditions in a laboratory-based simulation with 7 x 8-h night shifts (2300–0700h) and 7-h of time in bed between each shift. The conditions, in order of increasing exposure to light in the morning and early-afternoon, were: Morning Sleep (0830–1530h), Split Sleep #1 (0830–1330h & 1930–2130h), Split Sleep #2 (0830–1030h & 1630–2130h) and Afternoon/Evening Sleep (1430–2130h). Circadian phase was assessed on the nights

immediately pre/post the week of night work using the timing of dim light melatonin onset (DLMO).

Results: There was an interaction between study night (pre/post night work) and condition (x4), such that the pre/post change in DLMO differed between the conditions ($F=10.6$, $df=3,39$, $p<.0001$). Specifically, Morning Sleep delayed DLMO by 5.1 ± 2.1 h, Split Sleep #1 delayed DLMO by 2.6 ± 2.5 h, Split Sleep #2 delayed DLMO by 1.3 ± 2.6 h and Afternoon/Evening Sleep advanced DLMO by 0.7 ± 2.8 h.

Conclusions: The extent to which the internal body clock adapts to night work decreases as the duration of exposure to light in the morning and early-afternoon increases. If shiftworkers wish to maximise adaptation, then sleep should occur in the morning. Conversely, if shiftworkers wish to minimise adaptation, then sleep should occur in the afternoon/evening.

Sp42-3

Typologies of everyday life and off-work experiences among Brazilian teachers

Frida Marina Fischer¹ and Jefferson Peixoto da Silva²

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Introduction: The aim of this study was to analyse the relationships among work, everyday life, health and how teachers spend their time off work.

Materials and Methods: This is a qualitative exploratory study. We conducted in-depth interviews and a sociodemographic questionnaire with 29 elementary school teachers (13 males) at public schools in São Paulo, Brazil. We also interviewed the principals of those schools. Study participants worked Monday to Friday, with the number of working hours per week ranging from 11 to 69 h (mean 45.6 h). Data collection took place from March through August 2017. Analysis was based on theme coding, which was performed with software MAXQDA version 12. The participants' mean age was 45 and had 18 years in the profession, on average. The project was approved by the Research Ethics Committee of the School of Public Health, University of São Paulo.

Results: The teachers' narratives relative to their everyday life revealed three typologies: duty-duty, duty-need and duty-pleasure. We also identified six categories of off-work experiences: family life, physical activity, recreation/leisure, social, religious and recovery activities. The frequency developing these mentioned activities were low. The collected data indicate that among teachers, work tends to noxiously intrude into their personal lives.

Conclusions: The everyday life typologies described above showed that in addition to adverse workplace conditions, the participants were also facing precarious life circumstances. These typologies may help explain the health-disease process among this occupational group.

Sp42-4

Crafting work and leisure for recovery and optimal functioning across life domains

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Introduction: Recovery experiences have thus far been portrayed as experiences that simply “happen” to people. However, recovery can also be understood from a crafting perspective; that is, individuals may proactively shape their work and non-work activities to recover from stress, satisfy their psychological needs, and achieve optimal functioning.

Materials and Methods: In my talk, I will present the theoretical basis of needs-based crafting based on a conceptual review of the literature. Moreover, I will present empirical findings on the validation of a newly developed off-job crafting scale.

Results: In five sub studies, we found that off-job crafting was related to optimal functioning over time. Moreover, the newly developed off-job crafting scale had good convergent and discriminant validity, internal consistency, and test-retest reliability.

Conclusions: Theoretical and empirical evidence suggests that needs-based crafting can enhance optimal functioning in different life domains and support people in performing their work duties sustainably. Proactive attempts to achieve better recovery through needs satisfaction may be beneficial in an intensified and continually changing and challenging working life. Our line of research provides important avenues for organizational research and practices regarding recovery and needs satisfaction occurring at work and outside work.

Special Session 43 Asbestos Elimination

Chair: Sugio Furuya

Session introduction

ICOH Statement on Global Asbestos Ban and the Elimination of Asbestos-Related Diseases (2013) calls for a global ban on asbestos and for the elimination of ARDs. It also says achieving a worldwide ban on asbestos and the elimination of ARDs will require that physicians and occupational health personnel responsibly and persistently express their concerns, raise awareness and take necessary action regarding the need to prevent asbestos-related diseases. Although ARDs are still invisible in many developing countries the efforts for making ARDs visible and for achieving the elimination of ARDs/a ban on asbestos are ongoing. We will seek such efforts especially in Asia Pacific region.

Sp43-1

Global Elimination of Asbestos and Asbestos-related Diseases

Jukka Takala

International Commission on Occupational Health (ICOH), President, Rome, Italy

Introduction: A Global Programme on the “Elimination of Asbestos-related Diseases” was established by the ILO/WHO Joint Committee on Occupational Health in 2003 when some 100,000 deaths/year were estimated from asbestos-related diseases. Asbestos was found to cause asbestosis some 100 years ago. Reports of carcinogenicity by Gloyne and Merewether were in the 1st Supplement of ILO’s Encyclopaedia in 1938. Today all asbestos types have been classified as carcinogenic. Asbestos ban and measures to eliminate exposures to asbestos have been recorded by ILO in 2006, and WHO in 2007. The ILO’s “List of Occupational Diseases” covers all asbestos-related diseases.

Materials and Methods: Used historical, scientific, statistical data records and reports on asbestos-related outcomes and measures taken to eliminate exposures.

Results: The present estimate on asbestos burden globally is 239,000 -243,223 deaths at work and 260.029 all deaths. The list of countries where asbestos use is banned contains 67 countries. Only a tiny fraction of diseases is recorded as asbestos-related and compensated. Covid-19 as a lung disease considerably contributes to serious negative health outcomes for asbestos-exposed workers.

Conclusions: sbestos ban is not a financial burden and substitutes are available for all uses of asbestos. The EU banned asbestos in 2005 and the latest European Parliament decision requests for strong measures to prevent asbestos exposures in infrastructure, and a binding exposure limit of 1000 fibres/m³ at work. The economic burden caused by asbestos in EU ranged in 2019 between 107.8 * 10⁹ - 352 * 10⁹ EUR, globally much more.

Sp43-2

Making Asbestos-Related Diseases visible in Indonesia

Anna Suraya

Binawan University, Faculty of Health Science and Technology, Jakarta, Indonesia

Introduction: Indonesia’s processing of more than 100,000 tons of asbestos every year has put Indonesian people in the high-risk outcome of respiratory diseases and malignancies. “Indonesia ban asbestos network” has initiated presenting the evidence of Asbestos-related diseases (ARD) existence in Indonesia to facilitate government, and other stakeholders bring more effort to eliminate the ARDs.

Materials and Methods: The initiation started in 2016 by carrying out health examinations among 20 asbestos factories workers. A case-control study on the risk of lung cancer among asbestos-exposed workers followed it to obtain more evidence. Seminars, workshops, and other offline and online education methods have been executed to increase the awareness regarding asbestos and its health effects to various Indonesian communities.

Results: In 2017, the first occupational ARD compensation in Indonesia was settled. The case-control study succeeded in proving the increased lung cancer risk among asbestos-exposed workers. Policies regarding occupational diseases were reviewed, and a city in West Java declared it the first free asbestos city in Indonesia. The clinician denounced asbestos as a risk factor for lung cancer. An insulation company stopped using asbestos, and the prominent asbestos factories started producing non-asbestos roofs. In 2020,

for the first time in more than ten years, asbestos utilization in the country was below 100,000 tons.

Conclusions: Providing evidence of the existence of the ARDs is crucial for a country to encourage the government and other stakeholders to protect Indonesian people from the asbestos hazards.

Sp43-3

Making ARDs visible in India

Ashish Mittal

OHS-MCS, Occupational Health, New Delhi, India

Introduction: First Schedule of Occupational Safety, Health and Working Conditions (OSHCW) Code, 2020 includes hazardous processes including manufacture, handling and processing of asbestos and its products; and its Third Schedule lists asbestosis as a Notifiable Disease. No official data indicates high number of asbestoses affected workers amongst 100,000 asbestos workers, where civil societies have been continuously reporting high prevalence of ARD's in India.

Materials and Methods: Secondary literature review.

Results: According to a 2011 inventory of more than 60,000 asbestos-laden products, approximately 600 companies and suppliers operated worldwide that year. In 2019, India imported 374,649,000 Kg of Asbestos worth \$181M, becoming the 1st largest importer of Asbestos in the world & exported \$641k in Asbestos, making it the 11th largest exporter of Asbestos products.

Recent Import Trade data for 2020-21 reveals 130 active importers / buyers in India, of chrysotile asbestos fibre (raw, beaten, washed or graded to length) from Russia, Brazil, Kazakhstan, China, etc. More than 1700 workers affected with ARD's has been recently diagnosed in medical camps organized by Civil society organizations in different states of India.

Conclusions: Even with enough scientific evidence of toxicity of asbestos, civil society efforts to ban the use of asbestos and ban of asbestos resounding across the world in almost 70 countries, the Indian industry continues to thrive. Immediate steps are required in the supreme national interest to safeguard the health of present and the future generations.

Sp43-4

Working Towards the Banning of Asbestos Containing Materials in Pacific Island Countries

Lance Richman

PacWastePlus, Technical Waste Project Officer, Apia, Samoa

Introduction: Fifteen (15) Pacific Island Countries (including Timor-Leste) have, as part of the Secretariat of the Pacific Regional Environmental Programme (SPREP) annual regional meetings in 2017, 2018 and 2021 noted the threat posed by asbestos to Pacific island communities, endorsed the development and implementation of a Pacific-wide ban on the importation, re-use and re-sale of products and wastes containing asbestos, and directed the Secretariat to progress work on the development and implementation of such a ban.

Materials and Methods: PacWastePlus a program within SPREP will assist Pacific Island Countries to implement legislative instruments that ban the importation of asbestos and asbestos containing materials and address legacy issues.

Documents that we will produce in support of this effort include:

- 1) Asbestos Management Policy and Regulation for Pacific Island Countries and Timor.
- 2) Model Regional Asbestos Management Policy.
- 3) Legislative and Regulatory Analysis with Recommendations (two documents).
- 4) Asbestos Legislative & Policy Drafting Guidance.
- 5) ACM Management Outreach (numerous documents).

Results: The PacWastePlus program is assisting Pacific Island Countries to effectively remediate legacy asbestos, and regulate its use, transport, and disposal to protect human health from the harmful effects caused by exposure.

Conclusions: The PacWastePlus program will provide practical resources for Pacific Island Countries to further reduce exposure to asbestos fibres.

Sp43-5

e-Toolkit for the Elimination of Asbestos-Related Diseases in Developing Countries

Ken Takahashi and Kim Brislan

Asbestos Diseases Research Institute (ADRI), WHO-CC for Elimination of Asbestos Related Diseases, Sydney, Australia

Introduction: Since its inception, the Asbestos Disease Research Institute (ADRI) is on a mission to improve the diagnosis and treatment of asbestos-related diseases (ARD) and at the same time contribute to effective measures to prevent exposure to asbestos. ADRI is the world's first WHO Collaborating Centre for the Elimination of Asbestos Related Diseases; its designation was earned by committing to training workshops and consultancies for developing countries. However, Australia's ensuing total ban on international travel has rendered the delivery of in-person training workshops impossible (as of Aug 2021). Neither has our plan for online training workshops eventuated as our counterparts needed to 'prioritise COVID management'. ADRI's scheme for international cooperation has inevitably shifted to the development of training materials.

Materials and Methods: The ADRI WHO-CC website hosts the e-Toolkit and is freely accessible. Reflecting the desirable approach towards ARD elimination, contents are multidisciplinary including public and occupational health, clinical medicine and basic laboratory science. Contributions have been made by 50+ experts from 15+ countries and growing.

Results and Conclusions: Texts consist of dedicated contributions and licensed journal articles with hyperlinks to slide shows and originally developed educational/science videos. We aspire to balance the context of 'in developing countries' with 'best practice' as much as practically possible. Importantly, the e-Toolkit is intended for utilization in online or in-person workshops, post COVID.

Special Session 44 European Postgraduate Assessment in Occupational Medicine

Chair: Alenka Škerjanc

Session introduction

European Postgraduate Assessment in Occupational Medicine

Sp44-1**The UEMS perspective for specialist medical training in Europe**

Vassilios Papalois

Imperial College, London, UK, SURGERY, London, UNITED KINGDOM

Introduction: The Union of European Medical Specialists (UEMS) is an organisation with 63 years of history that aims to promote quality in specialist medical training, practice and patient care. It is a democratic, inclusive, progressive European Medical Organisation that has three components: the National Medical Associations of 41 Countries, the UEMS Specialist Bodies and a plethora of collaborations with universities, scientific and professional organisations.

Methods: The UEMS has a holistic vision as to how to best support specialist medical education and practice.

Results: The main vehicles for realising this vision are the European Training Requirements (ETRs) which are headed by the UEMS Specialist Body, and are the product of a broad pan-European consultation. The ETRs follow many review and revision stages before they are finally approved by the UEMS Council. The ETRs are linked with the relevant UEMS assessments for each specialty that have a very robust process for assessing the eligibility of applicants and utilise all modern methods of assessment of competence-based practice. The UEMS support specialist practice by the assessments of the training centres offering them accreditation for training based on a comprehensive evidence report and onsite visits.

Conclusions: All the above are complemented by the accreditation of specialist educational events in Europe. The most advanced process of the UEMS European Accreditation Council for Continuing Medical Education covers all modern modalities of education and training. We are keen to develop new partnerships and collaborations in Europe and around the world.

Sp44-2**European Training Requirements in Occupational Medicine**

Alenka Škerjanc

University medical centre Ljubljana, Clinical Institute of Occupational, traffic and sports medicine, LJUBLJANA, SLOVENIA

Introduction: In 1958 the representatives of the professional organisations of medical specialists in European Economic Community created the Union of European Medical Specialists (UEMS). UEMS soon established contacts with the political authorities and defined the basic principles of medical specialist training in Europe and elaborated common general criteria for all specialists wishing to move from one member country to another.

Materials and Methods: To realize this objective, UEMS created Specialist Sections for each of the disciplines practiced in the EEC. These groups of experts of representatives of the national associations of the specialties concerned carried out the idea of coordinating and harmonizing specialist training and criteria for the recognition of medical specialists.

Results: Occupational Medicine (OM) Section was born in 1997. The OM European Training Requirements were approved by the UEMS Council in 2013. There are 10 topics included: Framework for practice, Clinical practice, Fitness for work, Hazard recognition-risk control, Disaster preparedness, Service delivery, Leadership and

professionalism, Epidemiology and preventive health, Research methods, Effective teaching. The first European Appraisal in OM was provided in January 2020 and it was approved by The Council for European Specialists Medical Assessment, an advisory body of the UEMS.

Conclusions: The Appraisal was a milestone for the specialty of OM to promote its expertise among other medical specialties so we are devoted to continue to achieve the stable and a high level OM education all over Europe and to promote it all over the world.

Sp44-3**The collaboration of European Association of Schools in Occupational Medicine (EASOM) in the development of the European Postgraduate Assessment in Occupational Medicine**

Begoña Martínez-Jarreta

University of Zaragoza, EASOM, ZARAGOZA, SPAIN

Introduction: EASOM was founded in 1993 with the mission to promote cooperation between institutions involved in Occupational Medicine (OM) training. Its visions/objectives: to add value to member schools through access to European OM academic networks; the improvement of European curricula for the teaching of medical students, including specialist training and continuing professional development; the exchange of students between EU countries and the development of a quality assurance system for training endorsed and adopted by member schools; cooperation with national, European and global official bodies in all aspects of OM training. Several collaborations have taken place, most notably between EASOM and UEMS-OM Section, which recently has been instrumental in achieving the common goal of developing the European Appraisal in Occupational Medicine.

Materials and methods: Identification and analysis of both Societies collaborative initiatives aimed at the development of EPAIOM, and a review of the key aspects that enabled success.

Results: EASOM and UEMS-OM have come a long way in the search for a desired cooperation and some EASOM Summer Schools became meeting places promoting this. Finally, the first European Appraisal in Occupational Medicine was successfully held in January 2020, at UEMS headquarters in Brussels, and a second in August 2021 on the basis of a good collaboration which shows certain key aspects.

Conclusions: Still much to be done in the field of OM teaching both at the undergraduate and postgraduate/specialist level and we need to be together. Highlighting achievements encourage us to carry on.

Sp44-4**European Postgraduate Assessment in Occupational Medicine in Practice**

Fabrizio Mariagobba and Kari Reijula

University of Modena and Reggio Emilia, Department of Biomedical, Metabolic and Neural Sciences, MODENA, ITALY

Introduction: The Occupational Medicine (OM) Section of Union of European Medical Specialists (UEMS) organized the European Postgraduate Assessment to release European Diplomas in OM. To ensure that the Assessment is adequate and meets appropriate standard, the procedures provided by the Council for European Specialist Medical Assessments (CESMA) were adopted.

Materials and Methods: Ad hoc "Writing Group of the OM Exam" is continuously preparing multiple choice questions (MCQs) of three different levels of difficulty covering all ten topics of European Training Requirements in OM. The evaluation of levels and choosing MCQs is done by a "Setting Group". The Assessment itself has 130 MCQs. To ensure that the procedure is adequate to accomplish the standards requested for OM medical professionals practicing in Europe the UEMS-CESMA evaluation of the Assessment was requested.

Results: In January 2020 first Assessment in OM was held in Domus Medica Europea in Brussels. Two UEMS-CESMA reviewers evaluated the organization of the assessment, the quality of MCQs and undertook on-site evaluation of the whole process: according to their evaluation the Assessment was approved by UEMS. The second Assessment was successful held in August 2021.

Conclusions: The European Assessment in OM was positively evaluated by UEMS-CESMA since its first edition. In 2022 the third Appraisal is currently under planning. The "Writing Group of the OM Exam" is at work in collaboration with European Association of Schools in OM to update and further enlarge the question bank taking into account the advances in knowledge and changes in OM medical practice.

Sp44-5

The Importance of European Postgraduate Assessment for trainees in Occupational Medicine in Europe

Tiago Barros Oliveira

Vivamais, PREVENTIVE MEDICINE, Lisbon, Portugal

Introduction: Most European Union countries recognize the medical training from other countries allowing free movement of doctors without harmonization. The Union of European Medical Specialists (UEMS) Assessment in Occupational Medicine (OM) gives a mark of excellence to specialists in OM that may be a differentiation factor in the open market.

Materials and Methods: The info on the Assessment was on UEMS website and by sections member activities. The venue was in UEMS Office. The questionnaire was composed of 130 multiple choice questions (MCQs) with 3 levels of difficulty: 50 low level (1 pt), 50 medium level (2 pts) and 30 difficult level (3 pts). There was 240 points max., the threshold was 150 points.

Results: Most of applicants were trainees in OM. The average age was 32.7 years. The strongest motivation was to test our knowledge and motivation by employers. We gave the highest mark to technical information, venue and customer service were rated high. European Training Requirements differ from the national ones. We wished to have more time for MCQs, despite all finished the test in a due time. There were positive experiences (well organized, clear instructions, high level of MCQs, good coverage, meeting other candidates), the only negative was a feeling to lack time.

Conclusions: The Assessment was challenging, but that was expected. The exam is optional but its recognition at the European level should be desirable to any trainee. The Assessment will reduce the inequalities within EU countries over time and will strongly impact the recognition of OM among other medical specialties and all over the world.

Special Session 45 Supporting a breakthrough against child labour and hazardous work in agriculture

Chair: Peter Hurst

Session introduction

Child labour is defined as work that is inappropriate for a child's age, affects a child's education or is likely to harm their health, safety or morals. Much of the work children carry out in agriculture is not age-appropriate: it is likely to be hazardous or to interfere with children's education, and overall development. For instance, when children are forced to work long hours or handling hazardous pesticides, their opportunity to attend school and develop their skills is limited, and this would most likely interfere with their future well-being and the ability to access decent and productive employment opportunities. The rate of hazardous work for children in situations of child labour remain alarmingly high, especially for the age cohort 5-11 y.o.

2021 has been declared the International Year for the Elimination of Child Labour as monitored in the 2030 Agenda through SDG target 8.7. For the first time in two decades, global progress against child labour has stalled, severely threatening the realization of the SDGs. In 2022, the Government of South Africa will host the V Global Conference on Child Labour and the target for the elimination of all forms of child labour in 2025 risks not be achieved.

The report "Child Labour: Global estimates 2020, trends and the road forward" (ILO-UNICEF 2021) shows that, of the estimated 160 million child labourers in the world in 2020 (+5% compared to 2016), 70 percent, or 112 million, are engaged in agriculture (+4 million since 2016) and its sub-sectors (crop farming, forestry, livestock, fisheries and aquaculture).

A wide range of stakeholders, from food and agricultural workers, producers, rural educators and extensionists, labour actors, all need to be involved at multiple levels to carry this important effort to reduce hazardous child labour by giving voice and building commitment at global, regional and national level. It all consists in increasing the visibility of ongoing accomplishments and positive changes that are potential game-changing solutions.

Sp45-1

WIND: A participatory approach to promote occupational safety and health in agricultural Micro, Small and Medium Enterprises

Halim Hamzaoui

International Labour Organization, LAB-ADMIN, GENEVE, SWITZERLAND

The agricultural sector plays an essential role in the socio-economic development of any country. With an economically active population of about 900 million workers. Agricultural workers are exposed to a broad range of hazards and risks at work. The risk of accidents further increases with difficult terrain, poorly designed tools, exposure to extreme weather conditions... associated with working and living in remote and rural communities. Small-scale farmers are especially vulnerable to these risks at work. The WIND approach (Work Improvement in Neighborhood Development) is designed to assist small-scale farmers and their families in improving safety and health at work and in their everyday life. The uniqueness of the WIND approach lies in facilitating voluntary improvements of working and living conditions, through the active participation of farmers, their families and community members. It also places focus on simple, practical solutions that can be achieved by using locally available, low-cost materials. The approach consists of 33 checkpoints and includes many low-cost improvement examples with clear illustrations in important technical areas for farmers. It contains an action checklist for agriculture and checkpoints on materials storage and handling, workstations and work tools, machine safety. The WIND approach allowed the continuous improvement of working conditions on small-scale farmers allying promotion of prevention, amelioration of

productivity and competitiveness of enterprises, sustainability of production and protection of environment.

Sp45-2

How To Ensure Health And Safe Working Conditions For All

Andrews Tagoe

General Agricultural Workers' Union, ACCRA, GHANA

Agriculture represents an estimated 1.3 billion workers worldwide, that is half of the world's labour force. It is also one of the three most hazardous sectors of activity (along with construction and mining). The ILO estimates that at least 170,000 agricultural workers are killed each year. There is a likely under-reporting of accidents in the agricultural sector and the figures could increase if occupational health and safety of farm workers, especially amongst small farmers where there are no unions, was captured by official statistics. Pesticides and other agrochemicals poison many agricultural workers and this is especially the case for small-scale farmers. Much of agricultural work is, by its nature, physically demanding. Children in Ghana are very much exposed to hazardous work in agriculture, one of the worst forms of child labour. This is the case in Lake Volta Fishing and in Commercial Agriculture of internationally traded cash crops such as cocoa, oil palm and rice. GAWU has conducted several initiatives to reduce hazardous work and child labour in Ghana, both in formal and informal agriculture. The actions have been very diverse through campaigns for the Ratification and domestication of ILO Convention 184, the provision of information and awareness about pesticides and its dangers (colour coding, return periods, labels interpretations, pesticides chain effects from 'plough to Plate' from farm to parliament. GAWU also promotes Accident Reporting from the workplaces. GAWU is extremely committed to eliminate child labour and applies an integrated area-based approach in order to realize child labour free zones in Ghana. GAWU believes that all children deserve to grow safely and work on their dreams, not on farms.

Sp45-3

Adaptive learning approaches for addressing hazardous child labour and reducing pesticide exposure

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The Covid-19 pandemic has exacerbated vulnerabilities, social inequalities, especially in rural areas concerning certain groups. In rural areas, where the 'informal sector' is widespread, workers are poorly protected under labour law, personal protective equipment is scarce, and health care is limited. Pesticides are among the most serious risks to workers' health and occupational exposure to hazardous pesticides occurs through different exposure routes. For this reason, the Rotterdam Convention Secretariat in FAO together with other teams such as the Child Labour in Agriculture Prevention team in FAO pay great attention to reduce exposure to hazardous pesticides for certain vulnerable groups, in particular women and children. Applying online tools for raising awareness and building capacities, technical assistance was provided to Parties to the Convention and other relevant stakeholders. Examples of activities are:

- Development of two brochures on OSH, child labour reduction and pesticide exposure:
 - o The technical note for agricultural stakeholders "Addressing hazardous child labour and reducing risks posed by hazardous pesticides"
 - o The Information note and call for action "Eliminating hazardous child labour through safe and sustainable farming practices"
- A series of capacity development regional webinars on vulnerable groups exposure to hazardous pesticides and human rights-based approach
- Expanding interactive tools for engaging users
- In the framework of the International Year against Child Labour in 2021, a course was organized in each region to address hazardous child labour and reduce pesticides' risks.

Sp45-4

Promoting a comprehensive approach in the agriculture sector and by agriculture stakeholders towards the elimination of hazardous work and child labour

Ariane Genthon

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The report "Child Labour: Global estimates 2020, trends and the road forward" show that 160 million children are engaged in child labour, of which 79 million are performing hazardous work. 70% of child labour remains in agriculture, mostly unpaid family work, in hazardous conditions. 2021 was the International Year for the Elimination of Child Labour and 2022 will see the organization of the V Global Conference on Child Labour. The COVID-19 crisis is threatening to turn back the clock in terms of progress achieved. Addressing children's exposure to pesticides and agrochemicals should be made a top priority.

- By promoting and adapting to local contexts, easy-to-use awareness raising tools for behavioural changes at community level
- By enhancing the capacity of agricultural communities to take action against hazardous child labour and hazardous pesticides
- By educating young people and children on the environmental and health consequences of hazardous chemicals' use in agriculture
- By generating knowledge on chemicals and children's exposure
- By advocating at global level to make hazardous child labour elimination and decent work for young people through safe farming practices a priority

Special Session 46 Best practices of training experts in occupational health

Chair: Kari Reijula and Jorma Rantanen

Session introduction

The global trends of work will impact the need for education and training (E&T) of occupational health (OH) specialists. There is a movement to student-centered, competency-based education. New forms of work are emerging due to globalization, technology change and COVID-19. Distant work needs new strategies for OH service provision. The multi-professional collaboration will

grow. There is a great gap in coverage of OH services and a shortage of competent OH personnel. The Session will analyze the new challenges for the E&T of OH specialists throughout the world and propose new strategies for training curricula. The SC Education and Training in OH and SC OH Nursing are invited to contribute.

Sp46-1

Need for modern harmonized curriculum for occupational health professionals

Kari Reijula and Jorma Rantanen

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To provide good OH services, the personnel of OH has to be well trained. Physicians, nurses, physiotherapists and psychologists need sufficient theoretical knowledge and practical skills. The quality of OH service is closely related to the competence of OH personnel. OH aims to prevent accidents, occupational diseases and harmful exposure related to work. Assessment and support of workability are in the focus of OH activities. OH service is multi-professional team work. OH professionals need to communicate with other experts and understand the basics of relevant science which is needed in daily work. To adequately assess workplaces, OH personnel has to know how to recognize potential hazards, assess residual risks after taking account of controls in place, and how to make appropriate recommendations. OH personnel has also to be able to assess psychosocial issues and physical injury but also the ability to communicate effectively. Assessment of fitness for work and support workability are in focus of OH actions. OH has to know how to use workplace restrictions, potential adaptations and rehabilitation if needed. OH personnel has to be trained for evidence-based practice and to make appropriate recommendations in order to maximize the health and wellbeing of the workers and minimize any harm caused by work. The goals in OH training are a healthy and safe work environment, a healthy worker whose workability is good, and a work community that supports health and well-being. For this we need to update curricula to all OH professionals.

Sp46-2

Occupational medicine training in Korea

Won-Jun Choi

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From the 1970s' to 1980s', Korea experienced rapid changes in its industrial structure. Occupational diseases outbreaks have occurred in late 80s' and early 90's, but the diagnosis of occupational diseases has been difficult. The demand for expertise in responding to occupational diseases has risen. In 1996, at the request of the Ministry of Labour, Ministry of Health approved a new specialty on occupational medicine. As same as many other specialties on medicine, occupational medicine education and training takes four years after one year of internship. The residency program includes 360 hours of classes about occupational and environmental medicine and public health such as occupational diseases, health promotion, epidemiology and statistics, 30 months of occupational and environmental health practice, 3 months of

toxicology practice, and 12 months of clinical medicine training. There are mandatory requirements for training institutes including two or more board-certified occupational and environmental medicine specialists, spaces for the clinic, and equipment for disease diagnosis and work environment assessment. As of 2021, there are 35 quotas for training annually, and 31 training institutes. As the number of board-certified specialists have been increased, there are 899 occupational and environmental physicians as of 2021. The recent task and challenge of medical education and training in Korea is so-called competency-oriented training. We are developing the entrustable professional activities and core competencies for occupational and environmental medicine training.

Sp46-3

Best practices of training Latin America experts in occupational health

João Silvestre Silva-Junior

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Occupational Health training (OHT) is a relevant topic. It deserves special attention particularly during critical public health conditions such as COVID-19 pandemic. Investment developing human capital included OHT debate and practice are needed to achieve positive results. Occupational Health (OH) professionals deal with human lives and should be fully capable to effectively perform their duties. The Latin American scenario is complex, and countries of the region experience distinct social and economic development stages. These differences impact the recognition of workers' health in national policies. Labor and health legislations play a regulatory role implementing OH practices in productive processes of different job sectors. The presentation aims to show OHT of three Latin American countries - Brazil, Colombia, and Mexico. Those are the most populous of the region. It will be presented regulations and legal requirements for the provision of professional services in the OH field. Topics related to training of OH physicians and nurses will be the focus of the presentation, in order to point out whether classical and emerging issues are taken into account in academic curricula. Additionally, it will be shown the importance given to development of core competences required for OH practice, considering educational programs and strategies. This is necessary to establish the required training in order to deal with regional challenges concerning protection, promotion, and maintenance of workers' health.

Sp46-4

New challenges in the training of occupational health nurses

Kim Davies

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Introduction: The training for Occupational Health Nurse has changed within the last couple of years and more so during the COVID-19 Pandemic.

Materials and Methods: In the digital age, learners neither have the patients nor can read long chapters in books. Therefore, learning material and style need to change to incorporate the learning method. Training methods have been adopted to accommodate a new way of training millennial students, accounting for learning needs and methods changes. Material needs to be more accessible to entice the students to learn and research information required for the curriculum they are studying by incorporating more visual

resources such as graphs, videos, tables, and technology. Innovative learning material needs to be developed to ensure students are engaged and trained adequately within the field of Occupational Health. Practical studies have become the norm and will assist students in this field. Training during COVID - 19 has taught us that change is challenging but also very rewarding.

Results: While assisting with Occupational Health training at a tertiary institution and developing course material, it became evident that learning, course and delivery method need to be developed and updated within the digital age.

Conclusions: Training and courses provide students with awareness and understanding of workplace hazards and how to identify, report, and control them. As the Occupational Health nurse is part of the multidisciplinary team, it is critical that training addresses this new way of thinking that equips nurses for all aspects of the working field.

Special Session 47 New challenges to professional ethics in occupational health

Chair: *Jorma Rantanen*

Session introduction

Several professional organizations on occupational health and safety, including the International Commission on Occupational Health (ICOH), have drawn codes of ethics for their memberships based on the Hippocrates Oath.

Globalization with all its ramifications, such as the pandemics, is setting new demands and has changed substantially the conditions of operation in professional practices, not least in occupational health. It is important to identify the new challenges to professional ethics and discuss the strategies for ensuring high ethical standards of occupational health professionals throughout the world and to defend the right to ethical conduct and professional independence of occupational health experts in the new globalizing world of work.

Sp47-2

Ethics and Occupational Health: From the changing world of work to the future challenges of the COVID-19 pandemic

Antonio Valenti and Diana Gagliardi

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Introduction: The ethical dilemmas confronting occupational health are becoming more complex as they reflect changes in the world of work, demographic shifts, new technologies and future challenges to public health due to the spread of the COVID-19 pandemic. This scenario is setting new contexts for occupational health physicians (OHPs) in their tasks and professional conduct, emphasizing the role of OHPs in balancing between individual (i.e. the health and working capacity of individual employees), enterprise (i.e. maximize the production) and community (i.e. the health and safety of the community at large) interests. This study looks at the problems raised by these ethical concerns in occupational health and proposes some solutions

Materials and Methods: Thanks to a comprehensive analysis of ethical decision-making models in occupational health, we identified some drivers and barriers for correct professional ethics that

can represent a starting point to acknowledge some proposals for ethical solutions

Results: There has been no systematic attempt to study the true extent of ethical issues and how they are resolved in practice. In fact, the presence of numerous variables to be taken into consideration, as well as the growing number of potential stakeholders involved in ethical choice, prevented the identification of an ideal proposal able to solve ethical challenges in OHPs practice

Conclusions: To deal with the ethical dilemmas in today's changing world of work and the pandemics, the logic of an integrated approach must take account the importance of all three types of ethics: personal (individual), professional and institutional.

Sp47-3

Challenges from the COVID-19 pandemic to professional ethics in occupational health

Jorma H. Rantanen

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Introduction: The prevention and management of the COVID-19 pandemic present several ethical challenges to occupational health (OH). The scientific evidence, OH realities, and ethical aspects provide parallel imperatives, but they may be in conflict with the non-medical interests in politics, economy, business, or in contrast between public health and private interests. The ethical challenges in the pandemic policies are critically dependent on equity, solidarity, and justice.

Materials and Methods: Key (pertinent) challenges to OH in the present COVID-19 pandemic situation were recognized in the recent policy documents of the WHO and ILO and the recent research articles on the ethical challenges involved. Major challenges in OH were recognized at all levels: global, national, company and individual levels.

Results: Grave inequities prevail in the policies and practical actions for COVID-19 in the global world of work. OH aspects in the pandemic policies and practices have not received sufficient attention in terms of the recognition of high-risk work environments and jobs, high-risk individuals, prevention, protection and rehabilitation at work post-COVID-19, and recognition and compensation of COVID-19 as an occupational disease. Ignorance, unpreparedness, late or non-action, and inequities present ethical problems.

Conclusions: Gaps in ethics mean also gaps in effective and equal prevention, management, rehabilitation and compensation. From a perspective of ethics and effectiveness, the identification of gaps provides a vitally important lesson, not only in the present pandemic, but also for future ones.

Sp47-4

Codes and guides on professional ethics for non-medical / multidisciplinary occupational health experts

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Introduction: The field of occupational health has become more multi- and transdisciplinary over recent times, with the inclusion of categories of expertise that have a shorter history in terms of ethical guidelines when compared to the traditional medical professions. These categories of non-medical professionals are guided by their own codes, including the International Code of Ethics for Occupational Health Professionals, developed by the International Commission on Occupational Health (ICOH) and now in its third edition (2014).

Materials and Methods: A broad-brush comparison is presented between the ethics codes developed by various associations of occupational health professionals, and how these codes have evolved with the changes in the world of work.

Results: There is a need to implement parallel ethical principles which may be applicable to the multidisciplinary teams, programmes, and projects, as the individual experts have different responsibilities and roles to play in occupational health practices and the delivery of occupational health services. The ICOH Code of Ethics does not aim to cover all areas of implementation, or all aspects of the conduct of occupational health professionals, or their relationships with social partners, other professionals and the public. It is well accepted that some aspects of professional ethics may be specific to certain professions and need additional ethical guidance.

Conclusions: The changing world of work has forced a paradigm shift in the practice of occupational health, including the addition of new dimensions into the respective codes that guide occupational health professionals.

Special Session 48 Aquaculture occupational health and safety - towards preventive approaches

Chair: Mohamed Jeebhay

Session introduction

The global scoping study on occupational health and safety (OHS) in aquaculture commissioned by the Food and Agriculture Organization revealed that over 19 million workers work in aquaculture. Workers are often faced with a range of hazards and highly hazardous tasks. Limited aquaculture OHS information exists at a global level, with major data gaps especially on work-related diseases, regulatory standards, industry practices and OHS management systems. This calls for coordinated research to inform improved policies, practices and other interventions. The special areas of focus for this session are:

- global trends in aquaculture
- hazardous work in aquaculture and its relevance for occupational exposures and health
- tools and strategies for risk assessment
- strategies for prevention

Sp48-1

Occupational health and safety in Tanzanian aquaculture – emerging issues

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Introduction: The Tanzanian aquaculture industry represents great potential for food production and jobs, but the associated occupational hazards and health risks have not been assessed in detail. The aim of the study was to conduct a scoping analysis of the status of occupational health and safety (OHS) based on current aquaculture activities, specifically of the fish and seaweed farming sectors, in Tanzania.

Materials and Methods: Relevant information was obtained through aquaculture site visits, worker observation, interviews with key stakeholders, and a review of literature relevant to the Tanzanian aquaculture sector published in scientific communications and grey literature.

Results: The study revealed that the aquaculture industry in Tanzania is in its nascent stages, especially in relation to OHS development, despite some well-established isolated operations in the country. The industry is dominated by small-scale fish and seaweed farmers, the majority of whom work in the informal and semi-formal sectors. Aquaculture workers are exposed to a number of occupational hazards and their associated health effects have been poorly characterized. Substantial gender disparities exist within the sector, which together with climate change, impact on worker health and safety.

Conclusions: Future research should focus on characterizing occupational exposures and documenting the associated health effects in Tanzanian aquaculture workers. Standardized methods should be used for this purpose, taking into account gender disparities as well as the impact of climate change on the OHS of this vulnerable group of workers.

Sp48-2

Occupational safety and health risk assessment and management challenges in Brazil – lessons from the AquaSafe mobile software application

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Introduction: AquaSafe is a mobile learning application that can be used as one of the modalities for teaching, training and risk assessment in aquaculture occupational health and safety (AOHS). The app has checklists, risk assessment tools and other relevant information on AOHS.

Materials and Methods: Content information was based on global scientific literature, ILO, FAO, WHO and OHSAS 18001. An online survey is also available to identify which application tools are used and to assess the application's effectiveness in promoting prevention of injury and illness in aquaculture workers.

Results: Available for Android, its interfaces promote learning through a questionnaire; risk assessment checklists; and tools to identify the root cause of the AOHS problem. Users can find information on risks, personal protective equipment and educational videos on AOHS as well as COVID-19. Findings from the online survey revealed that most responders indicated that AquaSafe

increased their knowledge of AOHS. Participants reported that risk tools, checklists and what-if are used more frequently than quizzes, videos and the “5-whys”.

Conclusions: While AquaSafe is designed to support knowledge awareness, risk assessment and decision making in AOHS, it is not used widely enough. The low response rate to the survey and downloads suggest that AOHS is not a priority in low-middle income countries, such as Brazil. AOHS awareness remains a challenge and requires differentiated approaches.

Sp48-3

Marine finfish aquaculture mass mortalities and aquaculture occupational health and safety: assessing hazards and risk

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Introduction: Mass mortality events (MMEs) involving the sudden death of thousands to millions of fish are problematic in marine finfish aquaculture globally. MMEs entail significant asset losses; compliance threats to environmental, animal health and occupational health and safety obligations; and undermine social license to operate. MMEs require rapid mobilization of workers, vessels and other supports to identify the extent and cause of the die-off, plan and undertake operations for removal, transport, and disposal of dead finfish. No existing research has explored the potential aquaculture occupational health and safety (AOHS) hazards and risk associated with responding to MMEs.

Materials and Methods: An AOHS research team performed a multi-national desktop exercise using information on definitions of MMEs, incident reports, legal and regulatory guidance and documentation and media coverage from five countries to identify potential AOHS hazards and risks associated with MMEs. Results from country profiles were synthesized and incorporated into a multi-disciplinary, expert elicitation risk assessment process for MMEs. Results: Findings indicate variability in MME definitions, requirements for event reporting and AOHS-related contingency planning across countries. A preliminary bow-tie risk analysis highlights key hazards and potential pathways between MME-prevention planning, monitoring and response and AOHS risks. Conclusions: AOHS concerns need to be fully and effectively integrated into broader risk assessments on ways to reduce MMEs and their consequences in marine finfish aquaculture.

Sp48-4

Safer workplaces in fish farming - strategies for mitigating occupational health and safety risks

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Introduction: Norwegian aquaculture employees are exposed to a high accident risk compared to other industries. Today's open-sea fish farm production requires workers to be present at the fish farm daily for performing manual tasks to ensure fish welfare and maintain farm structures. There is thus a need for measures to reduce occupational health and safety (OHS) risks.

Materials and Methods: A researcher project was conducted to explore OHS risks in Norwegian fish farming. Data was collected through a survey with 447 respondents working at fish farms and on board service vessels. Fish farm technology design principles regarding OHS were mapped through interviews and a questionnaire administered among manufacturers.

Results: Norwegian fish farmers experience high well-being and an overall good health. They report a sound safety climate. Illness is the most common cause for work-related sick absence followed by acute injuries. Fish farmers report considerable musculoskeletal complaints related to work and worry about the long-term consequences. Pain in the neck area, shoulder and arms, back and hands/wrists are most commonly reported. There is potential for developing design principles that equipment suppliers can use to build safety barriers into their products and to improve ergonomics of workplaces.

Conclusions: This project has provided novel knowledge about health and safety conditions for production site workers in the Norwegian aquaculture industry. The results are being applied to reduce OHS risks by building safety barriers into work procedures, workplace designs and equipment.

Special Session 49 The Occupational Medicine Pipeline - developing Occupational Medicine expertise internationally

Chair: Peter Connaughton and Richard Heron

Session introduction

Findings will be presented from an international survey of 48 occupational and environmental medicine (OEM) societies on how they develop and maintain OEM expertise. Examples of best practices will be described. Options and strategies for future collaborations and international development of OEM will be discussed.

Sp49-1

Findings of an international survey on how occupational and environmental medicine expertise is developed and maintained.

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and Public Health, Baltimore, MD, USA, ⁵ Executive Committee, IOMSC, Perth, Australia, ⁶ University of Maryland School of Medicine, Baltimore, MD, USA, ⁷ American College of Occupational and Environmental Medicine, Elk Grove Village, IL, USA

Introduction The objective of this international survey was to learn how occupational and environmental medicine (OEM) expertise is developed and maintained around the world.

Materials and Methods An anonymous survey was conducted of leaders of the 48 member societies (from 43 countries) of the International Occupational Medicine Society Collaborative (IOMSC) to evaluate OEM training, certification, maintenance, and recertification requirements.

Results OEM physician leaders representing 46 of the 48 IOMSC member societies (95.8%) completed the survey between December 2019 and February 2020. Academic post-graduate and on-the-job training were the most frequent methods for developing OEM expertise, with little use of online coursework. There was minimal content in medical school in most countries. Board certification usually required graduate specialty training but occupational medicine recertification requirements were uncommon. In lower income countries on the job training and formal training abroad were more common.

Conclusions The survey identified opportunities for the introduction and/or expansion of OEM content in medical school curricula in the majority of countries. There are significant opportunities to increase the utilisation of online coursework, particularly in lower income countries.

Sp49-2

International best practices and barriers to developing expertise in occupational and environmental medicine.

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Introduction The objective of this analysis of survey responses was to identify common barriers to developing OEM expertise and to highlight educational best practices for sharing internationally.

Materials and Methods An anonymous survey was conducted of leaders of the 48 member societies (from 43 countries) of the International Occupational Medicine Society Collaborative (IOMSC) to evaluate OEM training, certification, maintenance, and recertification requirements. A large volume of free text commentary from the survey participants was reviewed and evaluated.

Results Respondents confirmed that most OEM work is performed by non-specialists. A few exceptions were noted, including specific OEM tasks in some countries, for example mandated fitness for work assessments. There was a widespread lack of expertise in OEM, due to factors including a lack of curricula in medical schools. There was also a lack of recognition, visibility and funding for the specialty. A variety of examples of best practice strategies for

developing expertise were shared, including established national standards for OEM curricula in medical schools.

Conclusions: The survey identified opportunities to increase OEM expertise, including focusing on implementing curricula in medical schools, and raising the visibility of the specialty. There are opportunities for increased OEM training of medical practitioners who are unable to pursue advanced specialist training.

Sp49-3

Opportunities for increased collaboration to advance the development of OEM expertise internationally.

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Introduction The objective of this analysis was to connect the findings of the IOMSC survey on the development of OEM expertise with the ICOH goals for training in occupational health.

Materials and Methods The findings of the international survey on the development of OEM expertise were considered in the context of the goals of ICOH. The needs and opportunities identified in the survey were also considered in the context of the vision and goals and the International Occupational Medicine Society Collaborative (IOMSC).

Results The survey identified opportunities for the development of expertise in OEM which align with the goals of ICOH Scientific Committee on Education and Training in Occupational Health. The IOMSC is positioned to support the international development of OEM expertise by sharing information on competencies, best practices in medical curriculum content and examples of specialty certification pathways from different countries.

Conclusions The development of expertise in OEM internationally can be amplified by increased collaboration between organisations and growth in international partnerships. The COVID-19 pandemic has further highlighted the value of developing OEM expertise for the advancement of occupational health.

Special Session 50 Occupational Safety and Health Challenges and Solutions in the Post-Pandemic Future of Work

Chair: Wiking Husberg

Session introduction

The Nordic Future of Work and OSH Group presented its mandate and scope at ICOH in Dublin in 2018. Our work is a collaborative effort with inputs from ICOH, ILO and EU OSHA. The Nordic Labour Inspectorates established the group to conduct a scoping review of challenges in the Future of Work and propose some practical recommendations to address these challenges. In this session we will present results from our ongoing work.

Sp56-1**Work today and in the future: Perspectives on Occupational Safety and Health challenges and opportunities for the Nordic labour inspectorates**

Yogindra Samant, Paivi Mattila-Wiro, Wiking Husberg, Magnus Falk, Annemarie Knudesen and Saemundsson Eyjolfur

Norwegian Labour Inspection Authority, Working Environment and Regulations, Trondheim, Norway

The Nordic Future of Work launched its work at ICOH Dublin meeting in 2018. The outcome of that work in form of a report is now available. Findings from this report as they concern range of topics from Globalization to Digitalization and Climate change to Demographics will be put forth. Moreover solutions for future OSH policy and practice on certain areas such as platform work, NCDs, Migrant Workers will be proposed.

Sp50-2**EU OSHA's perspectives on the Future of Work and OSH**

William Cockburn

EU OSHA. Director. Bilbao. Spain

On June 28, the European Commission published a new strategic framework on health and safety at work 2021-2027, "Occupational safety and health in a changing world of work". Building on the experience of previous strategic documents dating back twenty years and following extensive consultation with stakeholders, this document defines the key priorities and actions for improving workers' health and safety. It addresses rapid changes in the economy, demography and work patterns, sets out a 'vision-zero' approach to prevention and aims to prepare us for future health crises. The success of the strategy will, of course, be measured by the impact it is able to achieve – to what extent will it contribute to improved working conditions, to fewer injuries and diseases? Key to this is implementation. A solid evidence base; an adequate regulatory framework; sufficient capacity and effective cooperation, especially with social partners are all essential elements. EU-OSHA has a prominent role in the strategic framework and it will continue to work together with all actors to ensure a successful implementation of the strategic framework.

Sp50-3**Occupational Safety and Health Challenges and Solutions in the Post-Pandemic Future of Work: ILOs View**

Joaquim Pintado Nunes

ILO, Lab Admin / OSH, Geneva, Switzerland

In 2019, before the advent of the COVID-19 pandemic, the ILO identified technology, climate change, transformations related to work organization, and demographics as the main drivers of change that would affect occupational safety and health in the future of work. Solutions advanced for global and country responses to these challenges relied on risk anticipation, a multidisciplinary approach to safety and health, building competence on OSH, taking advantage of the complementarities between the public health and occupational safety and health spheres, tripartite governance, and expanding

partnerships. During the past year and a half, the world of work has changed dramatically and encountered many significant changes in relation to COVID-19, with workplaces being affected by new risks in relation to both physical and mental wellbeing, in addition to other well-known hazards. The pandemic accelerated the pace of change in unexpected ways. The presentation will take an up-to-date look at the factors of change and proposed responses identified before the pandemic and their suitability for the post-pandemic world. The presentation will also propose a set of key ideas on how to make the most of safety and health for a human-centred recovery that recognizes the fundamental importance of safe and healthy working conditions to decent work.

Sp50-4**Work, Health and Safety Beyond Covid-19**

Michelle Baxter

Safe Work, Australia. Chief Executive Officer, Canberra, Australia

The COVID-19 pandemic has transformed our world and our workplaces. Workers, employers and businesses have been impacted globally, some more severely than others. While it may feel as if the world came to a halt, the world of work continued to change rapidly over the last two years. In some areas the pandemic accelerated emerging workplace trends, altering the risk and profile of workplace injuries and presenting new challenges around how these are managed. In Australia workplaces of different sizes and across various industries have undertaken rapid and large-scale changes that to address the work health and safety (WHS) risks and challenges presented by COVID-19 at work. Some of these changes may become embedded as long-term risk mitigation strategies as businesses reopen. This presentation will explore the changing nature of WHS challenges in the Australian context, including new WHS risks associated with increased prevalence of isolated work, working from home, psychological hazards, and the ongoing risk management of exposure to COVID-19. Rapid advances in technology and new working relationships and arrangements resulting in a fluid concept of the workplace have created further complexity in identifying and responding to emerging WHS challenges.

Sp50-5**Labour Inspection and Occupational Health during and post pandemic period**

Siong Hin Ho

International Association of Labour Inspection, President, Singapore, Singapore

Labour inspectorates play a key role in national responses to COVID-19. Through their technical expertise, in addition to verifying compliance with national legislation, labour inspectors provide advice to employers and workers assisting them in the development and implementation of workplace policies and programmes to prevent and control COVID-19 contagion, and to adapt work practices to applicable labour legislation. In the context of the COVID-19 pandemic, labour inspectorates in many countries are being affected in their normal operation, either because of an increased demand for their services or because this public health crisis affects inspectorate's resources, namely when inspectors need to stay home because of their health condition or to comply

with lockdowns. Many such organizations have been reprioritising and changing methods of operation with regards protection of the safety and health of workers, control and assistance to the implementation of employment retention measures such as lay-offs, or changes in workplaces related to working time arrangements and other. Attention is and should also be paid to the safety and health of labour inspectors themselves when visiting workplaces. Presentation will revolve around the changes operated in labour As well as lessons learned and strategies to be deployed to ensure the effective discharge of labour inspectors' duties now and in the post-COVID-19 future.

Special Session 51 Pandemic and post-pandemic challenges, a vision of the Perosh network

Chair: Diana Gagliardi

Session introduction

This session summarizes a part of the research activity led by 10 European institutes, members of Perosh (Partnership for European Research in Occupational Safety and Health) during the pandemic. It also emphasizes what we have learned to prepare for the future:

- preparedness to cope with another pandemic with better tools for infectious risk assessment,
- better understanding of factors ruling the efficiency of prevention measures,
- better knowledge of the psychosocial risks in the sectors of care during such crisis and leads to improve their prevention,
- observations in such an extreme situation with much more people working at home than before offered a lot of opportunities to understand the associated occupational risks.

Sp51-1

Pandemic and post-pandemic challenges

Louis Laurent

INRS, Studies and Research, Nancy, France

Introduction: All institutes in the field of occupational safety and health had to provide quick answers to advise public authorities and companies, with questions such as personal protective equipment, risk assessment at the workplace, prevention measures and the impact of telework. In addition, the pandemic is likely to induce changes in the future work organization, for instance the use of information technologies at work. Eleven institutes presented their views at the occasion of the PEROSH 2022, 4th Research Conference conference in Madrid.

Materials and Methods: This presentation is a synthesis of seventeen talks. Various methods have been used, adapted to the urgency, consisting often in literature review, follow up of pre-existing cohorts, specific survey and interviews.

Results: 1) Exposure assessment with two kinds of activity, one aiming at a better understanding of outbreaks at the workplace, the others aiming at the development of job-exposure matrices. 2) Compliance of prevention measures in companies, investigation of their effectiveness, and evolution of risk prevention induced by the pandemic. 3) Psychosocial risk in the care sector, factors modulating its effect, prevention measures. 4) Effect on health of massive

telework and lessons which could be derived for thy post pandemic world to implement telework in companies.

Conclusions: Although there is a wide spectrum of cultures among European countries and various research approaches, many conclusions are similar or complementary. These results will be useful to tackle new questions in the post pandemic world.

Sp51-2

Risk analysis of Covid-19 in the workplace: practical approaches by activity sector in Italy

Fabio Boccuni, Giuliana Buresti, Diana Gagliardi, Bruna Maria Rondinone, Benedetta Persechino, Marta Petyx, Antonio Valenti and Sergio Iavicoli

INAIL, Dept. Of Occupational And Environmental Medicine, Epidemiology And Hygiene, Rome, Italy

Introduction: Italy was the first among western countries to face the spread of the Covid-19 pandemic. The progressive adoption of several containing measures by the Government during the first lockdown period from March 2020, encompassed the temporary suspension of non-essential business activities, resulting in a reduction of about 75% of workers present in their workplaces (including remote workers).

Materials and Methods: INAIL developed a methodology for assessing the risk of SARS-CoV-2 infection in the workplace to support the Government for a safe reactivation of businesses evaluating the impact of the modular reopening of work activities after the first lockdown period. The average risk classes have been associated to the number of employees by sector to take into account the potential impact on the mobility due to the commuting. Results: Specific protocols for reopening activities have been developed for many sectors; these included administrative, preventive and protective measures to manage the risk in the workplace and mitigate the impacts for the community at large. Practical recommendations were allowed for public transport, manufacturing, meat processing and cutting plants, construction, schools, shopping malls and retail shops, catering services, seaside facilities and personal care services.

Conclusions: The proposed methodological framework has been adopted by the Italian Government to guide the prevention strategies and address the prioritization of the vaccination campaign in workplaces, with the final aim to contribute to the fastest achievement of the whole population immunity from Covid-19.

Sp51-3

Infection Control Measures and Occupational Safety and Health in German Companies during and after the Covid-19 Crisis

Anita Tisch, Sophie-Charlotte Meyer, Sabine Sommer and Swantje Robelski

Federal Institute for Occupational Safety and Health in Germany (BAuA), Unit Working Time and Organization, Dortmund, Germany

Introduction: All over Europe, occupational safety and health (OSH) gained importance during the Covid-19 pandemic. Most companies adapted many different OSH measures to cope with the risk of infection. Thereby, in German companies, the adoption of infection

control and OSH measures highly depends on different company characteristics.

Materials and Methods: We employ data from the 2nd and the 16th survey round of the study “Establishments in the Covid-19 crisis (BeCovid)”, a German representative establishment survey of approximately 2,000 companies in several branches. Both survey rounds, conducted in August/September 2020 and August 2021, focus on infection control measures and health and safety regulations. The latter further includes questions concerning future challenges for OSH.

Results: The results show that a large variety of different measures helped to provide infection control and OSH during the crisis. Larger companies not only adopted more measures, but also were more likely to implement measures also concerning psychological health of employees. While the majority of all companies plan to consider OSH in future management decisions, again mainly larger companies are going to invest in digital tools to provide OSH in the future.

Conclusions: The covid-19 crisis raised awareness on OSH. It is important to use this awareness and work towards safer and healthier workplaces in the long term.

Sp51-4

Working in times of Covid-19. psychosocial risks and emotional impact on health centers staff

*Rebeca Martín Andrés, Aitana Clara Garí Pérez,
Laura Rodríguez Merino, María José Santiago Valentín,
Silvia Termenón Cuadrado and Angeles de Vicente Abad*

*National Institute of Safety and Health at Work (INSST),
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Introduction: The COVID-19 crisis will have an undeniable impact on the population's emotional health. The present study aims to shed light to the psychosocial impact on the Spanish health centres workers during the first and second wave of COVID-19 and possible preventive measures to minimize it.

Materials and Methods: Literature review (Pubmed, SCOPUS and Cochrane Library Plus); statistical analysis of the 2019 National Labour Force Survey; 41 semi-structured interviews.

Results: The review shows that the group most at risk is made of women, nurses or low qualified professionals, aged between 20-30 years, work experience <5 years and without previous crisis training. Working in first line impact on mental health leads to a higher prevalence of anxiety, depression, and post-traumatic stress disorder. There are several preventive interventions to be implemented, including those based on peer support and resilience training. The semi-structured interviews confirmed consequences compatible with bibliographic findings and allowed to deepen into the knowledge of the sector's preventive system.

Conclusions: Working in health centres during the pandemic gives rise to psychosocial risks that require a specialized approach. Exposure to these risks at the workplace can lead to negative effects on people's physical and mental health so that preventive measures are required. Mental health surveillance is key for an early detection and addressing the damage caused by the pandemic. The commitment of managers, middle managers and prevention services heads to psychosocial health is essential for the success of preventive actions.

Sp51-5

Working from home during the COVID -19 pandemic in the Netherlands

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*Netherlands Organisation for Applied Scientific Research (TNO), Unit
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Introduction: The call to work from home was one of the measures taken by the Dutch government. Almost 50% of the Dutch workers did so. Although working from home was already common in the Netherlands, the number of homeworkers and the number of hours they worked from home increased significantly. This paper provides an overview of changes in working conditions and health of homeworkers in the Netherlands between 2019 (pre-COVID-19) and March 2021.

Materials and Methods: For this, the NWCS-COVID-19 cohort study is used. This study is a follow up study of an annual survey conducted by TNO and Statistics Netherlands among a representative group of workers in the Netherlands (the Netherlands Working Conditions Survey (NWCS)). For the NWCS-COVID-19, a group of participants of the NWCS 2019 was approached again in June 2020, October 2020 and March 2021. 8,911 respondents provided data in all four waves.

Results: The results show both improvements and deteriorations of working conditions and health and wellbeing. For example: compared to the pre-pandemic period respondents reported more sedentary behaviour. Workers with young children struggled with work-life balance during the first wave. Homeworkers report a good health and less MSD's than before the crisis. Work related stress did not increase. Some groups, however, do feel lonely and miss connection with work.

Conclusions: The expectation is that home working will be more common in the future than before the pandemic. In organizing this hybrid way of working, we must ensure that positive effects of home working are maintained and negative ones are minimized.

Special Session 52 Young workers - our future workforce needs OSH attention now!

Chair: Susan Gunn and Frida Marina Fischer

Session introduction

Workers below the age of 18 are often overlooked, yet as of age 15, and even younger depending on the type of work, they may work legally and assist their family with chores. Like adult workers, they too are exposed to workplace hazards and require policy protection and education about the risks. In certain respects they have unique vulnerabilities that must be taken into account. Our youngest workers need occupational health protection too!

Sp52-1

New numbers and what they tell us about child workers in the world today

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*International Labour Organization, Fundamental Principles and
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Introduction: Worldwide, 222 million workers are below the age of 18. Of these, 160 million are classed as child labour because their

health or educational development are at risk. After two decades of decline, these numbers are now increasing.

Materials and Methods: To shed light on the world's youngest workers, International Labour Organization supported national child labour surveys produce global and regional estimates every four years. The latest report draws from 106 household surveys covering 2/3 of the world's children aged 5-17 years.

Results: Issued in June 2021, the ILO-UNICEF report delineates child labour by age, gender, area of residence (urban and rural), occupation, and branch of economic activity. The largest share (72%) is in family-based work which, contrary to assumption, was not found to be safer as 42% of these children were doing hazardous work. An earlier ILO analysis of 21 countries' data had calculated that in a one year period, 106.4 million child workers (all occupations) had experienced a work-related injury. Future national surveys will incorporate new tools to better measure child workers' exposure to workplace risks, violence and health-related impacts.

Conclusions: These global statistics provide critical insight into the nature and scale of a large population of workers currently receiving little occupational health attention in spite of its being greatly needed to accurately focus policy, legislation, and risk education. Economic and environmental trends exacerbated by the pandemic indicate work by children of all ages is likely to increase in the years to come.

Sp52-2

Psychological health of children who work: the effects of schooling, age and gender

Mohammad Vaqas Ali, Catherine Pellenq and Laurent Lima

Forman Christian College, Sociology, Lahore, Pakistan

Introduction: Globally over 152 million children do hard and often hazardous work. Parents' decision of whether or not their child should work usually takes into consideration the physical danger, but what about the risks to children's mental and emotional well-being? The purpose of this analysis is to gauge whether gender, age, or education plays a role in how children are affected psychologically by such work.

Materials and Methods: Quantitative analysis of data from a comparative study of brick kiln workers aged 8-18 years (total 936 respondents) in Pakistan and Afghanistan was combined with qualitative assessment of a portion of the same population.

Results: Factorial Anovas confirmed that work was the strongest predictor on key dimensions of emotional health: working children demonstrated a greater sense of insecurity (.358), feeling abused (.055), and negative emotions, such as fear (.027). Gender was another predictor: girls who worked expressed more negative feelings and a greater sense of mistreatment compared with boys. Schooling was associated with overall positive impacts, especially pronounced in younger boys (8 - 13 years) and adolescent girls, in effect counterbalancing and in certain aspects even negating the deleterious effects of work.

Conclusions: This study underscores the importance of considering psychosocial impacts when determining policy and interventions aimed at young workers. Since age and gender were shown to operate differently on the different dimensions of emotional well-being, qualitative measures have proven to be crucial for understanding the factors generating these effects.

Sp52-3

Occupational and Health Profile of Children Working in Tobacco Family Farms in Brazil

Ana Claudia Gastal Fassa, Neice Muller Xavier Faria, Ana Laura Sica Cruzeiro Szortyka, Rodrigo Dalke Meucci, Nadia Spada Fiori and Maite Peres de Carvalho

Federal University of Pelotas, Department of Social Medicine, Pelotas, Brazil

Introduction: Despite the lack of precise estimates, studies in several countries indicate that a significant number of children participate in tobacco production facing workplace hazards and its educational and health consequences. This study described the main tasks developed by Brazilian child workers and the prevalence of Green Tobacco Sickness (GTS), pesticide poisoning, respiratory symptoms, musculoskeletal pain and urinary cotinine.

Material and Methods: It was conducted a cross-sectional study in a random sample of 912 tobacco growers' properties, in southern Brazil, in 2011. It was identified 99 workers under 18 years of age in 79 properties. Two instruments were used to assess individual and rural property aspects. This study was approved by the Research Ethics Committee of the Federal University of Pelotas (Opinion no 11/2010).

Results: Among the interviewees 11% were younger than 14 years old, 51% were male, 26% started agricultural work before the age of 12 years. They worked mainly in harvesting and tying hands of tobacco, 50% reported exposure to pesticide. Of the 12 youngsters, between 14 and 17 years old, 83% had more than 20 ng/ml of cotinine in their urine. During lifetime, 13% had three or more GTS episodes and 3% had pesticide poisoning. In the year before the interview, 6% had wheezing, 16% reported coughing without having a cold and more than 1/4 had thoracic spine or low back pain.

Conclusions: There are few studies on child labour in rural areas, however, this study observed an early inclusion of children in tobacco cultivation which can be related with several health problems.

Sp52-4

Psycho-social functioning of child workers in the brick industry in Nepal

Sunil Kumar Joshi and Susan Gunn

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Introduction: The psychosocial attitudes relating to self and work are major determinants of perception and practices for a child worker. The aim of the study was to assess the severity of psychological impacts on child workers in the brick industry in Nepal. **Materials and Methods:** This was a cross-sectional study design involving children up to 17 years of age from Bhaktapur and Sarlahi districts, Nepal. The children were classified into two groups: children working in brick factories and non-working children with similar socio-economic backgrounds.

Results: Regarding the psychological variables, it was recorded that 8.4 per cent of the respondents in Bhaktapur and 7.2 per cent in Sarlahi felt looked down by others with the nature of job they perform. 4.2 per cent of the respondents in Bhaktapur and 2.1 per cent from Sarlahi perceive that their work is crucial for family support. Specifically, the psychological measures for emotional attachment, hopelessness and helplessness were positively associated

(OR>1, P<0.05) (AOR>1, p<0.05) with the children's working status.

Conclusions: Psychosocial impacts were observed in child workers. Working children were more likely to be emotionally fragile and to feel helpless than non-working children. Removing child workers will be a major step but proper education and psychosocial activities should be supported as many of the families are working for years in the brick industry.

Special Session 53 Critical Issues in the Future of Decent Work

Chair: Paul Schulte

Session introduction

This session will draw from the efforts of an ICOH workgroup on the future of decent work. The focus of the workgroup will be to develop a white paper. The speakers in this session are members of the workgroup and will present selected topics from the white paper. Including a broad overview of the future of decent work, as well as focus on migrants, policies and productive safety climate.

Sp53-1

Overview of Framework for Decent Work of Occupational Safety and Health

Paul Schulte

National Institute for Occupational Safety and Health, Division of Science Integration, Cincinnati, United States

Introduction: Decent work is the focus of the 2030 United Nations Goal 8 for sustainable development. There is a need to identify the occupational safety and health aspects of the 4 pillars of decent work: job creation; social protection; rights of workers; and social dialogue.

Materials and Methods: This presentation presents an overview of a framework in development by an international workgroup. The framework identifies the occupational safety and health issues at the intersection of the 4 pillars and 8 major determinants of decent work. The determinants include: new and emerging hazards and risks, demographic (age and gender), globalization, informed work, pandemics, workplace policies, and climate change.

Results: The future of decent work will be influenced by residual effects of the COVID-19 pandemic, and the impact of technology, globalization, demographic transition, and climate change. Psychosocial hazards will continue to emerge and be a major threat to workers. Meanwhile, traditional hazards of physical work will still be an important focus. New unanticipated hazards are also likely to arise.

Conclusions: The occupational safety and health focus will need an expanded focus to address the future of decent work. Moreover, to address this broad range of factors the field will need to utilize transdisciplinary interactions and systems-thinking.

Sp53-2

4D Jobs - Dirty, Dangerous, Difficult and Discriminatory: An update of the 3D Job theory

Acran Salmen-Navarro

New York University, Grossman School of Medicine, New York, United States

Introduction: 3-D jobs theory "Dirty, dangerous and difficult" is an American neologism derived from an Asian concept referring to certain kinds of labor performed by unionized blue-collar workers. The initial term intended to address the precarious nature of these type of jobs, limiting to occupational exposures. This paper proposes 4-D jobs as an update considering health disparity and the discriminatory aspects of occupational health for migrant vulnerable workers.

Methods: A literature review was performed of the 3-D theory, workplace discrimination and occupational health for migrant workers, finding a gap that need to unify physical exposures and discriminatory social determinants which will make precarious work 4-D jobs.

Results: We found that social determinant of health, health disparities and workplace discrimination are studied in silos and discussed with a public health perspective when addressing work-relatedness, instead of synergistically approaching it as Occupational Health.

Conclusions: 4-D jobs will acknowledge, respect and act upon health disparities due to structural discriminatory policies towards migrant workers. This contribution hopes to exhort policy makers around the world to implement comprehensive preventive measures to protect migrant workers by addressing their physical workplace exposures and discriminatory social determinant of health resulting in healthier and dignifying workplaces. This is particularly critical if we are to develop policy programs that focus on the future of decent work and contribute to achieve the UN SDG 8 by its 2030 deadline.

Sp53-3

Policy Implications For The Future Of Work

Stavroula Leka

Nottingham University, Business School, Nottingham, United Kingdom

Introduction: This presentation discusses implications in relation to policies and regulation in the future of work, specifically focusing on policies addressing occupational health and safety and well-being at macro (e.g. international, regional) and meso level (e.g. provincial or sectoral).

Materials and Methods: A review of existing hard and soft law instruments was conducted and key issues were considered for the future of work.

Results: With new and emerging risks affecting work and the workforce, including risks associated with the Covid-19 pandemic, digitalization, remote work and virtual work, there are new challenges that must be addressed in policy making. One of the key challenges is keeping pace with developments which result in new working conditions and new and emerging risks. Research and policy often lag behind changes in practice. A key consideration is responsibility of employers and workers and social protection, given the rise of the independent worker.

Conclusions: There is a need for the policy framework to be re-examined in light of new and emerging risks and a good balance to be found between hard and soft law. Regulation should clarify OSH liabilities and responsibilities in relation to new systems and new ways of working (ILO, 2019). Considering the complicated landscape of work, other forms of policy, such as standards and

voluntary social partner agreements can play an important role. Holistic policy models would need to be developed adopting a lifelong perspective to working life with a strong well-being focus (Leka, 2018).

Sp53-4

Psychosocial Safety Climate (PSC) In The Future Of Work

Maureen Dollard

University of South Australia, Centre for Workplace Excellence, Justice and Society, Adelaide, Australia

Introduction: The world of work is turbulent, struck by the global pandemic, new technologies (AI, IoT, robotics, big data, digital engineering, machine learning, real time feedback), shifting demographics, different patterns of employment, expanding globalisation, and international competition. Positive change is possible, but in technologically advanced work often touted as a vision for future work, we see warning signs of increased psychosocial risks leading to dehumanisation, stress and burnout (Dollard & Nesar, 2019). These risks threaten innovation and creativity, essential ingredients for future meaningful work. How can we align the future of work with a human centred corporate climate for worker psychological health and safety (otherwise PSC)?

Materials and Methods: Several intervention and empirical studies are reviewed which investigate, from external to internal factors, how a human-centred PSC approach can be built.

Results: There is evidence that PSC can be built which can future proof for shocks, inspire creativity, and readiness for technological change, alongside improving working conditions and health.

Conclusions: PSC provides a values and systems framework within which to address new and emerging risks. The corporate climate can be used to address new risks associated future work to ensure innovation, sustainability and long-term benefits for society, corporations, and employees.

Special Session 54 Biorisk Management in the workplace: beyond the tick box

Chair: Tanusha Singh and Mary Ross

Session introduction

Biorisk management is crucial in preventing transmission of hazardous biological agents (HBAs) across various industries and occupational groups to reduce the burden of disease and will be the focus of the session. The COVID-19 pandemic demonstrated the challenges and complexity of identifying biohazards and establishing causal links, fitness for work post infections and workplace accommodation. This session intends to close existing knowledge gaps and empower delegates with information on current best practice examples as a means of sharing solutions locally and globally. The focus will be on determining effective and appropriate workplace strategies using a risk-based approach to prevent exposure to HBAs which complements the global strategy on occupational risk management.

Sp54-1

Overview of biorisk management: reality to resilience

Tanusha Singh

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Introduction: Occupational exposure to infectious and non-infectious biological agents in both healthcare and non-healthcare settings has been known for decades. However, improved knowledge and awareness about workplace risks is needed to identify the opportunities to prevent exposure and ensure occupational health and economic resilience.

Materials and Methods: Traditional methods for biorisk management are deficient in addressing the challenges of the new world of work spanning the formal and informal economies. The field is diverse and complex and requires a multidisciplinary approach using modern tools and a back-to-basics approach.

Results: Amplifiers of diseases caused by biological agents are increasing, whilst epidemiological studies are limited and some biological hazards are not well understood. Workers can be directly exposed but can also serve as vectors. Thus, a combined (agent, environment and worker) risk factors approach is necessary for a comprehensive biorisk management strategy. However, several countries do not have the capacity and capabilities to manage their own programmes.

Conclusions: Lessons from the COVID-19 pandemic reinforce the need to strengthen the implementation of robust prevention and control strategies to ensure preparedness and to build and sustain a resilient occupational health system. The success of mitigating biological risks is underpinned by an understanding of the transmission, revision of existing guidelines and translation to standards is needed for adoption in workplace, and improved surveillance systems for early warning and a proactive response to potential risks.

Sp54-2

Hazardous biological agents: risk assessment to risk control

Thomas P. Fuller

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Introduction: Biological occupational hazards have long been associated with illness and fatality in healthcare and other industries. Due to long periods between exposure and health outcomes, the degree to which occupational exposures contribute to morbidity and fatality is grossly under-reported. During the COVID-19 pandemic the profession of occupational hygiene stepped forward to confront the new challenges for risk assessment and control of this and other infectious agents in all workplaces.

Materials and Methods: Occupational hygienists played a key role in the understanding the transmission and control of the SARS-CoV-2 virus over the past two years. Their ability to assess the risks of occupational exposure and communicate those to broad groups was instrumental in reducing negative outcomes, not only in healthcare, but many other highly impacted industries. Risk controls for COVID-19 and other emerging communicable diseases continue to be developed and implemented. New and diverse strategies for risk assessment and control have been analyzed and evaluated. Shortcomings of existing risk controls are also identified. **Results:** As new and emerging infectious diseases continue to barrage workplaces, the numerous ways to assess, quantify and control risk of exposure and illness need to be reported and implemented. Occupational hygienists and other health

professionals must work together to develop programs and policies to rapidly identify and control risks to all workers.

Conclusions: The most effective and practicable means of control to reduce occupational exposures then need to be disseminated and communicated broadly.

Sp54-3

Health surveillance and fitness for work

Stefano Porru

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Introduction: Health surveillance of workers (HS) is a fundamental preventative strategy to implement health and safety protection and promotion in occupational settings. Fitness for work (FFW) is one of the major outcomes of HS. The relevant number of workers exposed to a variety of biological agents in various occupational settings, multiple transmission modes, underestimation of potential relevant adverse effects and work-related infectious diseases and injuries demand evidence-based, tailored and effective HS and FFW.

Materials and Methods: Principles, criteria, methodologies and significance of HS and FFW are established by technical and scientific guidelines, international core documents and Code of Ethics, evidence-based scientific literature and specific legislation. HS and FFW are based on sound risk assessment procedures on a collective and individual basis.

Results: HS is preferably performed by occupational physicians (OP) pre-assignment, periodically or on special request. Main objectives are: to evaluate general health and medical conditions of susceptibility/vulnerability of each worker; clinical and etiological diagnosis; epidemiological surveillance; counselling; FFW, sometimes with restrictions, aimed at protecting workers, third parties and sometimes the service provided. Besides medical examinations, questionnaires and laboratory tests are often necessary. Assessment of immunization status is of utmost relevance.

Conclusions: HS and FFW benefit from a multidisciplinary approach based on good occupational health and medical practice. An OP's proactive role is needed, especially in the current pandemic era.

Sp54-4

Non-infectious hazardous biological agents - what have we learnt about inhalant food allergens in the workplace?

Mohamed F. Jeebhay

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Introduction: Inhalation of food-derived allergens during food processing in the workplace represents an important risk for the development of occupational allergy, rhinitis and asthma (OA). It is estimated that between 10-25% of occupational rhinitis and asthma is caused by inhalation of food-derived materials along the food value chain and related work activities.

Materials and Methods: This presentation will draw on various epidemiological and clinical studies conducted in South Africa to identify important risk factors for occupational allergy and asthma in food processing workers. The adequacy of preventive measures in selected workplace contexts will also be examined.

Results: Aerosolisation of proteins derived primarily from vegetable and animal sources during food handling and processing, additives used as preservatives or colourants, and food contaminants are the main causal agent groupings. Occupations associated with an increased risk include farming and harvesting, food processing, storage and packing activities, as well as food preparation and transport. The consistent risk factors for OA identified include environmental (bioaerosol generating activities, the allergenic potential of the food agent, elevated dose) and host factors (atopy). The impact of preventive approaches such as workplace dust control measures, medical surveillance programmes as well as education and training activities are highlighted.

Conclusions: The exposure standards for inhalant food allergens are inadequate in preventing OA in the food industry.

Special Session 55 Global application of action tools for facilitating primary prevention in different settings

Chair: Etsuko Yoshikawa

Session introduction

An increasing emphasis is placed in occupational health services on proactive risk assessment and control adjusted to local situations. Especially, participatory workplace environmental improvement programs are gaining importance as a practical means of promoting occupational safety and health activities at the workplace. The emphasis of these programs is generally placed on self-management that focuses on behavior-oriented low-cost and multiple-area improvements by using various action tools. Aim of this special session is to examine global application of these action tools for facilitating proactive risk management.

Sp55-1

The roles of action-oriented tools in small and medium-sized enterprises

Kazutaka Kogi

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Introduction: International cooperation in participatory work improvement is developing through various networking arrangements. Recent experiences indicate the importance of action-oriented tools in facilitating participatory steps in small-scale workplaces.

Methods: Effective types of action-oriented tools for participatory programs in small and medium-sized enterprises were reviewed. How they are utilized was examined in different sectors, including manufacturing, construction, healthcare, food services and agriculture. Attention was paid to easy-to-apply tools, such as good examples and checklists, in facilitating improvement actions in the local context.

Results: The reviewed programs commonly used action tools for facilitating participatory planning of feasible improvements. In particular, photographs showing local good practices and action checklists listing feasible preventive actions proved useful. They focused on risk-reducing actions in work methods, environment and work organization. The use of these tools facilitated planning of practical improvements addressing multiple risks at work. These experiences confirmed the merit of a locally adjusted toolkit

focusing on low-cost ideas. Short-term training utilizing such a toolkit commonly led to concrete results in varied sectors.

Conclusions: The use of good practice photographs and action checklists as action tools was confirmed useful in varied sectors. It is recommended to promote their use especially in small-scale enterprises.

Sp55-2

Adaptation of the participatory approach and action tools to improve occupational safety and health in African countries

Ton That Khai

Former President of Can Tho Medical College, Can Tho Medical College, Cantho City, Vietnam

Introduction: The Work Improvement in Neighbourhood Development (WIND) programme, based on the ILO participatory action-oriented training (PAOT) methods, has contributed to improve the safety and health of farmers and reduce work-related risks in the agricultural sector. The WIND programme focuses on simple, low-cost ways of improvement and provides practical measures to the farmers in improving occupational safety and health (OSH) and productivity.

Materials and Methods: A training of trainers on WIND approach in the cacao supply chain was conducted in Cote d'Ivoire, West Africa in 2020. The training supported the development of a sustainable mechanism to promote OSH in the rural community. This training activity followed with the development of practical and easy-to-understand action tools and training materials based on the PAOT methodology.

Results: Differences are seen in the types and ranges of improvements undertaken and in the ways to organize action-oriented programs addressing the workplace needs. In the year 2021, a total of 347 improvements on OSH in agriculture have been successfully implemented in two communities Grand-Zatry and M'batto.

Conclusions: PAOT has proven effective for facilitating the locally adapted risk management processes and reducing work-related risks in the cacao supply chain. The sustainability of the participatory improvement activities is also proven by the follow-up results. The training and action tools therefore demonstrate the effectiveness of the participatory approaches to improve OSH in agriculture.

Sp55-3

Participatory approach and tools for stress reduction in Japan

Etsuko Yoshikawa

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Participatory workplace environment improvement programs have been used for applying multifaceted measures such as improvement of work procedures and working conditions, attainment of a comfortable workplace environment for employees, and promotion of mutual support. These programs have been effective for promoting primary prevention for mental health. In the participatory programs, workers review their workplace using action tools such as good practice photos and action checklists and conduct group discussions in small groups in each workplace. Through these processes, employees reflect on the entire workplace from a comprehensive perspective and propose concrete ideas applying an action-oriented approach. Repetition of group discussions with positive attitude has effectively stimulated communication in the

workplace. In other words, the use of action tools and participatory approaches can increase the motivation of employees to improve the workplace environment and promote better workplace atmosphere. Meanwhile, the COVID-19 pandemic has dramatically changed our lifestyles and workstyles. Daily communication in the workplace has reduced due to promoting secure physical distancing, and adaptation to new ICT technologies is needed. In this paper, current methods for developing participatory workplace environment improvement programs incorporating ICT technology as an effective approach for the promotion of primary prevention for mental health in the workplace with and after COVID-19 are discussed. It is important to advance practical methods for reducing stress at work that can be applied to the new-normal working life.

Sp55-4

The effect of an ergonomics intervention on psychosocial factors and musculoskeletal symptoms among health care workers in Thailand

Wanpen Songkham

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Introduction: Work-related musculoskeletal disorders (MSDs) are mostly concerned among health workforce. Ergonomic and psychosocial risk factors are among the highly mentioned causes of MSDs. Therefore, the effective ergonomic intervention is required.

Materials and Methods: This intervention study aimed to evaluate the effectiveness of the Healthy Unit Guidance (HUG) program which is participatory action-oriented training (PAOT), a tailored participatory ergonomics intervention designed for reducing ergonomic risk factors and enhancing psychosocial factors among nursing personnel. The HUG program was conducted with assistance of nursing staffs from orthopaedic wards at a university hospital in Chiang Mai province, Thailand. The intervention protocol consisted of a series of structured facilitator and participant workshop, follow-up visits, and sharing session of the success experiences.

Results: The results showed that all participated orthopaedic wards improved their work environments on their own initiative idea and resources. Results found the reduction of ergonomics risk factors and improvement of psychosocial factors. These were measured based on 7 areas of nursing tasks. They were patient care and treatment; storage and handling of medicines, medical devices, and equipment; workstation design; physical environment; time management and planning; social support at work; and welfare facilities.

Conclusions: This study found a significant achievement of the HUG program. The findings support the idea that a PAOT approach produces better work environment outcomes for health care workers, particularly nursing staffs.

Special Session 56 Workplace Health Without Borders (International) – How the collaborative work of an international occupational health charity changes the face of occupational health around the globe

Chair: Kevin Hedges

Session introduction

This Session is a broad look at the collaborations among international not-for-profit organizations working to improve occupational health around the world and highlights how an international

charity (WHWB) can collaborate with membership organizations, universities and international host bodies to provide opportunities locally, nationally and globally for professionals to offer and receive training and mentoring to advance the knowledge, skills and experience of occupational health professionals around the globe. Content: Two examples of projects as well as OSH training initiatives of international charities (WHWB and OHTA) working collaboratively to improve occupational health and reduce the burden of occupational disease around the world.

Sp56-1

OHTA's process for building capacity in Occupational and Environmental Health & Safety — Changing the world, one course at a time

Chris Laszcz-Davis

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Introduction: Occupational related injuries & deaths continue to be a widespread international problem. A significant contributor to this problem is the lack of occupational health resources in the less developed world. Based on this need, the Occupational Hygiene Training Association (OHTA) was formed in 2005 to provide an internationally accepted training & qualification framework, a stepping-stone for developing professionals.

Materials and Methods: Quality, peer-developed & reviewed teaching packages/modules, freely downloadable at www.OHlearning.com, are translated or suitable for translation into local languages, & used globally. Courses that lead to the international qualification are run by OHTA-Approved Training Providers (ATPs) & their organizations with at least one professionally qualified OH and demonstrated ability to provide quality teaching.

Results: More recent OHTA initiatives include collaborations with many organizations, e.g. IOHA, ICOH, WHO, ILO, WHWB and NIOSH. New course/module opportunities include distance learning, a focus on emerging health hazards, a renewed focus on age-old hazards in new applications, & expansion into safety and environmental related issues.

Conclusions: From early ideas in 2005, OHTA has evolved to become a significant global force in the training & development of the occupational & environmental hygiene profession. Its structure is deliberately designed to be responsive to the views of the established global occupational & environmental hygiene community, while retaining a razor-like focus on the needs of businesses & others to build OH capability.

Sp56-2

The importance of occupational hygiene principles and collaboration between organizations to fight a pandemic

René Leblanc

International Occupational Hygiene Association (IOHA), In the capacity of IOHA Past President (2020), Montreal, Quebec, Canada

Introduction: Over the years, the International Occupational Hygiene Association (IOHA) & its members have built strong associations with partners from different backgrounds.

Materials and Methods: IOHA's collaboration with ICOH, OHTA & WHWB has made it possible to disseminate information, training, & promote professional skills in occupational hygiene. The technical & didactic quality of the training offered & the worldwide accessibility of these courses is a model to emulate.

Results: In recent months, public health professionals have bravely faced an unprecedented pandemic. Some of the fundamental principles of occupational hygiene, i.e. administrative measures (distancing, symptom reporting, remote work, etc.) and engineering measures (ventilation, negative pressure, separation by sectors, etc.) have been successfully applied & implemented. The contribution of occupational hygiene to the fight against COVID-19 has been essential although there are still many unknowns. Following the investigation of the SARS outbreak in 2003 in Toronto, Canada, the Board of Inquiry concluded that "occupational hygienists must be an integral part of the response team & in the development of infection control strategies".

Conclusions: IOHA & ICOH are worthy collaborators. Together, we have signed declarations & submitted recommendations to world leaders. It is desirable to evaluate opportunities to collaborate further in order to exchange experiences & assess how we can benefit from sharing our knowledge. Finally, we must leverage from the current momentum because never before has the world population been so aware of prevention.

Sp56-3

Workplace Health Without Borders - The Tanzania Experience: Training and Projects

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² *International Workplace Health Without Borders (WHWB) – Board of Directors,* ³ *Occupational Hygiene Training Association (OHTA) – Advisory Committee*

Introduction: Workplace Health Without Borders (WHWB), a not-for-profit volunteer organization formed in 2011, with a vision - "A world where workers do not get sick because of their work" - has partnered with organizations in order to improve occupational health in the workplace, community and worldwide. One example is with several institutions in Tanzania, Africa.

Materials and Methods: Training brings WHWB's mission "to life" by training specialists to identify workplace hazards so workers can protect themselves, their families & communities. As an Approved Training Provider for the Occupational Hygiene Training Association (OHTA), WHWB has trained university students, government occupational health & safety inspectors, doctors, nurses, ergonomists & private industry contractors, using OHTA training materials. We worked with the Muhimbili University of Health and Applied Sciences & then OSHA Tanzania to "gather" students & interested parties for in-person training in 2015 & 2019. Several projects, including assessment of silica exposure to stone crushers, have resulted.

Results: WHWB has developed in-country relationships through training & projects, and is seen as stellar in its provision of both in-person, &, during the COVID-19 pandemic, evolving to on-line information & education sharing.

Conclusions: Since inception in 2011, WHWB has evolved to support global training & projects in various under-served countries. WHWB partners with OHTA, IOHA, AIHA as well as local, national &

international organizations to identify needs & link volunteers to continue the quest for improved working conditions.

Sp56-4

The India-WHWB Experience: Processing of coloured gemstones in Jaipur - a collaborative approach to worker health education

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Introduction: In collaboration with the Tiffany and Co Foundation, Workplace Health Without Borders (WHWB), The University of Queensland, the University of Lausanne, the American Gem Trade Association and local partners, we investigated health and safety issues and concerns in the gem cutting sector of Jaipur, and developed solutions to improve practices in Hindi and English.

Materials and Methods: Forty four gem cutting factories (including home-based workshops) in Jaipur were visited. Noise and dust measurements were collected and awareness messaging disseminated to educate workers about risks and the means to control them. Film and photographs were captured to document the processes.

Results: Fine dust inhalation - a major concern with variation depending upon the gemstone cut. Short term noise levels range from 70 to well above 90 decibels (dBA weighting). Sustained levels of 85 dBA are considered a risk for hearing loss.

Conclusions: Working collaboratively we collected and analysed data, and gathered footage, that informed the creation of educational material on the prevention of silica exposure and other relevant occupational health information in gemstone cutting and polishing. Training videos and posters were created in English and Hindi and distributed at the pilot locations. The posters and the training videos will be presented in this WHWB Special Session.

Special Session 57 Systematic reviews and meta-analyses on exposure to long working hours for the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Chair: Frank Pega

Session introduction

The World Health Organization (WHO) and International Labour Organization (ILO), supported by a large number of individual experts, have developed and published the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury (WHO/ILO Joint Estimates). As part of this workstream, the Organizations have recently produced and published the first estimate of burden of disease attributable to exposure to long working hours. This special session presents the systematic reviews and meta-analyses conducted as the base for these estimates and provides an open floor for discussions of future research for potential additional WHO/ILO Joint Estimates of burden of disease from exposure to long working hours.

Sp57-1

The effect of exposure to long working hours on ischaemic heart disease

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Introduction: We aimed to systematically review and meta-analyse estimates of the effect of exposure to long working hours on ischaemic heart disease.

Materials and Methods: We followed a published protocol (Prospero: CRD42017084243). Risk of bias, quality of evidence and strength of evidence were assessed using adapted Navigation Guide and GRADE tools and approaches.

Results: Twenty-six cohort studies met the inclusion criteria, comprising a total of 763,376 participants (310,396 females). Across included studies, we did not have serious concerns for risk of bias. Compared with working 35-40 h/week, we were uncertain about the effects of working 41-48 h/week and 49-54 h/week on ischaemic heart disease incidence and mortality; working =55 h/week was associated with moderately increased risks of ischaemic heart disease incidence (RR 1.13, 95% CI 1.02 to 1.26) and mortality (RR 1.17, 95% CI 1.05 to 1.31), respectively. Subgroup analyses and sensitivity analyses found no evidence for differences by WHO region, sex, outcome definition, outcome measurement, and risk of bias.

Conclusions: Evidence on exposure to working =55 h/week was judged as ""sufficient evidence of harmfulness"" for ischaemic heart disease incidence and mortality.

Sp57-2

The effect of exposure to long working hours on stroke

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Introduction: We aimed to systematically review and meta-analyse estimates of the effect of exposure to long working hours on stroke.

Materials and Methods: We followed a protocol (Prospero: CRD42017060124). Risk of bias, quality of evidence and strength of evidence, was assessed using adapted Navigation Guide and GRADE tools and approaches.

Results: Twenty-two studies (20 cohort studies, 2 case-control studies) met the inclusion criteria, comprising a total of 839,680 participants (364,616 females). Across included (cohort) studies, we did not have serious concerns for risk of bias. Compared to working 35-40 h/week, we were uncertain about the effects of working 41-48 h/week; there may have been an increased risk for acquiring stroke when working 49-54 hours/week (RR 1.13, 95% CI 1.00 to 1.28) and a moderate increase for =55 h/week (RR 1.35, 95% CI 1.13 to 1.61) on stroke incidence. We were uncertain about the effect on mortality from stroke. Subgroup analyses and sensitivity analyses found no evidence for differences by WHO region, sex, outcome definition, outcome measurement, and risk of bias.

Conclusions: Evidence on exposure to working 49-54h/week and =55 h/week was judged as ""sufficient evidence of harmfulness"" for stroke incidence.

Sp57-3

The effect of exposure to long working hours on depression

Reiner Rugulies

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Introduction: We aimed to systematically review and meta-analyse estimates of the effect of exposure to long working hours on depression.

Materials and Methods: We developed and published a protocol (<https://doi.org/10.1016/j.envint.2018.11.011>) before literature search commenced, applying the Navigation Guide as an organizing framework, including adapted GRADE tools and approaches. We searched electronic academic and grey literature databases for potentially relevant records, complemented by internet searches, hand searches and expert consultations.

Results: Twenty-two cohort studies met the inclusion criteria, comprising a total of 109,906 participants (51,324 females) in 32 countries in three WHO regions. Across included studies, we had serious concerns for risk of bias due to selection and due to missing information on life-time prevalence of depression before baseline. Compared with working 35–40 h/week, pooled odds ratios for incident depression were 1.05 (95% CI 0.86–1.29), 1.06 (95% CI 0.93–1.21) and 1.08 (95% CI 0.94–1.24) for 41–48 h/week, 49–54 h/week and ≥55 h/week, respectively. We judged the quality of evidence as low and were uncertain about the effect on incident depression for all exposure groups. Subgroup and sensitivity analyses found no evidence for differences by WHO region, sex, age, socioeconomic status, outcome measurement and risk of bias.

Conclusion: The available evidence is insufficient to assess effects of long working hours on depression. Studies examining the association between long working hours and risk of depression are needed that address the limitations of the current evidence.

Sp57-4

The effect of exposure to long working hours on alcohol consumption, risky drinking and alcohol use disorder

Lode Godderis and Daniela V. Pachito, WHO/ILO Working Group on Exposure to Long Working Hours and Alcohol Consumption, Risky Drinking and Alcohol Use Disorder

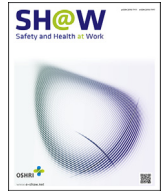
KU Leuven-IDEWE, Centre for Environment and Health, Leuven, Belgium

Introduction: We aimed to systematically review and meta-analyse estimates of the effect of exposure to long working hours, on alcohol consumption, risky drinking and alcohol use disorder.

Materials and Methods: We followed a protocol (Prospero: CRD42018084077). Risk of bias, quality of evidence and strength of evidence, was assessed using adapted Navigation Guide and GRADE tools and approaches.

Results: Fourteen cohort studies met the inclusion criteria, comprising a total of 104,599 participants (52,107 females). Across included studies, risk of bias was generally probably high, with risk judged high or probably high for detection bias and missing data for alcohol consumption and risky drinking. Compared to working 35–40 h/week, exposure to working 41–48 h/week increased alcohol consumption by 10.4 g/week. Exposure to working 49–54 h/week increased alcohol consumption by 17.69 g/week. Exposure to working ≥55 h/week increased alcohol consumption by 16.29 g/week.

Conclusions: Exposure to long working hours may have increased alcohol consumption, but we are uncertain about the effect on risky drinking. We found no eligible studies on the effect on alcohol use disorder.



Free Communications

01 ACCIDENT PREVENTION

001

Accidents, results of inspections and good practices for the management of ageing of industrial plants

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Introduction: The Italian implementation of the Directive 2012/18/EU (Seveso III) imposes to provide a plan for monitoring and control of risks related to ageing of equipment and systems that can lead to loss of containment of hazardous substances, including the necessary corrective and preventive measures.

Materials and Methods: An overview of the national standards and guideline concerning asset integrity is given, also focusing attention on the role of Public Authorities in addressing ageing in hazardous installations. The main outcomes of the analysis of some industrial accidents, where ageing mechanisms have been identified as a significant cause, are then presented.

Results: Starting from some examples on how organizations manage ageing through “asset integrity management” procedures, a brief description of the processes and methodologies implemented and a focus on good practices are proposed. In addition, the paper describes the results and return of experience of Safety Management System (SMS) inspections, where weaknesses emerged with reference to ageing of the hazardous installations inspected.

Conclusions: Industrial plants are subject to degradation phenomena based on the static/dynamic stresses, as well as the effects of operational changes, which is why it is useful to know the performance decay rates to plan adequate maintenance activities, and to identify the most suitable NDTs for assessing the state of damage. The correct implementation of the SMS plays a considerable role, which requires each equipment to be subject to control programs, planned in order to ensure safe operational continuity.

002

The Artificial Neural Network (ANN) Model for Predicting the Preventive Behaviors toward Dust Exposure among Stone Crushing Mill Workers

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Introduction: The crushing stone for construction industry is well known for producing harmful dusts that can cause respiratory health problems. Personal discipline of employees in health and safety is important to protect themselves from health risks. The objectives were a). To assess factors relating to preventive behaviors toward dust exposure of stone crushing mill workers by using artificial neural network model, and b) to predict the preventive behaviors of stone crushing mill workers toward dust exposure by ANN Model.

Material and Methods: A cross-sectional study was used in 320 workers from 26 stone crushing mills, Thailand. ANN Model was used for predicting the preventive behaviors from influential factors. Inference statistics model was used to interpret the correlation between variables and the preventive behaviors of workers.

Results: The subjects were male (66.9%), average age 42 years old, primary education (58.6%), married (68.2%), never smoke (52.0%), no respiratory disease before joining the company (94.1%), did not take physical activity (50.6%), worked 8 hours a day (75.8%), 6 days a week (57.0%), average duration working was 8.4 years. Preventive behavior toward dust exposure of workers were not concerned with preventive behavior toward dust exposure (65.2%, mean \pm SD = 5.81 \pm 2.53). ANN showed error with Mean Absolute Percentage Error was 7.8%.

Conclusions: The findings revealed that factors that influenced workers to protect themselves from dust were history of smoking, physical activity, working hours per day, working days per week, perceived susceptibility, perceived barriers, enabling factor

003

Longitudinal association between near-misses/minor injuries and moderate/severe injuries by presence/absence of depressive symptoms in a nationally representative sample of workers in Japan

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Introduction: This study aimed to examine the longitudinal association between near-misses/minor injuries and moderate/severe injuries in industrial settings by the presence/absence of depressive symptoms using 1-year follow-up data obtained from a nationally representative sample of workers in Japan.

Materials and Methods: Of the 18,231 eligible participants at time 1 (T1), 12,127 who responded to the 1-year follow-up survey at time 2 (T2) (4,370 females and 7,757 males; mean age (SD), 45.3 (10.5) years) were included in the analysis. Multivariate logistic regression analyses were performed with the presence/absence of moderate/severe injuries at T2 as the dependent variable.

Results: During the follow-up period, 1.6% of participants reported moderate/severe injuries in industrial settings. ORs for moderate/severe injuries were significantly higher for those with depressive symptoms at T1 (OR=2.5, 95% CI 1.8 to 3.4) compared to those without. After adjusting for relevant variables, participants who reported near-misses (OR=1.7 (95% CI, 1.3 to 2.4)) and minor injuries (OR=2.5 (95% CI, 1.3 to 4.7)) at T1 were more likely to have moderate/severe injuries at T2 compared to those who reported no near-misses/minor injuries. However, this association was stronger in participants who did not have depressive symptoms at T1 than in those who had depressive symptoms.

Conclusions: Especially for those without depressive symptoms, utilization and sharing of information about near-misses/minor injuries among workers, managers, employers and healthcare professionals may prove more useful for preventing moderate/severe injuries.

004

Occupational accidents related to the record-breaking heavy snowfall in northern Fukui Prefecture in February 2018

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Introduction: In Feb. 2018, the Fukui Local Meteorological Office observed a record-breaking heavy snowfall of 147 cm.

Material and Methods: Observation data of weather points in Fukui Prefecture were obtained from the Japan Meteorological Agency website. The hourly snow and temperature data measured by snow sensors were obtained from the Road Maintenance Division, Fukui Prefecture. We received emergency transport data from the Fukui City Fire Department and the six fire departments in northern Fukui.

Results: The peak of snowfall occurred from early to mid-February. In February, of the cases that the fire departments in northern Fukui transported to medical facilities, there were 43 work-related accidents related to heavy snowfall. The classification of injuries and illnesses was as follows: 4 serious (including 1 CPA case), 19 moderate and 20 minor. Fractures and suspected fractures were the most common initial diagnosis at the destination hospital, followed by bruises and contusions. In terms of reasons of injury, 22 cases

were slips and falls on the way to work, 10 cases were injuries or sudden illness during snow removal work, 5 cases were falls during snow removal work, 3 cases were sudden illness (suspected pulmonary embolism, dehydration and fever) caused by being in a car for a long time due to heavy traffic, and so on.

Conclusions: The local meteorological office had issued early warnings about heavy snow and low temperatures and urged people not to go out unnecessarily. If instructions had been issued earlier to prevent workers from coming to work, a significant reduction in damage would have been possible.

005

A Strategic approach of Health care management system & proactive safety measures to achieve Zero Accident and Zero Incident from Apr 2020 to March 2021 at Large Petrochemical Manufacturing Division

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Introduction: Safety and Health of workers is a core element for the organizational growth. Robust health care management system & Proactive safety culture play important role for preventing Work related injury and accidents & contribute positive impact for sustainable continuous production at manufacturing site.

Material and Method: A study was conducted from Apr 2020 to March 2021 when no work injury reported at petrochemical plant where around 1200 workers are working. Focus was on Monthly Mock drill with Emergency Management training for enhancing technical skills of workers. Safety interventions were Touchless Permit management among workers. Camera Surveillance to monitor the Social distancing, and close watch on Safety deviations to take immediate action. Robust confined space training imparted. Mock-drill conducted for Inert entry in a reactor. Hazard Identification Task Risk Assessment reviewed by safety person. Pre-Start up Safety Review ensured for each section after every shut down. Special PPE exhibition. Discussing safety briefing on "Daily Tool-Box talk", Monthly conducts of Behavior based observations under Reliance Safety Observation Process.

Results: At petrochemical plant around 1200 workers are working inside the complex. Work injury Data from Apr 2020 to March 2021 was considered for the study. Results observed Zero work injury case at site.

Conclusions: Structured safety protocols & Good health of workers imparted great support to bring alertness among workers at workplace. This has built up a strong spirit of proactive safety systems & emergency preparedness resulted Zero accident and Zero Incident.

006

Association between daytime sleepiness and motor vehicle crashes among Japanese taxi drivers

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Introduction: The Epworth Sleepiness Scale (ESS) is a commonly used scoring system to assess Daytime sleepiness (DS) which is a

known risk factor for motor vehicle crashes (MVCs). However, because it is a self-reported questionnaire, there are several limitations of ESS and the usefulness of ESS for predicting MVC is still disputable. Thus, we conducted a cross-sectional study to examine the association between ESS and MVC among Japanese taxi drivers. Material and Methods: Participants of our study consisted of 1,376 Japanese male taxi drivers. DS was assessed by ESS, and total ESS scores were categorized into quartile groups. MVC episode during the past five years was assessed by a self-administrated questionnaire. The multivariable generalized linear model was used to examine the association between ESS and MVC after adjusting for age, sex, body mass index, having snoring, sleep hours, length of service and driving distance per year.

Results: The median (inter quartile range) ESS score was 4 (2–6) and the proportion of MVC was 59.9%. The prevalence ratio (95% confidence interval) of MVC for the highest quartile of ESS score was 1.18 (1.05–1.32), compared to the lowest quartile of ESS score (p for trend <0.01).

Conclusions: We found a significant association between ESS and MVC among Japanese male taxi drivers after adjustment for potential confounders, despite relatively low mean ESS score of this study population. Further longitudinal studies are needed to elucidate the usefulness of ESS as a predictor of sleep-related MVCs among commercial drivers.

007

The effect of safety climate on workplace accidents: The role of abusive supervisor as moderator.

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Research has established the role of safety climate in reducing workplace accidents and injuries, but little is known about how leadership affects this relationship. Using social exchange theory, the current study firstly investigates the mediation effect of safety behaviours (i.e., safety compliance and safety participation) between safety climate and safety outcomes (i.e., accidents and injuries). Secondly, the study examines if abusive leadership thwarts the process from safety climate to safety behaviours, and subsequently, from safety behaviours to safety outcomes. Using a three-wave (each at three months apart) multilevel design, 322 firefighters located in 46 fire stations throughout Malaysia participated in the study. Overall, the study found support for safety compliance (but not safety participation) as the mediator between safety climate and safety outcomes. Abusive supervision was found to moderate the relationships between safety climate and safety compliance, and between safety behaviour and safety outcomes, but in the opposite direction of our hypothesis. From the findings, the benefits of safety climate and safety behaviour are amplified, unlike hypothesized. The findings are consistent with paternalistic “tough love” attitude within Asian fire service, where abusive supervision motivates positive change on safety behaviour, subsequently reducing accidents and injuries. The findings highlighted the unapparent benefits of abusive supervision concerning the effectiveness of safety climate in generating safety behaviours to reduce safety outcomes.

008

Comparing FRAM and STAMP for occupational health and safety (OHS) and operational risks analysis: the case of data gloves in assembly 4.0 production

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Introduction: Manufacturing in the context of industry 4.0 faces increasing complexity. Thus, emerging occupational and operational hazards might become a concern if not considered early in the design process. Systemic and innovative approaches can be used to address hazards in complex socio-technical systems. FRAM and STAMP (STPA) are appropriate and promising methods to analyze OHS and operational risks “at the source” in such systems. Material and Methods: This study briefly compares the application of FRAM and STAMP in case studies regarding the use of data gloves in manual assembly. An overview of the applied methods regarding the literature from 2004 to 2021 will be provided. Following, the FRAM and STAMP (STPA) models will be presented and their use for the analysis of three case studies will be discussed.

Results: Our results show that these systemic methods can provide a good understanding, explaining, and analysis of manufacturing systems in the context of industry 4.0. While FRAM can provide a holistic and positive view from six aspects of defined functions, STPA considers system components in more detail regarding controls and feedback.

Conclusions: To provide more comprehensive and valid results, applying a combined approach of these methods is promising. It has the potential to enhance the analyst’s understanding and capability to analyze an assembly system and its components when a smart wearable is introduced, especially in the first stages of system design. Further research and developments are needed.

009

A review of chainsaw accidents over a 10-year period in the New Zealand forest industry

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Introduction: Forestry is a high-risk industry and one of the most dangerous occupations globally. In New Zealand, the number of accidents and injuries associated with chainsaw use are a concern to employers and regulatory bodies. The aim of this study was to review chainsaw incidences reported to New Zealand’s Incident Recording Information System (IRIS), a voluntary accident reporting system available to forest owners and managers.

Methods: An electronic search was undertaken of chainsaw incidences in the IRIS database over a 10-year period (2011 to 2020). All data was anonymised. Keywords were used to the search

incident fields to identify: incident type and activity; demographics; location and environment; incidence characteristics; and injury type and treatment.

Results: Over 10 years, 810 chainsaw related incidents were identified. Loss of control (22%), slip/trip/fall (19%), and hit by an object (13%) were the most cited cause of injury. Cuts and lacerations accounted for most injury-related events (73%), with the hands/wrist (33%) and upper extremities (21%) most frequently affected. Those with 1 to 5 years' experience had the largest number of incidents. Injuries resulted in an estimated 93.5 hours of lost time, at average cost of NZ\$2,338 per incident.

Conclusions: Chainsaw prevention measures in NZ forestry should focus on inexperienced workers and safer working methods. A limitation of the IRIS database was a lack of detailed information to direct change. There is a need for greater insight into contributory risk factors and a participatory approach to preventing accidents associated with chainsaws.

010

Occupational Health and Safety Risk Management in Selected Mozambique Printing Industry Businesses

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Introduction: Occupational Health and Safety (OHS) is important for any organization due to legal obligations and prevention of occupational injuries and illnesses. The objective of the study was to analyse the OHS risks and provide preventative actions to reduce occupational injuries and diseases in printing industry in Mozambique.

Material and Methods: A case study, bibliographic and documental review was adopted. A questionnaire focusing on the workers knowledge about occupational diseases prevention, as well as OHS conditions in their organization, was submitted to 34 of 101 employees printing companies. 8 managers participated in a dialogue and guided a visit to their departments. Preliminary risk analysis were used to allow prioritizing occupational risks and its management actions.

Results: Hands and fingers amputation with guillotine was the highest risk identified. Forklift use and maintenance works involving electrical parts combine various risks (electrocution, burns, death; musculoskeletal disorders (MSD), carbon monoxide poisoning that may result in instantaneous death). MSD and repetitive strain injuries resulting in high absent; dermal diseases associated with handling solvents and chemical used in printing industry. 63% of risks were classified as moderate, 21% as minor and 12% as serious. 74% of respondents never attended an OHS training or dialogue.

Conclusion: The majority of workers did not know that they were exposed to occupational risks. Observations suggest that administrative controls such as OHS training and company policies are some of the first steps to manage OHS in Mozambican printing industry

011

IndianOil guidelines on Journey Risk Management- A tool for prevention of road traffic accidents

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Introduction: Journey Risk Management (JRM) is part of IndianOil Road Transportation Safety policy with an aim to prevent road accidents. It includes features such as maximum driving hours, rest period, night driving policy, journey risk management etc to prevent road accidents of commercial heavy vehicle carrying petroleum products.

Materials and Methods: Four most accident prone road routes in India were selected for carrying out the JRM study to identify blind spots, driving time restrictions, different speed limits & availability of emergency services (Hospitals & mechanic shops), parking areas. Based on the findings of the study a trip management sheet was prepared with a main and alternate route for travel. The sheet also included details of hazards, landmarks, services and facilities, risk rating and points of accidents risk. Collected data was fed into a Vehicle Tracking System (VTS) fixed into the tank trucks. As the VTS works on GPS system, it automatically warns the driver about the forthcoming hazard of the route and the preventive measures that needs to be taken en-route. Now, the JRM study is being extended to all available routes.

Result: The integration of VTS with a JRM study in IndianOil helped in enhancing road safety awareness amongst tank truck drivers while driving heavy commercial vehicles carrying petroleum products thereby preventing road traffic accidents.

Discussion: A systematic and regular journey risk management study helps in accident prevention leading to safety of lives, property and petroleum products. This is in line with the Core values of IndianOil i.e. Care, Innovation, Passion & Trust

012

The Biellese Inter-Association Table for Safety and Hygiene at Work: An Organizational Model in a Province in Northern Italy

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Introduction: An interdisciplinary work model based on the collaboration between various figures appointed to implement measures for the application of the rules and procedures relating to guaranteeing safety and health in the workplace, was created in a Piedmontese Province, characterized by a historical and important industrial vocation.

Material and Methods: In July 2008, on the initiative of the Biellese Industrial Union and the territorial Labor Unions, was established the Inter-Association Table for prevention and safety in the workplace. The table is attended by members of National Confederation of Crafts

and Small and Medium Enterprises, Cooperatives, Traders Association, Professional orders, National Institute for Insurance against work injuries, Workplace Safety and Prevention Service, Labor Inspectorate and Fire Fighters, aiming to make work environments safer.

Results and conclusions: In these years of activity, more than 60 meetings have been held, many topics have been dealt with and 7 public events have been organized. Through a synergic work between companies, workers and control institutions, have been developed six safety protocols about: Carders, Dyers, Wapers, Occupational Physician, Self-employed workers in construction and Manual handling of loads in construction. The results of investigating risk factors in the workplace and identified solutions for companies, will be published in the "solutions database" of the prevention information system. During the European Week for Safety and Health at work, the biellese inter-associative table organizes an informative day on the issues involved in joint work.

013

Investigating occupational injuries in the healthcare setting and realizing targeted training programs for healthcare students: a prevention project in Italy

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Introduction: Healthcare workers (HCWs) and healthcare students (HCS) are exposed to several risk factors that can lead to occupational injuries. The goal of this project is to investigate injuries phenomenon among HCS and produce targeted training programs based on the data collected.

Materials and Methods: A collaborative project between the School of Occupational Medicine of the University of Genoa, Italy, and the National Institute for Insurance against Accidents at Work (INAIL) of Liguria Region was carried out involving three phases: (1) a scoping review of the literature, (2) an online survey aimed at investigating the determinants, prevalence of injuries, the knowledge, attitude, and behavior (KAB) among HCS, (3) the creation of digital training material.

Results: A total of n= 244 studies were screened. The study population included more than 400,000 HCWs and HCS. The most represented injuries in Western countries are caused by exposure to biological hazards, particularly due to needle stick and sharp injuries (NSSI), followed by musculoskeletal injuries. Furthermore, verbal and physical assaults are reported as an emerging concern. Concerning the online survey, the response rate was 25.9%, and questionnaire eligible for analysis were n=199. 82% of reported injuries concerned biological risk, reflected by a higher risk perception. Among the determinants, lack of training was one of the most common.

Conclusions: The results mostly show similar findings with previous literature, with the exception of physical assaults, which are less represented in this population. Gaps in training programs should be addressed.

014

Psychosocial Risk Management and Accident Prevention, a New Zealand (NZ) view

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Introduction: Health, safety, wellbeing and work are inextricably linked, yet are we all coming from the same evidence base? Proactive accident prevention should ensure all categories of hazards are managed. NZ has been slow in recognising the critical role psychosocial risk management plays in reducing accidents and harm. But with the recent release of ISO 45003 and a focus of mental health in workplaces, times are changing.

Materials and Methods: Discussion with leading NZ specialist identified a changing environment. A scan of recent literature, directions of government regulators and practices across industry validated these concepts.

Results and Conclusions: There are pockets of areas that are showcasing best practice. Specific targeted approaches by the industry for the industry, a raised profile of psychosocial risk management and introducing Māori concepts and values are demonstrating change. A shift is evident with our NZ public insurance provider, having a 2021 grant round directing applications in connecting innovation, psychosocial risk management, good work design and reduction of accidents and harm. Growing healthy workplaces is identified by the World Health Organization as the right, legal and smart thing to do. Effective leadership is essential in a changing world of work, with multiple drivers, including constant change. We need to have increased focus on education, collaborative, multi-sector approaches to increase stakeholder engagement. With a bicultural, holistic, strategic approach at individual, team and organisational levels will lead to a reduction of accident and harm prevention.

015

The use of digital technologies on industrial accidents prevention: an integrative review

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Introduction: There is an increasing number of applications of digital technologies into industry sites with different levels of complexity and industrial integration. Many of those solutions intend to increase productivity or reduce costs. It is important to emphasize the safety approach, and its effective result for accidents prevention. The aim was to identify the industrial digital technologies utilized for accident prevention / work safety.

Material and Methods: An integrative review literature was conducted and Web of Science, PubMed, PubMed PMC, Scopus, EMBASE, BVS Bireme, CINAHL and PROQUEST were searched.

Results: There were found 262 articles, after the exclusion of duplicated publications. The included articles showed the use of digital technologies for safety training such as in chemical industry, and for electric crane operation; risk management in confined spaces in steel industry; the use of augmented reality devices, and the use of information communication technologies in PPE. Furthermore, they presented possibilities to prevent dangerous

situations by determining parameters through simulation. The data from simulations can be used as input to monitoring systems that automatically causes interventions or even stops processes due to avoid the danger.

Conclusions: The digital technologies can improve the work safety in industries, giving support to accident prevention.

016

Occupational electrical burns in Tunisia: Epidemiology and Occupational Outcome

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Background: Burns are a public health problem. Although their incidence is rather low, they are considered one of the most devastating accidents due to their high morbidity, prolonged hospital stays. Occupational electrical burns (EB) are among the leading causes of work-related death and absenteeism. The aim of this study was to assess incidence of occupational EB and its occupational outcome in Tunisia.

Methods: This is a descriptive epidemiological study of all cases of occupational EB reported from 2015 to 2019 in Tunisia and recognized by the medical commissions of the National Health Insurance Fund.

Results: During the study period, 44 cases of EB were collected, representing 18.1% of all burns. The median age was 36.5 ± 11.7 years. The majority of the victims were unskilled workers (68%). Construction was the sector with the greatest number of EB (36.4%). High voltage burns were more common than low voltage burns. In the majority of cases, the lesions were of multiple localization (77.2%). The upper extremities were the most frequent site (72.7%). Vicious scars were the most reported (73.6% of cases) followed by stiffness (34.1% of cases) and amputations (27.3% of cases). Half of the victims had an temporary total incapacity greater than 6 months (50%). The average permanent partial incapacity rate was $28.2 \pm 27\%$. More than a third of the victims had lost their job (41.7%).

Conclusion: EB are a major health and safety problem at work requiring adequate prevention, in particular the revision of regulations on work safety

017

The development of the safety information sharing platform system for the delivery riders

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Introduction: Nowadays, increasing food delivery industry and associated accidents becomes a big challenge in Korea. Especially COVID-19 has made the situation even worse. Food delivery market using mobile ordering apps reached 17,000 billion dollars in 2020. It is about 5.3 times the size of market in 2018. It showed that major accident types were related motor bike riders.

Matherial and methods: The OSHFI as a sub-institute of KOSHA developed a safety information sharing system for delivery riders using Open-API.

Results: The delivery riders are asked to watch the short safety related video selected by some algorithms, when they turn on the delivery app to begin their works. The algorithms identify the locations of riders and consider weather conditions and any health issues such as particulate matter alerts and then they choose the most suitable safety video clip for the riders every day. Riders are also warned when they are approaching a dangerous zone which were formed based on the bike accidents records.

Conclusions: The developed system basically provides the riders with short safety video clips and danger zone alerts. Now the OSHFI is planning to expand the system's safety functions such as a safety delivery time calculator and expects the system is contributing to securing safety of delivery riders in Korea.

018

Application of smart technologies for safe construction industry

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Introduction: The form of technical guidance is required to change due to the limitations of face-to-face contact and the development of Industry 4.0 technologies after COVID-19 pandemic. In particular, it is necessary in construction sites where work and conditions vary in real time.

Material and methods: Accordingly, in the construction field of the KOSHA, special vehicles equipped with CCTVs and drones were introduced to open the era of untact inspections at construction sites. Vehicle-mounted CCTVs are used to inspect the inside and outside of the site non-face-to-face, as inspection materials such as steel frames, steel towers, and small and medium-sized dense sites are difficult to access or require a lot of manpower.

Results: The contents of the inspection are analyzed through a modeling program, and the results are shared with the competent front-line agencies and construction sites through cloud and mobile. Through this, a wide range of on-site inspections are possible, and real-time data scales enable timely adaptation to dangerous sites. Furthermore, through the operation of the pilot site, a manual that can use drones for safety and health technology guidance projects will be produced and distributed and expanded to front-line institutions.

Conclusions: Through these projects, KOSHA is striving to introduce future technologies and provide customized technology guidance tailored to the times.

019

Chemical self-monitoring system for expanding worker's right to know

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Introduction: General work of handling hazardous factors subject to work environment monitoring is legally managing the level of exposure of hazardous substances, but there are many works such as temporary, short-time, or non-routine ones which are excluded from the object of work environment monitoring. In addition, changes in the way of working and the use of new materials due to the advancement of the industry would inevitably increase the

legal blind spot. New alternatives are needed to prevent industrial accident arising from the legal blind spot.

Material and methods: In this presentation, KOSHA will introduce chemical self-measurement system project. Since 2020, by equipping five analysis laboratories in major five regions in Korea, KOSHA has been carried a pilot project which provides passive sampler to the applicants.

Results: This system then collects and analyzes the sample, and provides the result of analysis to the applicants. All system is free of charge. The purpose of this system is to reduce chemical poisoning accident, by satisfying and expanding workers' right to know and guiding business to voluntarily improve work environment.

Conclusions: The continuous expansion of the "Chemical Self-measurement System" is expected to play an important role in reducing chemical poisoning accidents by identifying and managing the legal blind spot information for the use of chemicals in the workplace.

02. AGING AND WORK

020

Experiences, Perceptions and Beliefs of the Ageing Workforce Regarding Chronic Musculoskeletal Conditions and Their Ability to Manage Them at the Workplace

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Introduction: Helping employees with chronic musculoskeletal disorders (CMSDs) to remain in work can make a significant impact on the individual, employers and society as it can increase productivity and reduce absenteeism or presenteeism in the workplace (Skamagki, King, Duncan, & Wählin, 2018). Published qualitative reviews have shown gaps or inconsistencies on the experiences, perceptions, and attitudes of employees with CMSDs in the workplace. The work ability amongst those with a CMSD varies and older employees may not perform to their full capacity.

Methods: This study is part of an exploratory sequential mixed methods research (MMR) design grounded in the pragmatist paradigm. The qualitative phase explored employees' experiences of CMSDs concerning their employment, their perspectives on managing these conditions at the workplace, and the strategies used to facilitate and maintain their roles. A total of 15 employees working in either the public or private sector across West Midlands, UK were recruited.

Results: Interviews were recorded, transcribed verbatim, and analysed using framework analysis. Analysis highlighted 5 key themes: Impact on wellness, Managing strategies and facilitators, perceived barriers towards management, employees' attitudes at strategies, thoughts and emotions.

Conclusions: Helping employees with CMSDs to remain in work can make a significant impact on the individual, employers and society. Professional advice and resources are essential elements in designing an effective management program for employees with CMSDs.

021

Associations between age and self-reported physical and mental health over time: a longitudinal study of manufacturing workers

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Introduction: Although age-related changes in health are well documented in the literature, most previous research focuses on older individuals usually post retirement. In this study, we sought to determine the trajectories of physical and mental health of manufacturing workers over time and the effect of age on these trajectories. Such research can help inform interventions to promote health throughout working life.

Methods and Materials: As part of the UConn Study on Aging and Musculoskeletal Health (UConn-SAM), we used surveys to measure self-reported physical and mental health of 103 manufacturing workers across four time points over a 12-year period. We investigated the effects of age (continuous), time (categorical), and their interaction on physical and mental health in mixed linear models with time as a repeated measure and adjusted for gender and job type.

Results and Conclusions: We observed no significant association between any age-by-time interaction and physical ($p=0.78$) or mental ($p=0.79$) health, so the interaction was removed and models re-run. We observed no significant association between time and physical ($p=0.33$) or mental health ($p=0.39$). Age was significantly ($p=0.04$) and negatively associated with physical health (beta coefficient=-0.12, standard error=0.06). We observed no significant associations between age and mental health ($p=0.09$). In our study, older manufacturing workers reported worse physical, but not mental, health. We observed no changes in physical or mental health of workers across the 12 year study period. Older workers may benefit from targeted interventions to promote physical health

022

Working Status was Linked to Cognitive Function in Taiwanese Older Adults

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Introduction: Taiwan entered the era of aged society recording 10 percent of aged people (aged ≥ 65) in 2018, and it is estimated that in 2025 Taiwan will become a super-aged society. Among older people (aged ≥ 50), little research aimed at health impact during pre- or post-retirement in Asia. Therefore, we explored the relationships between working condition and cognitive function in Taiwanese older adults through a longitudinal study. **Methods:** Taiwan Longitudinal Study on Aging (TLSA) is a multiple-wave nationwide survey recruiting representative older participants. Data from 1996 to 2007 in TLSA was used, with initial 5,131 participants. Among them, 2,756 people completed

the four waves of surveys. Working condition was assessed in each wave of survey. Cognitive assessment was based on Short Portable Mental State Questionnaire, 10-item free recall task and backward digit span task. Logistic regression analysis and generalized estimating equation (GEE) were performed to estimate the association between working status and cognitive function based on the cross-sectional study or repeated measures design.

Results: The better results of the cognitive tests were found among older workers than jobless elderly in each survey. After considering potential covariates, significant adverse effects of unemployment on tasks remained among those older than 50 years. Using GEE, the result showed significant protective effect for having a job on 10 item free recall test when the next time survey conducted, around 3 years later.

Conclusions: The risk of cognitive function might decrease among community-dwelling older workers in Taiwan.

023

Educational differences in labor market exit through disability pension: The contribution of labor market marginalization measured across the life course

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Introduction: The causes of the well-established social inequalities in labor force participation are not fully understood. The present study aims to investigate the association between educational qualification and early labor market exit through disability pension among men and to examine the contribution of labor market marginalization measured across the life course.

Method: The study was based on a cohort of men born between 1949 and 1951 who were examined for Swedish military service in 1969/70 and alive at age 55 (n = 40 761). Information on highest level of educational qualification was obtained from Swedish nationwide registers. Information on disability pension was collected through the ages of 55- 64 years. Information on labor market marginalization was collected from nationwide registers and defined from yearly information on days of unemployment and sickness absence over the working life.

Results: Preliminary results show a graded association between education qualification and disability pension. In the crude model, compared to men with the highest level of education men with less than 12 years of education had a more than 2-fold increased risk of disability pension. Prior long-term sickness absence and unemployment measured across working life explained a large part of the association.

Conclusions: Educational differences remained regarding disability pension among mature-aged workers, even after considering several important risk factors measured across the life course. Labor market marginalization over the working life explained a large part of the association between education and disability pension.

024

Investigating and explaining the “early exit culture” in Germany

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Introduction: Germany has since long an “early exit culture” (EEC) meaning that most workers anticipate their exit from working life much earlier than at legal retirement age. This is in contrast to Scandinavia, where a long working life is considered “normal”. We a) investigate whether the EEC still prevails in Germany and b) discuss what an EEC may mean for the individual, the enterprises and national level.

Methods: two large representative datasets were used to analyse the “subjective employment perspective” (SEE) of the working population in Germany: lidA Wave 3 (2018, baby-boomers aged 53 or 59 years, n=3.586) and GEDA2015 (20 to 64, n=13.590). The SEE was assessed by asking the participants until what age they “CAN”, “WANT” and “PLAN” to work.

Results: The EEC was confirmed. While legal retirement age is 66/ 67 y. for baby-boomers, findings indicate that this group WANT to work until 62.5 (females), 62.7 (males) years of age. Respective figures for CAN are 64.8 (females); 65.6 (males), and for PLAN 64.0 (females); 64.0 (males). GEDA-data indicate that the EEC is even stronger among the younger.

Conclusion: We postulate that the EEC in Germany does not mean that the work force will continue to retire early. Strong psychological, social as well as cohort-, period- and age-effects may explain the EEC. In the life course the individual workers’ EEC will be challenged by societal needs expressed in retirement regulations, by the workers’ health, working and private conditions, resulting in EEC adaptation processes. Instead, the low EEC may reflect a negative image of work and working with risks on individual, enterprise and national level.

025

Exploring barriers and enablers of work ability among older workers – a qualitative approach

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Introduction: The worldwide ageing population will inevitably raise the average age of the general workforce causing different challenges to older workers. To support older workers to preserve their ability to stay in the workforce, it will be necessary to identify potential barriers and enablers in order to design effective workplace interventions that aim to promote older workers’ ability to work. Hence, this qualitative study aims to explore various factors that promote or hinder work ability among older workers in Australia.

Methods: Fourteen purposively selected older individuals (>45 years) who were either working or recently left the workplace were interviewed using semi-structured interview guides. Data were recorded using digital software (e.g. Zoom) and transcribed verbatim. Data analysis followed a Thematic Analysis approach.

Results: Older workers in this study described various factors that either limit or support their current and future work ability. Among these barriers and enablers, three key themes emerged: Person-related factors (e.g. physical and mental health), workplace-related factors (e.g. flexible working arrangements) and societal factors (e.g. family-related commitments).

Conclusion: Our findings suggest that acknowledging the work ability concept as a multi-dimensional construct can have crucial benefits when assessing and designing interventions to support sustained work ability in the ageing workforce.

026

Gender differences in the impact of work exposures on age of withdrawal from paid employment among older workers

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Introduction: To successfully extend working life for both genders among older workers, more knowledge is needed on which work-related factors affect early exit from work differently for men than for women. The study evaluated gender differences in associations between work exposures at age 62 and age of withdrawal from paid employment in Norway.

Material and Methods: The study utilized registry data on individuals born 1949-1953 who were in paid employment when turning 62 (N=145,331). Individuals were followed from the month they turned 62 until either withdrawal from paid employment, 67 years, or end of follow-up (June 2016). Information about 8 biomechanical and 7 psychosocial exposures was obtained from a gender-specific job exposure matrix. Gender-specific hazard ratios (HRs) of all-cause withdrawal were calculated for each work exposure separately using Cox regression. Gender differences were examined by calculating the additive difference in the gender-specific HRs (male HR minus female HR). Cause-specific withdrawals were assessed with cumulative incidence curves.

Results: Largest gender differences were found for monotonous work (HR difference: 0.26, 95% CI: 0.23-0.29), high psychological demands (HR difference: -0.24, 95% CI: -0.27-0.21) and hands above shoulder height (HR difference: 0.15, 95% CI: 0.11-0.19). The gender differences were primarily driven by early retirement and health reasons.

Conclusions: Gender modified the impact of work exposures on age of withdrawal from paid employment among older workers.

027

Night shift work and biological ageing in hospital female nurses

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Introduction: Increased age-related diseases (e.g., cardiovascular diseases and cancer) and DNA methylation changes have been observed in night shift (NS) workers. Shift work involves a variety of physiological disruptions that might entail alterations in biological ageing. We aim to investigate this association through a parsimonious epigenetic signature.

Material and Methods: We enrolled 46 female nurses of the Policlinico Hospital (Milan, Italy) working in NS for at least two years and matched by age and length of employment with 51 female colleagues not working in NS. Sociodemographic and work-related information (including work-related stress assessed through the ERI questionnaire) and a blood sample were collected. Biological age (BA) was estimated considering the methylation pattern of five CpG sites in five genes (ELOVL2, C1orf132/MIR29B2C, FHL2, KLF14, TRIM59). Multivariate linear regression models were applied. The study was approved by the Hospital Institutional Review Board (702_2015).

Results: In the whole population, smoking, BMI, work-related stress, NS and number of years in NS were not associated to BA. We found an increased BA per each year worked in NS only in subjects with overweight/obesity [BMI \geq 25, β =0.46 (95%CI:0.05-0.87), p=0.03, p-interaction=0.097] or experiencing work-related stress [ERI $>$ 1, β =0.58 (0.10-1.06), p=0.018, p-interaction=0.056]. An even higher association [β =0.66 (0.03-1.29), p=0.041] was observed in workers with both characteristics (i.e., BMI \geq 25 and ERI $>$ 1).

Conclusions: Notwithstanding the small sample size, our findings suggest that NS can influence BA in hypersusceptible workers.

028

Do trajectories of occupational physical activity from midlife to retirement predict limitations in mobility and disability in later life? A multi-cohort study

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Introduction: We examined trajectories of occupational physical activity (OPA) from midlife to retirement and assessed how

different trajectories predict limitations in mobility (ML) and activities of daily living (ADL-disability) at old age.

Material and Methods: We studied workers above the age of 50 years (N=30300) using harmonized data from three cohort studies (FLAME, ELSA, HRS) from Europe and the United States. Repeated measurements of self-reported OPA were collected during approximately ten years. We studied persons who had data on OPA from at least two time points and had information on self-reported ML or ADL-disability at the last follow-up point. Latent class growth analysis was used to identify trajectories of OPA. Odds ratios (ORs) with 95% confidence intervals (CIs) for the associations of the trajectories and the outcomes were estimated and adjusted for confounders.

Results: Preliminary results show little heterogeneity in the development of OPA. Trajectories differed in terms of the level of OPA, but the trend remained rather stable across trajectories. Those with constantly high OPA had approximately 50% higher odds of ML and ADL-disability as compared to those with constantly low OPA. No difference between intermediate and low OPA trajectories was found.

Conclusions: OPA seems to remain relatively stable among the workers during the last years of their working career. High constant OPA from midlife to retirement may predict functional limitations in later life.

029

Integration of Blockchain Technologies into the Professional Longevity Management System

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In the conditions of demographic aging, depopulation and workforce deficiency in Russia, the need of the employment of aged workers will grow every year. Timeliness and complexity of the solution of the employment problems among aged workers determines the expediency of the creation of a system for screening and monitoring workability, with special age-oriented working conditions and jobs in various professional groups for the most rational employment of aged workers.

The digital transformation of the Russian economy, changing business models, increasing the role of open innovations and internal integrators have determined the need for digitalization of predictive analytical approaches to human resource management. We suggest an innovative model «Age-Friendly Workplaces» (AFWP) for the preparation of jobs for aged workers, including integral criteria for the assessment of workability and adaptability of aged workers to the functional, physiological and psycho-physiological work loads. Because adapting work to one's abilities, skills and state of health should be a continuous and dynamic process, based on adequate risk assessment, adapting work to older workers' health status and needs should not present an additional burden. This required the maximum digitalization of the AFWP-model using blockchain technologies.

The implementation of the AFWP-model at the Lenpoligrafmash Technopark with the support of the Project office of Power Machines JSC proved that aged workers are able and willing to work longer when they can better cope with the working conditions, workload or working hours.

03. CARDIOLOGY IN OCCUPATIONAL HEALTH

030

Trends in lifestyle-related health indicators among Belgian workers

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Introduction: Cardiovascular diseases and diabetes are growing health problems worldwide. These lifestyle-related diseases also affect people at working age and compromise their workability. The aim of this study was to investigate the trend of lifestyle-related health indicators (treatment for hypertension, dyslipidaemia or diabetes, BMI and blood pressure) that were monitored during periodical health examinations of workers between 2011 and 2019. **Methods:** A trend analysis was performed on the data of workers that had a health check by IDEWE, Belgian occupational health service, between 2011 and 2019. For these nine years, data on medication use, BMI and blood pressure were available for approximately 190 000 workers yearly. The trend of the use of antihypertensive, lipid-lowering and diabetes medication, overweight and hypertension was studied by age and gender groups and per economic sector.

Results: Overweight, hypertension and the use of diabetes medication increased significantly from 2011 to 2019. Since 2011 prevalence of these health indicators is highest in the transportation sector. The use of lipid-lowering medication showed a significant increase in men of 45 years or over. The use of antihypertensives was slightly decreasing between 2011 and 2019.

Conclusion: We confirm the significantly increasing trend of overweight and its health consequences (hypertension, diabetes, dyslipidaemia) in Belgian workers. To counter this evolution, it will be necessary to convince employers as well as employees of the importance of a healthy lifestyle and of the profit that can be made by investing in measures that support it.

031

The needs of patients with cardiovascular disease and healthcare professionals with regard to communication and collaboration on work participation and return-to-work

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Introduction: Traditionally, care was organized around medical specialties or interventions, but to add more value for the patient, the full cycle of care is at the core of modern-days healthcare delivery. To efficiently deliver care over the full cycle of care, communication and collaboration is essential. The objective is to identify needs of clients with cardiovascular disease (CVD) and healthcare professionals in terms of communication and collaboration.

Materials and Methods: For the qualitative study, N=19 clients with CVD were interviewed about their experiences with work-related care and their needs in terms of communication and collaboration between stakeholders. Additionally, N=24 interviews were conducted with professionals (occupational and insurance physicians, general practitioners, physiotherapists).

Results: The analysis of interviews is currently underway and will be ready for presentation at the conference. Preliminary results show the following themes: (1) Need for more transparency about the aim of the contact between stakeholders, (2) Need for a permanent stakeholder (occupational and insurance physician), (3) Inadequate information exchange between the cardiologist and occupational physician (OP), (4) Request of medical file by OP gives a feeling of distrust, (5) Information loss due to flawed contact between OP and insurance physician (IP).

Conclusions: Identifying the needs of clients and healthcare professionals in terms of communication and collaboration between stakeholders in the work-related support process, offers the foundation for creating more integrated care.

032

Syncope and work

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Introduction. Syncope, pre-syncope and falls of unknown causes occurring in the workplace may create harms and safety concerns. In addition, syncope recurrences may worsen the quality of working life. Little is known on the relationships between occupational distress (OD), sleep quality (SQ), mental health (MH), metabolic syndrome (MetS) and syncope occurrence.

Material and Methods. A retrospective study was performed on consecutive 741 workers who underwent periodic medical examinations. The survey form included ad hoc questions on syncope and standardized questionnaires on OD, SQ and MH. The workers underwent also medical examinations and laboratory tests searching for MetS.

Results. The prevalence of syncope was 13.9%, pre-syncope 26.0% and falls of unknown cause 10.3%. Syncope and pre-syncope were more prevalent in females than in males. In models adjusted for age and gender, the occurrence of syncope or pre-syncope was associated with a doubled risk of OD and with a more than doubled risk of low SQ and poor MH. Syncope recurrence had the strongest association with poor MH (OR 3.88; IC 95% 2.12-7.08). Neither syncope nor presyncope nor falls of unknown cause was associated with the presence of MetS.

Conclusions. The health promotion intervention in working place, aimed at reducing OD, improving SQ and MH, might positively impact on the risk of syncope, presyncope and falls.

033

Synergism of Cardiovascular Risk Factors and Disturbance in Autonomic Cardiac Control - Key Mechanisms in the Etiopathogenesis of Cardiovascular Disease

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Introduction: The identification of the pathophysiological mechanisms of cardiovascular disease (CVD) in a state of allostatic stress can be used to enhance the early diagnostics of CVD.

Material and Methods: We used a diagnostic method for Analysis of Heart Rate Variability to study the functional state of the cardiovascular system. Job Analysis was performed to determine the psychological and occupational risk factors inherent in the professional activities of the studied groups: 83 physicians and 30 controls. We assessed cardiovascular risk factors to determine the cardiovascular risk. Research involving humans has been approved by an institutional ethics committee.

Results: Results of Job Analysis revealed that a variety of psychological and occupational risk factors prevailed in subject physicians. Allostatic job stress in physicians causes a process of reciprocally coupled inhibition of the parasympathetic branch of the Autonomic Nervous System (ANS) and activation of the sympathetic branch of the ANS. In response to cumulative exposure to the effect of allostatic job stress on cognitive functions, we observed decreases in parasympathetic activity with pNN50 and HF, and increase in sympathetic-to-parasympathetic activity with LFa/HFa. In both groups, clear synergism of cardiovascular risk factors was established.

Conclusions: Screening of the most significant pathophysiological mechanisms that determine the risk of CVD revealed dysfunctional autonomic control, and synergism of cardiovascular risk factors. Recognition of the increased risk of CVD in a state of allostatic stress contributes to the early diagnosis of CV

034

Occupational exposure to different dusts and early effects on the cardiovascular system – during work and immediately after vacation

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Introduction: Ambient particle matter (PM) is a risk factor for cardiovascular disease (CVD). However, little is known about associations between PM in occupational settings and CVD. We investigated associations between occupational dust exposure and risk markers of CVD, and potential recovery effects after vacation. **Material and Methods:** Non-smoking, male construction workers were recruited via large construction companies, trade union and industry organization. Dust exposure measurements (respirable silica, respirable dust < 4 µm, PM 0.1-10) were conducted once, and biological sampling (blood pressure, pulse, markers of inflammation, coagulation, metabolism) twice for each participant; during work and

immediately after summer vacation. Linear regressions were performed evaluating associations between dust exposure and biomarkers. The Regional Ethics Committee, Stockholm, Sweden approved the study, Ref. No. 2019-00208.

Results: 65 workers participated, 37 classified in occupations of high and 29 of low exposure to respirable silica. Mean levels (mg/m³) in high/low groups were; respirable silica: 0.037/0.019, respirable dust: 0.510/0.228, PM 0.1-10: 1.185/0.461. Homocysteine concentrations were higher with higher concentrations of all dust types. HDL concentrations were lower and pulse higher with higher exposure to respirable dust and PM 0.1-10. After vacation, LDL concentrations were lower than during exposure, and systolic blood pressure was lower among those high exposed to all dusts. Conclusions: Occupational exposure to dust was associated with some risk markers of CVD. Vacation resulted in recovery in some biomarkers.

035

Modalities of Return to Work After Cardiac Episode

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Introduction: During the course of employment an employee may get a Cardiac catastrophe in terms of heart attack, Angioplasty, CABG, Valve surgery. Subsequent upon Return To Work (RTW) it becomes difficult for worker to adjust physically, socially, psychologically in environment. For employee expensive sick leaves are lost, more cardiac events, physical disability, reduced/no output. On the other hand, the employer is also not happy as he loses productive employee, on-going financial burden.

Method: Factory doctor and cardiologist are not conversant about successful RTW. Post event evaluation tests include re-vascularisation, Ejection fraction, Stress test to assess working capacity. Outcome is calculated for complicated/uncomplicated Cardio vascular disease with Heart rate >120/minute and Rating of Perceived Exertion <13 on Borg scale. Euro scoring system is done for quality of life and patient's ability of RTW. Role of factory doctor is important for RTW by understanding work capacity, shift work, machinery, environment. RTW is affected by age, comorbidity, work type, education. Cardiac Rehabilitation (CR) team is multi disciplinary, monitors exercise training to adopt work demand. After attack without ventricular dysfunction, recommended leave for office job is 2 weeks, manual job 3 weeks, strenuous job 6 weeks. CABG/Valve surgery 4-6 weeks for desk jobs, longer for physical work.

Conclusion: Compliance of RTW is high when CR program is associated with team works. Use gradually low intensity work to part time to full time. Endpoint is what worker can do rather he cannot. Employee must be at least 2 years productive.

036

Psychovegetative markers of arterial hypertension syndrome in miners

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Introduction. The chronic psychovegetative (PV) work stress increase risks of the functional disorders, such as arterial hypertension (AH). The PV and clinical indicators of cardio-vascular diseases (CVD) of miners has been studied to establish the markers of the AH.

Materials and methods: 60 miners (main group, n=60, age-46.8±2.0 y.o., experience-22.0±2.4 y.) were studied. Comparison group: comparable 49 no-miners. Main group was divided into group I n=20 under 45 y.o., group II n=40 over 45 y.o. Psycho-physiological tests used: "Determination of neuropsychic tension", "Integrative anxiety test", Shulte test, "The severity of PV syndrome". Conducted: electrocardiogram, daily monitoring of blood pressure, heart ultrasound, biochemical blood tests.

Results: An attention decrease, an anxiety increase and an increase of PV complaints were detected in the group of patients with AH (OR 7.50; 95% CI-2.39-23.58; OR 11.06; 95% CI-4.35-28.10; OR 22.50; 95% CI-7.09-71.41). PV state (PVS) and functional changes in the cardio-vascular system don't correlate in group I, and those miners distinguish with "psychologically realizable adaptive phenotype". Correlation analysis in group II shows moderate and low negative connection between age, experience and neuropsychiatric stress index, anxiety, attention decrease. Because 38 (95%) miners over 45 y.o. were diagnosed with AH, the "psychosomatically realizable adaptive phenotype" was described.

Conclusion: Our risk-oriented study shows that the age and experience increase leads to the PVS transformation and "psychosomatically realizable adaptive phenotype" is a marker of AH in miners.

037

Return to Work after an Acute Coronary Syndrome

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Introduction: Many patients who develop acute coronary syndrome (ACS) are of working age. Understanding factors that might facilitate return to work of these patients is of paramount. This study aimed to assess return to work (RTW) and its predictors in patients admitted for a first episode of ACS.

Methods: A prospective, monocentric, descriptive and analytic study including patients of working age who were admitted for a first episode of ACS in the Cardiology Department of a teaching Hospital in Monastir (Tunisia) in the period between June 2018 and December 2019. Patients were interviewed at baseline, one, three and six months after discharge.

Results: The study population was of fifty patients. The mean age of the population was 51.92 ±6.4 years (35 to 65 years). RTW was reported in 84% of patients within 6 months. In univariate analysis, the RTW associated factors were LVFE ≥ 45% (p=0.001), Killip class I (p=0.009), no in-hospital complications (p=0.044), a lower pack-years smoking (p=0.025), a better QOL in VAS (p=0.027), being employee (p=0.05) and a greater Global Physical Activity (p=0.001). In multivariate analysis, better Quality Of Life and number of children in charge ≥ 4 were the independent predictors of RTW.

Conclusion: This study showed that the majority of ACS patients returned to work within 6 months. More knowledge about factors facilitating RTW is needed.

038

Association between cardiovascular risk factors and work-related upper limb disorders

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Introduction : Work related upper limb disorders (WRULDs) are a major occupational health concern. Their occurrence results from the complex interaction between organizational, environmental and personal risk factors including cardiovascular ones. The aim of this study was to analyze the association between cardiovascular risk factors and WRULDs.

Methods: This is a case-control study enrolling patients who consulted at the occupational medicine department of the Farhat Hached Academic Hospital during the period from January 2017 to December 2019. The cases were patients with one or more WRULDs. Two witnesses of the same age and gender were matched to each case.

Results: Our study included 48 cases of WRULDs and 96 controls. Three factors were independently associated with the occurrence of WRULDs: hypersollicitation of upper limb ($P < 10^{-3}$; ORa = 11.1; 95% CI [2.9-41.8]), heavy load bearing ($P = 0.001$; ORa = 6.5; 95% CI [2.1-19.8]) and abdominal obesity ($P < 10^{-3}$; ORa = 8.7; 95% CI [3.1-24]).

Conclusion: The results of this study show a non-negligible part of cardiovascular risk factors in the occurrence of WRULDs. Although the cause-and-effect link remains difficult to establish, the prevention of these risk factors may reduce the occurrence risk of WRULDs.

039

A 10-year follow-up of cardiovascular risk in commercial flight aircrew

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Introduction : Flight aircrew are exposed to an increased risk of cardiovascular diseases (CVD) due to occupational exposures and the demands of this profession. The consequences of these diseases on flight safety are significant because of the risk of the occurrence of disabling symptoms. The aim of this study was to analyze the evolution of cardiovascular risk factors in commercial aircrew (CA) over a 10-year-period.

Methods: This is a retrospective descriptive and analytical study, carried out during the year 2020, and enrolling a population of CA of the airline company "Nouvel-air" who consulted the department

of occupational medicine of Farhat Hached academic hospital (Tunisia) as part of the medical fitness visit.

Results: Our study included 261 CA, with a mean age of 43.3 ± 5.9 years. Smoking and alcoholism were noted in 52.5% and 8.8% of cases, respectively. After 10 years of follow-up, obesity was diagnosed in 10.3% of AC with a significant increase in BMI during the study period ($p < 10^{-3}$, $r = 0.97$). Diabetes and hypertension were present in 4.6% and 1.9% of the study population, respectively. Blood glucose values increased significantly during the study period ($p = 0.002$, $r = 0.85$), unlike systolic and diastolic blood pressure values which remained stable during the study period. Cholesterol values increased significantly during the study period ($p < 10^{-3}$, $r = 0.96$). In contrast, triglycerides values were significantly reduced ($p = 0.01$; $r = -0.75$).

Conclusion: The prevention and the early detection of these factors should be undertaken before the onset of inaugural complications that may compromise flight safety

04. EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH

040

The role of food hygiene knowledge and awareness in decision-making of consumers of food street vendors: A focus group study in Lima-Peru

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Introduction: FAO reported 2.5 million people consume everyday street food worldwide, regardless of the risk related to improper food handling, inadequate raw materials and lack of water supply. There is a need to understand the characteristics of consumers' choice to eat from street food vendors especially among those who spend their daily activity outside their home or commuting, which can be address with an educational food safety program.

Methods: This is a qualitative study that gathered data through two focus groups discussions among eight university students during October 2019 in Peru. The inclusion criteria were being a university student, older than 18 years old and declaring eating from street food vendors at least once a week. This research was approved as a low-risk study by University of the West of England.

Results: The information was transcribed verbatim, coded and analysed by thematic analysis. Four organizing themes were constructed upon the codes, taste is worth the risk, accessibility of street food, safety perception and cultural experience.

Conclusions: This research showed that consumers believe that the most valuable factor for purchasing street food is taste, followed by accessibility, low price, faster to consume and previous experience eating street food since their childhood. The participants believe that even if they might get sick, they would not die because of it, rather it will get them stronger for the next time they consume street food. These are important characteristics of street food consumers' decision-making process that should be used to develop educational and awareness food safety

041**Effects of a training program for occupational health professionals on the cognitions and perceptions of workers: a randomized controlled trial**

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Introduction: Cognitions and perceptions can influence work participation of workers with a chronic disease. Occupational health professionals (OHPs) should take these factors into account during consultations. The objective of this study was to evaluate the effect of a new developed training program on the ability of OHPs to identify limiting cognitions and perceptions of workers and on their ability to recommend evidence-based interventions aimed at these factors.

Material: The ability to identify cognitions and perceptions and to recommend interventions was measured with home assignments, in which OHPs had to identify cognitions and perceptions of workers in video vignettes of consultations between OHPs and workers. Besides, they had to indicate which interventions they would recommend.

Methods: The effect of the training program was studied in a randomized waiting-list controlled trial. Generalized linear model repeated measures analysis was used to compare the scores on the home assignments of OHPs who participated in the training program and OHPs who did not participate.

Results: Results showed an increase in the ability to identify cognitions and perceptions of OHPs who received the training compared to the control group ($p < .001$). The results also showed an increased ability to recommend evidence-based interventions ($p < .001$) as a result of participation in the training.

Conclusions: The training program helps OHPs to identify cognitions and perceptions and to recommend evidence-based interventions. This can support them in their activities to increase the work participation of workers with a chronic disease.

042**A Journey towards Zero Harm: The Case Study of Qatar Steel Company**

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Safety culture can be seen as a wide concept studied by many researchers in many organisations and industries. Poor safety cultures can result in many accidents and possibly disasters. With this regards, research on organisational culture should be conducted in order to ensure that risks associated with high risk activities are minimised as low as reasonably practicable, safety management systems are effective and occupational accidents are avoided.

This study was set out to evaluate the safety culture in Qatar Steel Company (QSC). In addition, the study aimed to identify possible gaps in the health and safety management system of the company.

In order to achieve these objectives, the researcher used the case study research design, developed a questionnaire and reviewed critical safety documents related to the company to assess the effectiveness of the safety management system.

The researcher collected data from employees' perception in the manufacturing department sections: Direct Reduction plants, Rolling Mills and Steel Making. After that, the data collected was analysed and a discussion on the findings were conducted.

After completing the perception assessment, it was concluded that employees had positive levels of risk perceptions and that high compliance to safety procedures is existing. This in turn demonstrates top management commitment to health and safety and the efforts made by the safety organisation. The findings can add up to other studies conducted in Qatar or the steel manufacturing industry.

043**Introduction of a stress management training for leaders of small and medium sized enterprises**

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Introduction: Leaders in small and medium-sized enterprises (SME) are exposed to a broad range of challenges and therefore to high levels of stress. Moreover, SME rarely provide stress management trainings (SMT) due to limited resources and a lack of positively evaluated SMT. The project "KMU-GO" seeks to close this gap. The corresponding evaluation focuses not only on effects on leaders participating but also on their employees, which was mostly neglected in the past.

Material and Methods: The study is conducted as a 2×3 mixed design and aims at collecting data from $N = 200$ leaders. The two experimental groups (intervention and waiting control group) serve as a between and time (baseline, 6 and 12 months later) as a within factor.

Based on an already successful SMT, we developed 1,5 training days in line with a needs assessment. Two booster sessions follow 3 and 6 months later. The main contents of the SMT are an individual stress analysis, psychoeducation about effects of stress on the body, different stress management tools including cognitive, emotional, physiological and behavioral approaches, individual case work and strategies on how to foster a health-oriented workplace.

The main measures of this intervention are the leaders' stress reactivity, depression and anxiety scores, effort-reward imbalance, sick days and psychophysiological measures (heart rate variability, hair cortisol and salivary alpha-amylase). Furthermore, we investigate the employees' mental health as well as the SMT's cost-effectiveness.

We want to present the concept of our SMT, the design of its evaluation and report first practical experiences

044

Evaluation of a training for occupational health care professionals to implement a workers' health surveillance mental health module focussed on healthcare workers

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Introduction: Mental health complaints occur frequently among healthcare workers. A workers' health surveillance mental health module (WHS-MH) was found to be effective in improving work functioning of nurses. However, this WHS-MH is not implemented regularly. Therefore, a training for occupational healthcare professionals in the implementation of WHS-MH was developed and evaluated on participants' satisfaction, and effect on knowledge, self-efficacy and motivation.

Methods: A 3-hour training was held among 49 occupational physicians and nurses in the Netherlands. Participants were invited through their professional association. Before and immediately after training, participants completed a knowledge test to measure effect on knowledge, and questionnaires to measure effect on self-efficacy and motivation using a 5-point Likert scale. Questions on satisfaction were conducted after training.

Results and Conclusions: A mean knowledge test score of 5.3 points out of 11.5 (SD=1.6) before training did not significantly increase after training (M=5.6, SD=1.8). In total 37% agreed to have sufficient skills to implement WHS-MH, which significantly increased to 65%. Furthermore, 55% agreed to be motivated to initiate WHS, which significantly increased to 57%. Participants were satisfied with the training, for example, 53% were satisfied, and 22% were very satisfied with exercises during the training. We concluded that although a training had no effect on participants' knowledge on WHS-MH, it can be used to increase occupational healthcare professionals' motivation, and self-efficacy in terms of knowledge and skills to implement WHS-MH.

045

What have medical students learned and thought about Occupational and sports medicine after online course completion?

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Introduction: Due to the pandemic, Occupational and sports medicine (OSM) course was held online on Zagreb University School of Medicine during the academic year 2020/2021. Despite the introduction of case-based learning, we observed exceptional passivity of students during classes. They rarely asked questions

and were reluctant to discuss scenarios. We assumed that such behaviour could notably affect their knowledge and attitudes on OSM.

Material and Methods: The study included 34 of the invited 294 final-year medical students, who took online OSM classes. They used a chat or microphone to communicate with professors and answered multiple-choice questions anonymously. They completed a questionnaire immediately after the course completion and reported a grade point average (GPA, 5-point grading scale). The questionnaire consisted of OSM quiz (11 Yes/No questions) and 6 items (5-point Likert scale) about attitudes on OSM. The study was approved by the Ethics Committee of Zagreb University School of Medicine.

Results: Response rate was 11.6%. The median of GPA of the participants was 4.4 (interquartile range 4.0-4.6). Most (9/11) questions were answered correctly by more than a half of participants. Students were significantly more interested in the course than in the OSM practice ($P < 0.001$), and were not inclined to specialize OSM after graduation.

Conclusions: The students demonstrated knowledge of OSM after online course completion regardless of a lack of experience in virtual education. It is most likely that students with higher GPA are more prone to attend case-based OSM classes but had no interest to pursue career in OSM.

046

Integrating the United Nations goal of promoting sustainable work into Higher Education: an exploratory European study

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Introduction: Higher education institutions (HEIs) are key drivers of social progress, shaping the knowledge, attitudes and skills of future generations of business and social leaders. An international task group conducted a study on the question of whether and to what extent SDG 8 on good and sustainable work, is integrated into HEIs. The survey addressed three types of study programs that devote a substantial part of their curricula to working and employment conditions.

Material: Data were provided from 30 European countries. A total of 116 OSH, Occupational Medicine and HRM degree programs from 91 HEIs were analyzed regarding three dimensions: topics, learning objectives and other activities beyond the curricula.

Methods: Between May and June 2021 an online questionnaire was sent out (Ethics Committee of the HHU Düsseldorf, Germany, No. 2021-1438). For the study programs a comparative analysis was carried out. Learning objectives prioritized by the academic leaders were evaluated with the help of a qualitative content analysis.

Results: The relevance of the topics covered varied between the three study programs; only a few courses were offered in an interdisciplinary perspective or are open to others. Knowledge transfer and critical thinking are more important learning objectives than ethical values, socio-emotional and technical skills. The translation of SDG 8 to the university (as a place for decent work)

and beyond is limited but promising and offers some innovative models of good practice.

Conclusions: The results point to the importance and necessity of increased efforts to integrate the SDGs into HEIs.

047

Application of Webinars for popularizing Environmental and Occupational Health amongst Health Professionals during the Covid-19 Pandemic in India

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Introduction: Environmental and Occupational Health are neglected disciplines in India.

Materials and Methods: The process and results of popularizing Environmental and Occupational Health amongst Health professionals in India during the covid-19 Pandemic in India through Webinars will be explored. Social Media use for Continuing Education in Occupational Health shall also be made.

Findings: The Ten webinars of average duration of 90 minutes each, with contents relating to current developments in the fields of Environmental and Occupational Health with focus on Local, regional and Global updates in India, generated immense interest amongst Health Professionals with reference to Health practice during pandemic of Covid-19 in India evinced keen interest and popularity amongst Health Professionals. Use of Social Media for Education and Training in Occupational Health energized these efforts.

Conclusions/Implications: Innovative method of use of webinars amongst Health professionals can be effectively utilized for popularizing the disciplines of Environmental and Occupational Health in India. It is expected that this interest shall be sustained in Post Pandemic period and the disciplines of Environmental and Occupational Health will get its rightful place amongst Health professionals in India leading to research initiatives and application of results in the practice of Occupational Health in India. This process and its application for Education and Training in Occupational Health in India shall be very useful in disseminating knowledge at low cost to Health Professionals in Post Pandemic period.

048

Improving Physical health of work force through education & training on the Principles of Food Safety and Nutrition

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Introduction: For maintaining good health, it is essential to spread awareness, education & training about a well-balanced nutritious diet. Employees eat food in canteens while they are in office, hence food safety/ hygiene in canteens & kitchens is essential.

Materials and methods: Health & Hygiene audit of 115 canteens of IndianOil establishments was carried out across the Corporation. Based on the audit observations & recommendations, a common checklist for good kitchen practices was firmed up and circulated across the Corporation. It was advised that the Hygiene Index of all Canteens / Kitchens of IOCL establishments must be maintained as per the checklist. Food safety workshops were organized for the

Canteen Staff. Employees were educated about the calorie count of their daily food intake. Food Safety posters were displayed in eating areas for mass awareness.

Result: This Project made employees more calorie conscious and improved their physical health. Menu makeover in consultation with the canteen committee made people more receptive to the changes which focused their good physical health. Targeted education & training on food safety helped the supervisors to maintain high standards of hygiene in their respective canteens.

Discussion: Awareness, education & training about a well-balanced nutritious diet is essential. It is important to periodically check the kitchen practices from hygiene and nutrition point of view. Periodic audits of canteen along with the education and training for cooks / service boys at the kitchen and pantry is essential to ascertain good health of employees of an organization.

049

Yes, I can improve working conditions! - Will a 120-minute online training workshop give ideas for improvements at work?

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Introduction: We examined the effectiveness of an international online workshop whether the participants would be able to suggest meaningful improvements. The workshop applied the Participatory Action-Oriented Training (PAOT) approach.

Methods: Focusing on the roles of an international online 120-minute workshop, the workshop was organized to elicit proposals for improving existing working conditions shown to the participants in 16 pictures. The participants had a group discussion about the conditions and how it could be improved, based on the results of the checklist exercise.

Results: The 120-minute online workshop was conducted comprising a 30-minute presentation of positive results from workplaces in India and Lebanon, and a 60-minute debate session about plans for improving existing working conditions. The workshop was conducted with 25 participants coming from 17 countries. At the beginning, a half of the participants found it difficult to improve working conditions. Applying a checklist listing feasible actions, the participants conducted group discussion. After selecting three good points and one point to be improved in each group, all groups presented improvement plans successfully. The suggested plans proved actually applicable in local conditions.

Conclusions: The 120-minute online workshop proved effective in delivering practical ideas to improve existing working conditions. The participants could be motivated to start actions by using the Participatory Action-Oriented Training (PAOT) approach. It is useful to rely on similar online training mini-workshops in building workers' initiatives.

050

Contributing factors for continual work improvement through concurrently organizing workplace-level workshops

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Aim: A trend is seen about implementing workplace improvements in successive years through the joint effort of workers and occupational health services. It is useful to know what factors contribute to continual improvement among diverse workplaces.

Method: Effective types of workplace-level actions and training tools were studied in the case of region-level workplaces jointly conducting work improvements in successive several years. Local government workplaces in a region in Northern Japan were selected for the study. How the short workshops and action checklists supported the continuation of planned activities was examined. Types of improvements and how they were facilitated were focused on.

Results: The workplace activities undertaken each year included short workplace-level workshops in which potential work improvements were planned by utilizing brief action checklists. Achieved actions were multifaceted covering work methods, physical environment and communication. Each workplace implemented 1-3 improvements each year and the achievements were fed back to all participating workplaces. This combination of workshops, checklists and achievement feedback jointly contributed to continuing actions in subsequent years in a parallel manner among participating workplaces.

Conclusion: The results indicated the merits of simple procedures assisted by the easy-to-use tools and repeated feedback of achieved practices. It is recommended to facilitate continual work improvement by easy-to-follow procedures and action tools. Parallel organization of workplace-level workshops leading to similar actions proved important.

051

Teamwork in medical education: are medical students team workers?

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Introduction: Despite the increasing importance of teamwork in healthcare, medical education still places a high emphasis on individual achievements. The purpose of this study is to examine students' team role preferences, including the relation with demographic and educational factors; and to provide implications for policy makers and medical educators.

Materials and methods: We used an exploratory methodology, following a repeated cross-sectional design. Data was collected from first year master students in medicine (n=2293) during five consecutive years (2016 – 2020). The Belbin Team Role Self Perception Inventory (BTRSPI) was used to measure medical students' self-perceptions of their team role.

Results: The Team Worker was the most preferred team role among medical students (35.8%), regardless of study year, gender or specialty. Female and male students had similar team role patterns, although female students scored higher on Team Worker (40.4% vs. 29.1%, $p < 0.001$) and Completer-Finisher (14.0% vs. 8.0%, $p < 0.001$). Additionally, the Team Worker was the most preferred team role among medical students who later opted for general practitioner (47.1%), a person-centered specialty (41.8%) or a technique-centered specialty (29.1%).

Conclusions: Our findings are encouraging due to the increased importance of interdisciplinary collaborations in healthcare. Nevertheless, policy makers and medical educators should do more to prioritize teamwork skills at all stages (i.e. admission to residency) and levels (i.e. in the explicit and implicit curriculum) to

ensure their continued development throughout the educational process.

052

The reporting of work participation outcomes and measurement methods in randomized controlled trials: a systematic review

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Introduction: Despite work participation being included as primary or secondary outcomes in clinical research trials (RCTs), it is often not possible to quantify or pool the results of work participation outcomes in systematic literature reviews (SLR). In this SLR we investigate how work participation outcomes are measured in RCTs across all medical fields, irrespective of the type of disease or intervention. **Methods:** We searched Medline, Embase, PsycINFO and Cochrane for RCT's published between 01/01/2014 and 21/05/2019. RCTs were included in which work outcomes were included as primary or secondary outcome, irrespective of intervention and with participants either currently employed or aiming to gain competitive employment.

Results: A total of 10222 abstracts and 819 full text articles were screened. After inclusion we grouped 435 outcomes from 269 trials into four main categories : 45% of the outcomes measured "absence from work", 30% "at-work productivity loss", 16% "employment status", and 9% "employability". Extensive variability was found in the authors' terminology and measurement methods across all categories. **Conclusion:** Work participation is a frequently measured outcome in research and across disciplines, but definitions and measurement methods vary substantially between trials. International consensus is needed in terms of terminology and measurement methods in measuring and reporting work participation. A core outcome set for work participation would be a valuable contribution to enable better synthesis of evidence.

053

Changing the World and Preventing Diseases with OHTA Courses

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INTRODUCTION: Occupational diseases and deaths continue to be a widespread international problem especially in the

developing world. A significant contributor to the problem is the lack of professional resources such as occupational doctors and occupational hygienists. This is being addressed by the Occupational Hygiene Training Association (OHTA) <https://www.ohtatraining.org/>. OHTA was created in 2010 by a group of international colleagues belonging to BOHS, AIOH and AIHA, to provide training for occupational hygienist and occupational doctors. Since 2010, 12,000 students have attended courses in Europe, Asia, Middle East, Africa, North America and South America. This presentation aims to improve global awareness of the OHTA training program.

MATERIAL and METHODS: The OHTA website provides access to the global training providers, courses, and free of charge student manuals. Courses include hazard awareness, exposure measurements and controls eg chemicals, noise and asbestos. The manuals have been developed using real work place situations and based on knowledge and experience. Quality and competence of the presenter is ensured as they must be certified occupational hygienists. Courses are face to face or on-line. The quality of the presenter and manual result in the best in class training available globally.

RESULTS and CONCLUSIONS: The OHTA is seeking out new opportunities to train occupational health professionals globally. Our goal is to prevent damage to worker's health and diseases. Greater awareness of hazards and prevention, will protect worker's health.

054

Incorporating Occupational Health and Safety Education into the University Curriculum

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Introduction: In Thailand, undergraduate students have limited opportunities to take occupational health and safety (OHS)-related courses in college before entering the work force. As young people are vulnerable to workplace harm, they would particularly benefit from education on safe work practice. This report is intended to present our efforts to incorporate OHS education across university curriculums and to provide recommendations for further research or new initiatives to expand OHS in education system.

Material and Methods: A coursework was offered as a general education course to all students regardless of academic background. The development of interesting lessons takes a great deal of time and effort, especially for students who were not in health related major. We applied the concept of blended learning to promote interactive and engaged teaching. Evaluation included formal student assessment and semi structured interview to determine student opinions.

Results: There were totally 393 students who have enrolled the course for the past 3 years. Students come from different disciplines such as nursing, engineering, economic, and business and administration. We found congruent results from both informal and formal student feedback. Almost students emphasized the importance of OHS content in the curriculum.

Conclusion: The findings indicate the importance of the approach to stimulating OSH awareness in young people. Further efforts to evaluate the program will require studies that evaluate programs in a systematic manner.

055

Effect evaluation of a training for supervisors to improve workplace guidance of vulnerable employees

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Introduction: Vulnerable employees have an increased risk to drop out of the labor market. Adequate daily guidance at the workplace could improve sustainable employability of these employees. However, supervisors of vulnerable employees often lack expertise to guide this group of employees. 'Mentorwijs' is a training for supervisors to improve knowledge, attitudes and skills needed for optimal supervision of vulnerable employees. We aimed to determine the effectiveness of the training.

Methods: 120 supervisors who followed the 'Mentorwijs' training completed a questionnaire before (T1), and directly (T2), 3 months (T3) and 6 months (T4) after the training. Outcome measures focused on determinants for behavior (i.e. knowledge and self-efficacy), intention to adopt attitudes and skills and applied attitudes and skills.

Results: Early findings indicate that knowledge ($\beta=0.88$; CI=0.73-1.04) and self-efficacy for attitudes ($\beta=0.36$; CI=0.21-0.51) and skills ($\beta=0.49$; CI=0.34-0.64) significantly improved over time (i.e. between T1 and T4). Improvements were mainly between T1 and T2, but remained stable over time. For intention to adopt attitudes no effects were found over time. Applied attitudes significantly improved over time, but effects were small ($\beta=0.25$; CI=0.09-0.40). For intention to adopt and applied skills no effects were found.

Conclusions: 'Mentorwijs' is a promising training to improve the guidance of vulnerable employees at the workplace. This study indicates that the training mainly improves knowledge and self-efficacy. More time and/or additional training may be needed to also improve attitudes and skills.

056

Discovering your work culture — It is personal

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Introduction: Work culture is about how people experience their work, and ideally, how people can flourish in their work. Management may offer regulations and policies to support an evolving culture. But the true culture of any safe and healthy workplace lies with each worker and how they personally experience and own their work.

Material and Methods: To understand the personal aspects of a work culture, it must be explored through personal means. Surveys and metrics are helpful, but they do not tell the whole story. Personal, extensive, one-on-one conversations with individual workers reveal people's experiences, thoughts, and feelings about their work. These are not interviews. Instead, these are informal conversations where each worker is encouraged to take the discussion in whatever direction they want, sharing their insights, passions, and disappointments about work.

Results: People described how they liked their work, what was missing, and what they wanted to experience. They have thought about these things every day at their job. As a result, they clearly identified specific problems and offered insightful solutions to fix them. And to make their work more enjoyable, people simply asked for three things — more personal relationships, more informal conversations, and especially, more opportunities to contribute and be heard.

Conclusions: In this context, work culture becomes the whole experience at work. It is holistic and pervasive. Indeed, the potential gift of a safe work culture is not how it is analyzed, but how it is experienced. Ultimately, workers own their work culture — because it is personal.

057

Role of workplace well-being initiatives in promoting healthy practices among the employees of selected smart phone manufacturing companies in Bangalore

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Introduction: The Indian smartphone manufacturing industry is thriving with new players entering the competitive market. Young, unmarried, college pass outs form the backbone of their workforce. Our study was conducted to assess the effectiveness of a workplace intervention programme towards increasing awareness and changing practice about common health topics.

Methodology: This cross sectional study was conducted between Jan 2018 to Dec 2019. Socio-demographic profile and baseline knowledge on key health topics were ascertained using a semi structured validated interview schedule. Workplace interventions which included periodic peer to peer health education sessions, design of health posters, changes to the canteen menu to incorporate more nutritious meal options were designed and implemented. End line assessment was conducted after 1 year.

Results: A total of 186 employees were interviewed, males(43.5%) and females(56.5%). Mean age was 23.29 ±2.13 years. Back pain, eye stress and headache were the most common morbidity reported. Knowledge regarding nutrition, hypertension, diabetes mellitus, ergonomics and musculoskeletal diseases significantly improved following the intervention($p < 0.05$). Reduced portion sizes, inclusion of seasonal fruits and vegetables and reduced salt consumption was observed. Menstrual hygiene practices also improved.

Conclusion: Scaling up of such simple, cost effective and technology driven workplace interventions and inclusion of health training as part of the induction training will help promote the long term health of these young workers.

058

"Talenti Latenti": a network for community welfare

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Introduction: "Talenti Latenti" is a three-year project born from the necessity to countering the economic and socio-cultural impoverishment taking place in the territory of ASLCN2, emerged following the 2008 crisis. It provided an innovative welfare community model in PPP, supported by a participatory governance, intended for the whole community of about 30,000 subjects.

Material and Methods: The project was developed around a PPP partnership, with the involvement of four local profit organizations and 76 municipalities. Analysing workers' need for social and health well-being, were developed the follow actions: health promotion policies; support for health-conscious consuming; reconciliation of family and work life; reduction of social vulnerabilities; promotion of volunteering. At the same time, the talentilateniti.it website was published, with pages relating to actions, courses and informative newsletter. In addition, was created a free itinerant social desk (welfare point), aimed to guide employees in the choice of services and to give information about social and health problems. From October 2018 to May 2019, 50 events were held with the participation of experts, which were attended by more than 1100 people.

Results and Conclusions: Over 64% of employees answered the questionnaire used to investigate their social and health needs. Adding up the 2,500 subscribers plus 20,000 unique visitors to the site with events' participants, we were able to achieve the objective to involve the entire target population. One company activated a three-year welfare business plan, investing in new services for employees and their family.

059

Design and user-related outcomes of virtual ergonomics training for office workers: scoping review of peer-reviewed and grey literature

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Introduction: Online training programs have emerged as an efficient way to address office workers' health. Current online office ergonomics training tested in the published literature and freely available in Occupational Health & Safety (OHS) authorities' websites were reviewed in terms of content and design and user-related outcomes.

Methods: This scoping review included a systematic search in five databases and six OHS authorities' websites in Australia (2), the USA (2) and Canada (2). A validated rubric for e-learning tool evaluation was used to assess the functional, technical, and pedagogical aspects of the training programs.

Results: Five intervention studies were identified in the literature reporting on musculoskeletal health outcomes, office ergonomics knowledge, and/or working posture. None of the studies reported on design-related outcomes. Eight online office ergonomics training programs were identified from six OHS authorities. All eight programs included information on workstation set-up and physical hazards while two included information on psychosocial health. These programs scored high in the technical (12/12) and

accessibility (10.5/12) aspects, and low in teaching (4/9), social (5/9) and cognitive (5.5/9) aspects.

Conclusion: Online office ergonomics training tested in the literature seem to focus on user-related outcomes while OHS authorities provide more comprehensive programs that meet specific design-related outcomes. Future partnerships between OHS authorities and the scientific community need to be considered to build robust evidence-based programs that address both the design and user-related outcomes

060

Occupational Health Unit (USAT), Faculty of Medicine and Pharmacy, Hassan II University of Casablanca 30 years of promoting occupational health in Morocco

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Introduction: USAT is the only university structure in the field of occupational health in Morocco. This year, it's celebrating its 30th birthday. This work highlights USAT's action since its creation in the fall of 1991.

Material and methods: USAT's record is judged on four criteria: training, research, preventive care and contribution to national occupational health goals.

Results: Each year since 1994, the USAT's team has provided occupational medicine education for around 1,800 students in Moroccan medical faculties. Between 1993 and 2020, more than 1,350 occupational physicians graduated. 56 qualified occupational health nurses. The 6 Moroccan Occupational Medicine Professors come from USAT. USAT participated in the first distance training in occupational health in French-speaking Africa (FORST) between 1993 and 2001. In terms of research, more than a thousand projects have been carried out. Among them, around thirty have been presented at ICOH Congresses since 1993 in Nice. The important weapon in the field of preventive care is the creation, in 2003, of the occupational health service at the university hospital to monitor the health of more than 5,000 agents. Today, it is also an important center of expertise in occupational pathology. USAT's contribution to national occupational health goals materialized through participation in many national commissions and especially, in 2010, the creation of Moroccan national institute of working life.

Conclusion: Many are therefore the USAT's achievements, however the organization of the 34th ICOH congress in spring 2024 in Marrakech, Morocco, is its biggest challenge.

061

E-learning modules have been an effective tool during COVID-19 pandemic to manage employee psychosocial issues at IndianOil

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Introduction: During the COVID-19 pandemic, the employees tirelessly made efforts to ensure the supply of petroleum

products across the country while the country was under lockdown. It was felt necessary to create a platform for communication and create better value for employees working under such new norms.

Materials and Methods: IndianOil e-learning platform for its employees kept the workforce gainfully engaged during the COVID-19 pandemic. Two e-learning modules on "Mastering the Art of Happiness" & "Stress Management at workplace" empowered the employees to take care of their psychosocial health. The digital platform enabled to share & learn with the employees as physical training programs were difficult to organize during the pandemic. The two e-learning modules represented an ideal combination for catering the psychosocial needs of the employees working 24/7 to ensure energy supplies across the India. The modules focus on emotional wellbeing, positive attitude and healthy habits which improves employees ability to manage stress and to remain happy during these tough times.

Result: The e-learning modules were highly sought after, appreciated and undertaken by the employees. These e-learning modules kept the workforce motivated, enhanced their resilience and helped them in managing through the adversity and challenging time of the COVID-19 pandemic.

Discussion: E-learning modules on occupational health helped to address the psychosocial issues of the remotest employee through robust digital e learning platform, which otherwise would have been difficult to achieve with physical training programs.

062

Teaching occupational health in fifth year medical students at the Pontificia Universidad Javeriana a way to facilitate their adaptability to their future professional life

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Introduction: Universities have an opportunity for improvement in teaching their graduates to adapt to their future work lives quickly and easily. One of the main stressors in life is the passage from the university to the world of work, therefore it is considered that the teaching of occupational health in recent years at the University can become a protective factor against this distress and that it increases the resilience of the medical future

Methods: Through a qualitative approach, specifically a narrative biographical methodology of the coordinator of the occupational health practice, an analysis of the experience of teaching occupational health to fifth-year medical students from 2018 to date will be carried out.

Results: It is considered that the students have been able to internalize knowledge on biosecurity, safe behaviors, burnout and occupational exposures in unusual contexts such as in rural areas of the country, as well as learning to carry out health promotion in the worker population and do primary prevention in a manner more effective and away from the context of health institutions

Conclusions: Teaching occupational health can help facilitate adaptation to the world of work in particular at the beginning of the working life trajectory. Occupational health education can strengthen primary health care

063

Contributing occupational health expertise to Wikipedia as a graduate class assignment

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INTRODUCTION: Graduate students were tasked to register in the Wiki Education platform and complete an assignment to expand and improve occupational safety and health content in Wikipedia. This was a collaborative effort between the National Institute for Occupational Safety and Health and university programs in the United States.

METHODS: From 2016 to 2020 instructors from 2 graduate programs in public health participated in this science communication effort. Instructors tracked students' progress throughout the semester. Students' contributions underwent public and peer review, and students presented to the class at the end of the course.

RESULTS: Forty-eight students expanded 55 existing Wikipedia articles, created 8 new ones, translated 2 articles to Spanish, and added 1270 references. Together these articles were viewed over 8 million times during the tracking period selected by the instructors. Feedback received from the participants suggested that students learned about science communication and digital literacy—providing valuable content on occupational health while reducing misinformation in the public domain. The process of identifying and addressing gaps in occupational health in Wikipedia requires participation and engagement toward improving access to information that otherwise would be restricted to the scientific literature, often behind a paywall.

CONCLUSIONS: The Wikipedia assignment was an engaging approach for instruction and it helped students improve their science communication skills and digital literacy, tools that are likely to be critical for successful science communication in their careers.

064

Riding the wave of educational transformation in the Covid-19 Pandemic: Covid-19 Pandemic as a catalyst in innovative education for occupational health residents

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Introduction: The two schools for occupational health in the Netherlands (NSPOH and SGBO) both offer a Medical Master program in occupational health. Within a week after the national announcement of the lockdown the schools transformed more than 80 percent of all classes into online education (493 residents).

Materials and Methods: Assignments were developed about knowledge on Covid-19 and about the impact on daily practice and existing assignments were redesigned. Expert-trainers and educators of the schools participated in teach-the-teachers workshops in online education. All education between March 2020 and 2021 was evaluated. Not only residents but also teachers were asked to evaluate their experience with online education. Expectations for future methods in education were addressed in a separate survey. **Results and Conclusions:** Residents appreciated online education better than the previously physical education. The education-evaluation score went up from 7.4 to 7.9 out of 10. The assignments contributed to development of 'reflective practitioners'. Residents were relieved that they could continue their education without delay while maintaining educational quality. They acquired skills otherwise not developed such as intensive online collaboration or online-peer group intervention. Smaller group sizes with disciplined structure led to improvement of in-depth-learning through more efficient peer-knowledge-exchange. The lack of social face-to-face contact ('coffee-machine learning') was the greatest challenge. According to a recent survey residents prefer a mix of 80% online and 20% face-to-face education in the future.

065

The place of disease prevention and health promotion in the fourth-year medical degree program in Morocco

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Introduction: Recently, Morocco's epidemiological situation has been showing new trends such as the increase of non-communicable diseases but also the persistence of communicable diseases like tuberculosis, STD's and meningitis. Most of these diseases are known to be preventable or at least manageable which highlights the needs for trained healthcare professionals in prevention. The aim of our study was to analyze the courses given to fourth year medical students in search for prevention topics as well as to investigate the perception of these students towards prevention.

Material and methods: A descriptive cross-sectional study was conducted among 121 medical students via questionnaires. For the content analysis, 282 courses were thoroughly analyzed and triaged according to predefined prevention themes.

Results: Half of the students (52,1%) consider their knowledge on preventive themes to be average and 43,8% consider it to be insufficient. Only 32,2% of the students thought their courses were sufficient in the field of prevention. For medical specialty courses, prevention was addressed in only 16 out of 212 courses. For surgery courses, only one course addressed prevention.

Conclusion: Our study reveals a feeling of incompetence in prevention among the students surveyed despite their interest in the area which stresses the need for deep reflection and a new approach in prevention training provided for future practitioners at the Faculty of Medicine and Pharmacy of Casablanca.

066

Workers' representatives empowerment through ICTs: new opportunities to improve companies' OSH management

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Introduction: The article presents a research-intervention study carried out by INAIL in partnership with the Research Institutes of the three main Italian trade unions. The study, starting from a well known need to support the empowerment of workers representatives (WRs), explores the opportunities offered by ICT for this purpose. In particular, it identifies the information and relational dimensions on which it is possible to intervene through the use of ICT to strengthen the capability of WRs to contribute to the improvement of companies' OSH management.

Material and methods: The study was carried out as part of a participatory design of a prototype of an online platform dedicated to WRs and used different survey instruments such as qualitative and qualitative interviews and workshops to explore the WRs support needs. It allowed to identify representatives' potential needs and subsequently to assess the platform's ability to meet them, as well as to identify possible uses of this tool that could not be predicted in advance.

Results: The initial needs identified can be summarized as follows: a reliable and complete point of reference from which WRs can access all information needed for carrying out their activities; opportunities for sharing knowledge based on practice with peers; support in dealing with information smog; easy access to operational tools and guidelines

Conclusions: The study has made it possible to define a precise demand for support from the WRs to which it could be given an adequate response through ICTs and, at the same time, to confirm how this demand has a clear impact on their ability to carry out the

05. EFFECTIVENESS IN OCCUPATIONAL HEALTH SERVICES

067

The potential of using hair cortisol to measure chronic stress in occupational healthcare; a scoping review

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Objectives: Workplace-based selective prevention of mental health problems currently relies on subjective evaluation of health complaints. Hair cortisol captures chronic stress responses and could be a promising biomarker for the early identification of mental health problems. The objective is to provide an overview of the state-of-the-art knowledge on the practical value of hair cortisol in the occupational setting.

Methods: We performed a scoping review of studies in PubMed, Embase and PsycINFO up to November 2019 assessing the relations

of hair cortisol with work related stressors, perceived stress, and stress related health outcomes in healthy workers.

Results: We found 22 individual studies that investigated the association between hair cortisol and work related stressors or perceived stress. There were five longitudinal studies, of which two observed an increase in work related stressors to be associated with higher hair cortisol, one found a relation with lower hair cortisol and one did not find a relationship. Findings of the 17 cross-sectional studies were also mixed. The one available longitudinal study regarding mental health showed that hair cortisol was not related to depressive symptoms.

Conclusions: Hair cortisol measurement within occupational health research is still in its early stage and more longitudinal studies are urgently needed to clarify its relationship with work related stressors and perceived stress before hair cortisol can be used to identify workers at risk for mental health problems.

068

Tuberculosis Infection Control Practice among Antiretroviral (ART) Clinics in North Central Nigeria

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Need for and barriers to voluntary HIV testing during health checkups in Japanese companies

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Introduction: Recently, a workplace program for voluntary testing for human immunodeficiency virus (HIV) has been introduced as part of workplace health checkups in Japan to support early detection of HIV infection. However, the need for this program and the barriers to its implementation are unclear. This study aimed to clarify the situation.

Material and Methods: In December 2020, we carried out a mailed questionnaire survey among 341 companies with contracts with a

health checkup center in Fukuoka, Japan. The respondents were those responsible for health checkups in their workplace. We asked about the need for voluntary HIV testing using the question "If there was a service that offered free HIV testing along with other blood tests, would your company want to use it?" If respondents chose "No" or "Don't know", they were asked to select the reason. Results: In total, 245 participants returned the questionnaire (response rate 74.5%), and 56 companies (22.9%) said they would use HIV testing during health checkups. The most common reason for not using testing was privacy protection of test results (56.6%), followed by lack of support for those with a positive result (48.1%), no authority to add test items (39.2%), and difficulty in building a consensus to introduce testing (35.4%).

Conclusions: Few companies saw the need for voluntary HIV testing in workplaces in Japan. Introducing voluntary HIV testing will require increased privacy protection and the establishment of a support system for those who receive a positive result.

070

Stress management of schoolteachers - A systematic review and meta-analysis

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Introduction: We aimed to analyze the effectiveness of interventions on the stress management of schoolteachers.

Methods: We searched Medline, Psyc-INFO, CINAHL, and Education Research Complete to identify relevant studies using relevant keywords. Job or occupational stress was the outcome measure. Study selection, data extraction, risk of bias assessment was performed by two independent reviewers. The pooled estimate of the effect was calculated using random-effects meta-analysis by the type of outcome measurement tool used and by type of interventions used. We used Grades of Recommendations, Assessment, Development, and Evaluation (GRADE) to assess the overall quality of the evidence.

Results: We reviewed 17 studies and 15 were randomized trials and 2 pre-tests, post-test studies. Based on a meta-analysis of 15 studies, a positive effect of the intervention (pooled mean difference -0.60, 95% CI -0.88 to -0.32) with high heterogeneity in the effect size ($\text{Chi}^2=132.6$, $P<0.001$; $I^2=87\%$) was found. A positive effect of intervention with high heterogeneity among studies was found by type of interventions used with meditation had a strongest positive effect among types of interventions studied.

Conclusion: We found evidence of moderate quality for meditation and cognitive behavior therapy interventions aiming to reduce the stress level of schoolteachers. The meta-analysis showed a positive effect, suggesting that interventions might reduce stress levels among teachers. The quality of the evidence was moderate.

071

Evidence based practice in occupational health services – A survey study with Finnish occupational health physicians and occupational health nurses

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Introduction: Evidence-based practice (EBP) means using the best available evidence to underpin decisions and practices in health-care. There has been hitherto very little research in how EBP is understood, organised and practiced in occupational health services (OHS).

Material and Methods: To fill this gap in knowledge, we sent out invitations to Finnish physicians and nurses working in OHS for them to fill in an online questionnaire in November 2020. We received responses from 225 participants. Twenty-one percent of responders were occupational physicians and 52% were occupational health nurses. The remaining 27% had also other duties, such as a supervisory or expert role.

Results and Conclusions: Seventy-eight percent of responders agreed or totally agreed with the statement: "Our organisation values evidence-based practice", whereas 15 % disagreed somewhat or totally, and the remaining 7% could not say. In contrast to the above, 52% of the responders agreed or totally agreed with the statement: "When there is new research evidence, our organisation evaluates the congruence of its existing procedures and policies with this new evidence", whereas 39% disagreed somewhat or totally and the remaining 9% could not say. Our results show that evidence-based practice is a strategic objective for Finnish OHS organisations but they still have some way to go in figuring out how to organise and support it in practice. Based on our findings and previous work conducted in primary care, we are developing a model of expertise to support OHS organisations in formalising the process of utilising new research evidence efficiently

072

EHS Management as an Institutional Strategy in Times of Crisis

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Background: This study aims to answer the question what is the Integrated Management System (IMS) implementation magnitude in companies and what is the respective scope of this results obtained?

Objective: An IMS implementation process in a multinational metallurgical company was analyzed, comparing its inherent advantages and difficulties, as well as correlating costs and benefits observed after the restructuring of EHS Management System.

Method: The case study was adopted as methodology.

Results: The results indicates that this restructuring generated productivity indexes improvements and interfered directly in the culture and organizational climate, providing an environment with fewer accidents and improvements in the style and quality of life of company's workers, amplifying talents retention and ratifying several scientific studies. The results also pointed that, 8 years later, this restructuring process direct reflected on indicators improvements as: Economic (ROI of more than US\$ 4.50 for each US\$ 1 invested and 70% reduction of Work Accident Insurance), Health (67% reductions in total absenteeism and 85% for musculoskeletal problems), Safety (accidents reductions: 82% in total, 92% in the lost time case accidents and 98% in the severity rates), Environmental (Improved efficiency of the Waste Management Program with the reuse of more than 95% of the waste generated), thus improving productivity and reducing assistance costs.

Conclusion: Considering these results it is evident that the investment in the EHS area is directly proportional to the profit, be it measured financially or in the quality of life of employees.

073***A mHealth-based bio-behavioral surveillance and intervention for diabetes prevention and control at Reliance Vadodara Manufacturing Division: A pandemic-proof framework****Dineshkumar Hukamji Prajapati**Reliance Industries Limited, Occupational Health Centre, Vadodara, India*

Introduction: Sedentary lifestyle and poor dietary habits are modifiable high-risk behaviors for type 2 Diabetes Mellitus. Under its Diabetes Control Mission, Occupational Health Centre at Reliance Vadodara Manufacturing Division implemented a mHealth-based bio-behavioral surveillance and intervention consisting of monitoring, awareness generation, and behavior change, which became a boon during pandemic. This study evaluated the impact of the intervention.

Material and Methods: Sample size for estimating proportion of pre-diabetics in a population of 2500 employees was calculated as 257, based on 24.7% global prevalence of prediabetes as per HbA1c, 5% precision, and 95% confidence level. HbA1c of enrolled 317 pre-diabetics was monitored during annual periodic medical examinations. Awareness messages were sent through weekly SMS and monthly imaginative mythological stories-based mails. Google fit android app was used to correct sedentary behavior targeting at least 10,000 walking-steps and 30 heart-points daily. Myfitnesspal app was used to improve dietary habits. Whatsapp-based self-reporting of weekly steps and diet were evaluated for peer-ranking. Virtual sessions were conducted with dietician, endocrinologist, and fitness coach. Lab values were compared before and after the intervention. **Results:** HbA1c of 118 (37%) enrolled pre-diabetics was converted to normal over a year since 2019. McNemar's Chi square was found significant (p value <0.0005).

Conclusion: The mHealth-based bio-behavioral surveillance and intervention proved to be effective in normalizing pre-diabetes individuals.

074***A review of the effectiveness of motivational interviewing interventions (MI) in the field of occupational health****Izumi Sezai¹, Chisato Murata², Hideyuki Goto³, Chizuru Yagawa⁴*

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Objectives: MI is a counseling approach involving interpersonal assistance for behavior change. The research purpose was to obtain suggestions on the possibility of utilizing MI in the field of occupational health by examining interventions and evaluations using MI in this field.

Methods: A systematic review of original articles published in English between September 2011 and August 2021 was conducted. A search was carried out in the PubMed database using the terms "motivational interviewing" and "occupational health."

Results & Discussion : Initially,106 studies were included; after removing the duplicates,based on the inclusion criteria, and reading the abstracts and texts,15 studies were selected for review.

Study design: Ten randomized controlled trials (RCTs),one quasi-experimental research, and 4 noncomparative intervention trials. **Target fields:**4 cases for obesity measures and four for heart disease/hypertension measures and so on. **Intervention method:** In addition to one-on-one MI-based health coaching, implementation of group MI, safety education, and so on. **Evaluation items and results:** Physical indicators such as BMI, lifestyle habits such as the number of steps walked, amount of food intake and number of cigarettes smoked, behavioral changes such as exercise duration and practice of safe behaviors, subjective mental health indicators, economic effects of the program, and so on. Although many of them suggested the effectiveness of MI, there were some in which the evaluation index effect could not be considered as an indication of the effectiveness of MI alone, especially in an RCT.

075***Provision of Occupational Health Service for Diagnosis, Treatment and Rehabilitation for the Patients of Silicosis by Department of Labor****Priyanka Roy**Directorate of Factories, Department of Labour, Kolkata, India*

Introduction: One of the most important component of services delivered by government statutory body is to provide occupational health service (OHS) for the workers with occupational disease. Under Factories Act 1948, silicosis is occupational disease which is a notifiable, compensable disease. But, problem lies with the migrant workers with no record of employers. This study was designed to provide OHS for diagnosis, treatment and rehabilitation for the patients of silicosis after a screening program held in the block of Minakhan, North 24 pgs, West Bengal, India.

Material and Methods: This was a cross-sectional study done for (a) screening of silicosis among workers (b) rehabilitation of silicosis affected workers. This study includes workers exposed to dust for 3 -5 years between 2007- 2012. The age group was from 18 to 50 years. Exact exposure data was not available. Screening was done in May 2018 and October 2019 and total 133 radiographs were collected. The diagnosis of silicosis was done by silicosis detection board using standard ILO radiographs of pneumoconiosis were used for rating the stage of silicosis. The ethical permission was taken from the department of labour.

Results : The Total 35 radiographs were identified as silicosis. Amongst 133 radiographs, 5 radiographs were non readable,93 radiographs appeared normal. Those detected 35 silicosis patients were compensated by monetary contribution made by department of labor. **Conclusion:** This study was also an example of good practice where multiple stakeholders like- department of health and welfare, district administration, labor department worked all together

076***Occupational Health & Wellness Index implementation for Effective delivery of Occupational Health Services in IndianOil****Jagdeep Rana, Sandeep Sharma, Dimple Kapoor, Gaurav Sirohi**Indian Oil Corporation Limited, Corporate HSE, New Delhi, India*

Introduction: Occupational Health & Wellness Index in IndianOil is evolved with an objective to facilitate effective implementation of

Occupational Health policies and practices. It shall enhance the level of internal customer satisfaction, strengthen, streamline & deliver better professional quality of Occupational Health Services across the Corporation.

Materials and methods: Occupational Health Services (OHS) audit of all Ten IndianOil Refinery units is conducted with a special focus on infrastructure for Occupational Health Services, surveillance of the working environment, surveillance of workers' health, OH & industrial hygiene data collection, record keeping, first aid and emergency medical services in the workplace. Marks are allocated against the points observed, OH & Wellness Index is calculated based on marks obtained against the total possible score. Index is implemented across the Corporation to further reinforce these targeted efforts. Best Refinery Unit is awarded a rolling trophy every year on "Indian Oil Day" function by the Chairman IndianOil.

Result: Periodic evaluation of the Occupational Health & Wellness Index interventions lead to improved delivery and better professional quality of Occupational Health Services, a good acceptance and adequate use of these services, and ultimately to healthy work for all. Discussion: Periodic and Systematic review of Occupational Health & Emergency Medical Services helps in strengthening them and ensure safe and healthy working conditions for employees. It helped us to align our Occupational Health Services objectives with business objectives of the organization.

077

Survey of Occupational Medicine Clinic potential in Thailand

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Introduction Occupational medicine clinic (OC) is the clinic in Government hospital that does the Prevention and management of occupational diseases for the workers. In Thailand we divided responsible area for public health to 13 area health (AH). Each AH is not equal in its industrial environment so that the potential of each occupational medicine clinic is not the same. The most important is AH1, AH6 and AH4 for they are rich in Industrial estates and many factories. We developed a standard for each OC so that all the workers can be assessed the clinic with the same quality all over Thailand.

Materials and Methods We send the questionnaires survey to the occupational medicine clinic to 73 hospitals in different AH. These questionnaires include 6 clinical standards: Structural standard, Service provider standard, Occupational medicine equipment standard, Support of OC standard, Policy standard and occupational medicine service standard.

Results and conclusions The response rate is 69.86%. When compare all AH score there are 7 OC in AH. (58.33%) that under average, most are in the standard of equipment category. When we considered the average score in OC in each AH. There are 3 in 6 OC, 3 in 8 OC and 2 in 4 OC in AH1, 6 and 4 that are below average in each AH. When Benchmark with the most scored OC there were the structural standard ($p < 0.01$), service provider standard ($p < 0.01$) and occupational medicine service standard ($p < 0.01$) that can be improved in each OC. The OC in each AH can plan the developmental direction by benchmarking with the best scored OC in each AH with evidence based on this study.

078

Steps to the future – Results of a pilot study on digital risk assessment in German schools

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Introduction: Although there is a legal obligation to carry out a risk assessment (RA) in schools in Germany, this is not sufficiently complied. Therefore, the Institute for Teachers' Health (IfL) developed the digital support tool "Cockpit IfL" to enable schools to conduct the RA independently. This paper presents the results of the pilot study on the use of "Cockpit IfL".

Method: To examine the functionality and feasibility of "Cockpit IfL" N = 20 schools took part in a pilot study in April 2019. The participating schools were able to use "Cockpit IfL" independently for three months before the evaluation was conducted. A guided interview as well as an online questionnaire with validated instruments (e.g. usability (SUS)) and own questions (e.g. satisfaction) were used for the evaluation.

Results: 75% (15) of the 20 participating schools actively used "Cockpit IfL". The effort-benefit ratio was rated as very reasonable by 86% of these 15 participants. Usability was rated as very good by 90% of the active participants. In addition, 85% of the active schools indicated that they could imagine using the support tool to conduct a RA on a regular basis.

Conclusion: The vast majority of participants rated "Cockpit IfL" as useful and very user-friendly. The results suggest that digital support can empower school principals to conduct a RA on their own. To verify the initial positive results in more detail, a larger-scale study will be conducted next school year. Among other things, we want to examine how much support from occupational health and safety specialists is needed to ensure an adequately conducted RA.

079

Safety Culture Framework for Nursing and Care Institution

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Introduction: Safety culture has been identified as a key element to provide quality care and patient safety. Previously was revealed that in care institutions safety culture was lower than in hospitals. The research problem of this study is related to the absence of the holistic concept of safety culture for care institutions. The aim of the study was to identify potential predictors of safety and to determine the holistic framework for the positive safety culture concept.

Methods: Safety culture subcultures were assessed by NOSACQ-50, CCQ and COPSQ-II in 23 Estonian care institutions.

Result: The results showed that employees behave safely in organisations where safety is a priority, employees have high competences and psychosocial risks prevented. To provide positive safety culture subcultures: just, reporting, learning, professionalism, and well-being should be developed. Differentiation of safety culture to subcultures bring together different elements and create a culture of trust. Culture of trust helps to encourage near miss accidents and happened accident reporting, failures

recognition and to ensure managerial level with adequate information.

Conclusion: Safety culture is a contextual complex phenomenon and should be analysed through differential perspective. Author proposed that periodical assessment of subcultures is in the middle of the proposed holistic framework of safety culture as predictors of care workers safe behaviour. The role of safety culture according to predictors of employees' safety behaviour arising from the multiple reciprocal components human, environment and organization.

080

Reach and effectiveness of a worksite health promotion program: a quasi-experimental study among workers in low socioeconomic position

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Introduction: This study aimed to evaluate 1) individual characteristics associated with reach and 2) effectiveness of a worksite health promotion program (WHPP) in improving health, health behaviour, work ability and sickness absence among Dutch workers.

Material and Methods: In 2 companies, 838 workers were invited for a Preventive Medical Examination (PME), coaching with Motivational Interviewing (MI), and health promotion activities (MEC approved: 2018-1717). Follow-up information was collected after 6 months. Characteristics associated with reach were assessed with logistic regression models. The effectiveness of the WHPP on body mass index (BMI), bodyweight, work ability, self-rated health, sickness absence, vigorous physical activity, smoking, alcohol intake, fruit- and vegetable consumption was evaluated with linear regression models with propensity score adjustment.

Results: 313 workers participated in a PME and follow-up data were available for 176 workers (response=56%), of which 100 workers with increasing cardiovascular risk attended MI coaching and 77 workers additionally participated in health promotion activities. Obese workers, at the production company, with insufficient vigorous physical activity, and low education were reached to participate in the WHPP. Participation in MI coaching and subsequent WHP activities was associated with an increase in quitting smoking of 21% (95%CI:4;37) and an increase in vigorous physical activity of 14% (95%CI:3;24).

Conclusions: The WHPP reached unhealthy workers in low education, and was effective in quitting smoking and improving vigorous physical activity.

081

Effectiveness of disease and injury prevention among healthcare workers: intervention studies published in the Conference proceedings of the Italian Society of Occupational Medicine (1989-2018)

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Introduction: The evaluation of the effectiveness of occupational health (OH) interventions has become a fundamental step in Occupational Medicine. We aimed to review the proceedings of the Italian Society of Occupational Medicine (SIML) Conferences in the last 30 years with special emphasis on OH interventions among healthcare workers.

Materials and Methods: Two authors independently hand-searched and screened the Conference proceedings of the SIML in 2004-2018. A third author resolved any disagreement. The selected studies were classified according to study design, population, type of intervention, risk factors, and outcome. We additionally included the OH intervention studies published in a previous review that screened the Conference proceedings of the SIML in 1989-2003.

Results: Out of 7518 reports published in 1989-2018, 197 OH intervention studies were identified. Of these, 55 were related to OH interventions among healthcare workers. The vast majority of these had a before-after study design without a control group. The effectiveness of training programmes was evaluated in 17 out of 55 intervention studies. The evaluation of health promotion strategies (n=8) and work-related stress prevention (n=4) was identified in the last 15 years. Only four OH intervention studies related to healthcare workers were currently reported in a peer-reviewed journal indexed in MEDLINE.

Conclusions: The hand-searching of the so-called grey literature highlighted a quite unexpected number of OH intervention studies. Recommendations need to be made to improve study design to evaluate the effectiveness of OH preventive interventions.

082

A study on effect of workplace wellness and health interventional activities on body mass index among workers in a shipbuilding industry in Goa, India

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Introduction: Employees are responsible for managing the day-to-day activities of an organization and are a valuable asset. Obesity is widely regarded as an epidemic, with potentially disastrous consequences for human health. Obesity is associated with an increased risk of multiple health problems, including hypertension, type 2 diabetes, dyslipidemia, degenerative joint disease and certain malignancies. Body mass index (BMI) is an index of weight for height that is commonly used to classify underweight, overweight and obesity in adults. The study was conducted to identify the effect of workplace wellness and health interventional activities on body mass index in employees and to make appropriate recommendations.

Materials and Methods: A longitudinal study was conducted at a shipbuilding industry after approval from the Institutional Ethics Committee of Goa medical college and hospital. Measurements of BMI were obtained with Quetelet's Index for 241 employees in 2017 after taking their informed consent and the same employees were again subjected to measurement of BMI in 2020 after conducting various activities for 3 years which included awareness talks, diet programs, yoga, pedometer monitoring, encouraging physical activity with stringent follow up. The data was analyzed using SPSS version 23.

Results: The average BMI in 2017 was 25.48 and that in 2020 was 24.19. The difference between the two BMI was found to be significant at a 1% level of significance.

Conclusion: The study shows there is significant and positive impact of rigorous workplace wellness and health interventional activities on the body mass index of workers.

083

The risk to Occupational Health Physicians of complaint to The Medical Council of Ireland; and the use of digital audio recording of consultations as a risk management tool

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Introduction: Occupational Health Physicians OHPs are recognised to be at increased risk of complaints to the Irish Medical Council IMC. This survey aims to measure this risk and to study Digital Audio Recording DAR of consultations as a potential risk management tool.

Methodology: A survey was sent to (41) OHPs asking the number of IMC complaints received in the previous 5 years and their views on the acceptability of DAR to workers/OHPs. A survey was sent to (20) workers (38) managers and (11) insurance claim handlers seeking their views on DAR. Results were anonymous. Ethical approval was obtained from The Medwise Clinical Committee.

Results: The response rate for OHPs was 30/41(73%); 15/30 had received a complaint in the past 5 years, 3 in 2020, giving a risk of 10%pa. This compares to 2%pa for all other doctors. (Relative-risk 5 p>0.05). DAR is acceptable to only 31.03%(9) of OHPs, but 60%(18) agreed that DAR will assist in the early resolution of IMC complaints. The response rate for workers was 75%(15/20); all were acceptable to DAR. The response rate for managers was 28/38(73.7%); 78.57%(22) were acceptable to DAR. The response rate for insurance claim handlers was 81%(9/11); 77.78%(7) were acceptable to DAR.

Conclusions: OHP are 5 times more likely than other doctors in Ireland to receive a complaint to the IMC. DAR is acceptable to workers, employers and insurers. OHPs require reassurance to accept DAR. DAR has potential as a tool to manage the risk of IMC complaints against OHPs. DAR of OH consultations requires further study.

084

Occupational safety and health coverage and needs among countries: results of the ICOH survey

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Introduction: The aim of this study was to map the coverage of occupational safety and health (OSH) rules and provisions and their enforcement at a country level worldwide. Members' participation in the International Commission on Occupational Health (ICOH) activities was also investigated.

Materials and Methods: This was a cross-sectional study conducted through an online questionnaire administered in February-March 2018 to 1929 ICOH members. A synthetic coverage index was calculated and combined with country, gross domestic product (GDP) per capita and the human development index (HDI) to synthesize information about the coverage of OSH rules and provisions and their level of enforcement. Multiple correspondence analysis (MCA) was used to analyze the members' participation in ICOH activities.

Results: We received 384 valid questionnaires from 79 countries, with a 20% response rate. 90.0% declared that in their own country there is a set of rules and provisions regulating OSH in the workplace, and training procedures and tools to improve workers' awareness. There was no statistically significant association between country and GDP per capita and the synthetic coverage index, whilst controlling for HDI. The level of engagement in ICOH activities is higher in members aged 65 years or older, coming from high-income countries, having held a position within ICOH, with a higher level of education and a researcher position.

Conclusion: This study shows that, to address OSH issues and their impact both at global and country level, an integrated and multi-disciplinary approach is needed, including research, education, and training.

085

Workers with Obstructive Sleep Apnea Syndrome: Proposal of a Clinical-Anamnestic Tool for the Occupational Health Surveillance

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Introduction: The Obstructive Apnea Syndrome (OSA) is a chronic disease with recurrent episodes of obstruction of the upper airways during sleep. OSA is a significant cause of excessive daytime sleepiness, determines about 7% of all road accidents and exposes the workers to a double risk of work-related road accidents (WRAs). The aim of this study is to propose a clinical-anamnestic tool that can be used in the occupational health surveillance (OHS) for the workers at risk of WRAs and occupational accidents (OAs).

Methods: A cross-sectional study on 90 patients with OSA was conducted in an Italian hospital (Rome) (January-September 2021). All participants were asked to complete the proposed

questionnaire. The study protocol was included the polysomnography and medical examination too.

Results: Of the 90 patients, 27 were women (30%) and 63 men (70%) with average age 52 years (SD±11) and length of service 29.4 years (SD±12). The Apnea–Hypopnea Index (AHI) was calculated in all patients: 30 patients (34%) in moderate and 38 (43%) in severe AHI severity categories. The average value of the patients' body mass index was 29 (SD±7) and the neck circumference was 41 (SD±9). The results of our tool highlighted that: 41 subjects (49%) reported RA while driving a vehicle, 23 persons (26%) reported OAs, 10 patients (12%) WRAs and 18 (21%) reported at least one episode of falling asleep while driving.

Conclusion: Assuming the impact of the OSA on the occupational fitness of workers, particularly those at greatest risk of WRAs and OAs, the OSH programs play a strategic role in the preliminary diagnosing and for monitoring the syndrome.

086

Experiences, needs and expectations of welfare benefits recipients regarding the welfare to work services and their caseworker - preliminary results from a mixed methods study.

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Introduction: This study explored experiences, needs and expectations of welfare benefits recipients from a large municipality in the Netherlands, regarding their caseworker and the welfare to work (WTW) services. Preliminary results are presented, final and more extensive results will be published in a peer reviewed journal.

Material and Methods: We used quantitative data from a client satisfaction survey that was held between July and December 2019 and filled in by 213 people who had received WTW services (response rate 15,6%). General satisfaction rate and agreement with 31 statements were assessed. Four group interviews with a total of 15 people receiving WTW services were conducted using a semi-structured interview guide. Verbatim transcripts were analysed using the principles of thematic analysis.

Results: The survey showed that the majority of clients is reasonably satisfied with the WTW services. The qualitative data showed positive and negative experiences of clients. Most clients described the relationship with their caseworker as hierarchic and expressed the need for a collaborative and trusting relationship. Clients want to work together with their caseworker and do not want to be pushed or forced to accept any job.

Conclusions: Our findings illustrate there is room for improvement in the WTW services. It is likely that WTW services that match the needs and expectations of welfare benefits recipients are more effective in terms of clients finding and keeping a job and thus no longer being dependent on welfare benefits.

087

A survey of communication in face-to-face versus telemedicine occupational medicine consultations

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Introduction; We sought to assess patient's experiences of their doctor's communication skills in an occupational medicine consultation comparing responses from those who had undertaken a telemedicine consultation with those who had a traditional face-to-face consultation.

Materials and Methods; We performed a retrospective, multi-site study to assess a patient's perception of their doctor's communication skills utilising a questionnaire sent out after the consultation had taken place. Ethical approval was obtained from our local institution. We chose a particular week and invited the first 3 face-to-face and first 3 telemedicine consultations for that week from each doctor at each of our occupational medicine practices to answer an anonymous online questionnaire which was based on a questionnaire devised by the Irish Medical Council (IMC) to assess an individual doctor's communication skills across 11 parameters. Responses were collected during the 3rd COVID-19 wave in Ireland. Responses pertaining to different communication domains were grouped as being poor-fair (negative) or good-excellent (positive). Results; 47/158 replies were received giving a crude response rate of 29.7%. The rates of positive (good-excellent) assessment of communication across 11 domains for each consultation type are as follows; - Face-to-Face: 81% mean, 76% median; range 71-93%. - Telephone; 82% mean, 83% median; range 75-89%. - Video; 77% mean, 73% median; range 67-93%.

Conclusions; Patient's assessment of a doctor's communication skills in an occupational medicine consultation is similar across both face-to-face and telemedicine consultations

088

The cost of work left undone - differences between private companies and public organizations

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Introduction: The work left undone (WUD) costs include direct costs of sickness absence, occupational accident and - disease insurance, work disability pension insurance, and occupational health care. We examined WUD costs among Finnish employers in 2017–2018 and compared the differences between public municipal organizations and private companies.

Material: We used public sectors' pension insurance company's (Keva) data and data collected by a private occupational health care company (Terveystalo) for 2017–2018. Our data include a total of 400,000 person-years in municipal organizations and 50,000 person-years in companies. We calculated WUD costs relative to the total wage sum. We assessed the statistical significance of the differences with a t-test.

Results: The WUD costs relative to the total wage sum were about 7.1% in municipal organizations and 6.4 % in companies. The most significant absolute difference was in sickness absence costs. They were about 27 % higher in public organizations (5.2 % vs 4.1 % of total wage sum). Another statistically significant difference was in occupational health care costs, which were 2.7 times as high in companies as in public organizations (0.3 % vs 0.8 % of the total wage sum). Conclusions: The WUD costs were higher in Finnish municipal organizations than in private companies. Municipalities' higher sickness absence mainly explains the difference, and companies' higher occupational health costs narrow the gap. Efforts must be made to monitor and control the WUD costs so that employees can maintain their workability throughout their careers in both the municipal and private sectors.

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Reincidence Epidemiological Analysis for Positive Covid-19 Cases in Mexico

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The pandemic caused by the SARS-CoV2 virus (COVID-19) represents an increase in the morbidity and mortality rate of the Mexican population, especially in people with health risk factors and associated medical history that despite already had COVID-19, present a second positive test and simultaneously a clinical relapse of the disease.

OBJECTIVES: The epidemiological behavior of the pandemic requires creating challenges and implementing strategies for the prevention and mitigation of contagion risks in the occupationally productive population, prevention and mitigation of contagion is essential to avoid clinical cases of infection and reinfection of the disease in the working population.

METHODOLOGY: Clinical and epidemiological follow-up of positive clinical cases of COVID-19 reinfection (period of more than 90 days) detected by monitoring PCR RT tests.

RESULTS: From a total of (1626 patients) with a positive RT PCR laboratory result, the percentage of clinical relapse and a new positive laboratory test was 1.41% of the population in follow-up. Among the positive cases with a second laboratory test, 60.86% correspond to the male sex, an additional analysis is presented by age and time of reinfection.

DISCUSSION: The analysis of this research finds an association of reinfection with patients with a history of smoking and bronchial asthma. Our study identifies reinfection by running two RT PCR tests separated by a period of more than 90 days from the initial infection resolution.

CONCLUSIONS: The reinfection of COVID 19 occurred in employees after a first period of the disease is possible

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Role of the occupational medicine consultation in the screening of non-communicable diseases

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Introduction: Non-communicable diseases (NCDs), including cardiovascular diseases, cancer, diabetes and chronic respiratory diseases, are the leading cause of death and disability worldwide. Periodic medical monitoring of employees is of paramount importance in terms of early detection of these pathologies. Methods: This is a descriptive, retrospective study carried out in the occupational medicine department of the Farhat Hached Academic Hospital, during a two-year-period. It included all the employees of our academic hospital, the employees of rectorate and the employees of the national office of university working in Sousse region and consulting as part of a hiring visit or periodic visit.

Results: The study included, 2012 employees with an average age of 42 ± 10.3 years. Active smoking has been reported in 27% of cases. Overweight and obesity were noted in 68.6% and 29.7% of cases respectively. The pathologies identified during the periodic visits were dyslipidemia (13%), diabetes (9.7%) and hypertension (6.7%). The action to be taken was to advise hygienic and dietetic rules (40.7%) and recourse to specialist advice (29.8%). The independent factors associated with NCDs, at the end of the multivariate analysis, were age greater than 45 years ($p < 0.002$; OR 95% CI: 10.5 [2.4-45.8]) and low socioeconomic level ($p < 0.001$; OR 95% CI: 2.9 [2.1-4]). Male gender was a protective factor ($p < 0.001$ OR 95% CI: 0.5 [0.4-0.7]). Conclusion: The consequences of NCDs are often dreadful, justifying early detection and treatment, especially during periodic visits, and this within the framework of the societal role of occupational medic

06. EMERGENCY PREPAREDNESS AND RESPONSE IN OCCUPATIONAL HEALTH

091

COVID-19 and its impact on Irish workplaces – OSH professionals experience and observations of preparation and adaptation

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Introduction: An investigation of Irish workplace adaptation to COVID-19 was conducted to assess impact to workers, their organisations and to develop new OSH adaptation mechanisms for future health emergencies.

Materials and Methods: As part of the study, OSH professionals (n=60), each representing their workplace, took part in a series of semi-structured online focus groups. Each focus group incorporated twenty quantitative questions (covering four themes: organisational preparedness; organisational impacts; worker impacts; and the future of OSH) that were answered anonymously via a poll function. Results: 59 participants completed the questions. 58% of workplaces began pandemic preparations prior to COVID-19 emerging in Ireland. 66% of workplaces remained open while 27% were partially closed. 34% of workplaces had more than half their workforce working from home (5% pre-pandemic). 37% of workplaces had a working from home policy with 54% of workplaces having risk assessments for infectious diseases in place prior to the pandemic. 41% of workplaces had identified a viral pandemic scenario as part

of its emergency planning prior to COVID-19. OSH professionals indicated that the majority (63%) of their colleagues understood the control measures instigated as a response to COVID-19 with a greater majority (90%) more willing to accept future workplace changes if they know it is to keep them safe and healthy.

Conclusion: Irish workplaces adapted well to the changing OSH landscape that emerged in response to COVID-19. Irish workplaces are now more likely to be able to adapt and respond well to future public health emergencies.

092

A comparative empirical analysis of low-cost decontamination methods for filtering facepiece respirators to address stock shortages during the COVID-19 Pandemic

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Introduction: Filtering facepiece respirators (FFRs) reuse practices to address shortages during the COVID-19 pandemic received attention; however, evidence of SARS-CoV-2 inactivation on respirators is limited. Quality FFRs for use during outbreaks remains a priority to protect frontline and essential workers. This study aimed to compare the effectiveness of three relatively inexpensive methods to inactivate SARS-CoV-2 and ensuring respirator performance.

Methods: Seven FFRs inoculated with SARS-CoV-2 were decontaminated with moist heat incubation (MHI), vapourised hydrogen peroxide (VHP), and ultraviolet germicidal irradiation (UVGI). *G.stearothermophilus* bioindicator was used as a control. FFR integrity, efficiency and user fit were assessed on 27 participants for 30 decontamination cycles. Ethical clearance was acquired from the University of the Witwatersrand (M200684).

Results: Most participants failed fit testing for KN95 irrespective of method used except for two individuals. Participants completed more cycles after UVGI compared to VHP decontamination. Only KN95 failed filtration post-MHI, VHP and UVGI treatment. A ≥ 3 log reduction of SARS-CoV-2 was achieved using UVGI for worn FFRs (Greenline 5200 FFP2 and Makrite 9500 N95 using MHI; 3M 8810SSA FFP2 using VHP; Greenline 5200 FFP2). UVGI and VHP methods achieved a 6 log reduction of *G.stearothermophilus*.

Conclusion: Some FFRs could withstand 30 cycles of UVGI and VHP processing without diminishing filtration efficiency or fit. SARS-CoV-2 log reduction varied across the methods and FFRs models emphasizing the importance of validation before reuse during a crisis.

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Occupational Medicine in Pandemic Management

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INTRODUCTION: Vaccination is considered to be the most effective measure in pandemic management and response. In order to be effective, administration of safe vaccine by well-trained health professionals is a priority. During COVID-19 pandemic, a Mobile Occupational Vaccination Team of 8 medical doctors and 4 administrative personnel working in Croatian Institute of Public Health, Division for Occupational Health, organized workplace vaccinations for workers in major Croatian companies.

MATERIAL AND METHODS: Data of vaccines administered by Mobile Occupational Vaccination Team during May 17, 2021 – June 16, 2021, were examined and compared with a total number of vaccines administered in overall Croatian population in the same period.

RESULTS AND CONCLUSIONS: During 1-month period a total of 825 070 COVID-19 vaccine doses were administered in Croatia, while Mobile Occupational Vaccination Team administered 12 049 doses or 1,46 % of all COVID-19 vaccines in the country. A daily average of vaccine doses administered by the Team was 402, or 548 if only working days were included. Having in mind that the Team consisted of only 8 doctors who administered vaccines to the working population, it is clear that doctors in the field of Occupational Medicine, with a will to take action, can be highly effective and have a crucial role in pandemic management and response, which should be considered in future pandemic preparedness planning.

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Health Emergency Management in Public Administration: A Reproducible Model to Ensure Environmental Sustainability and Quality of the Spaces for Workers

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Introduction: During the Covid19 pandemic, standard criteria were defined for the construction of new spaces to be used as vaccination centers, in relation to the goals of the UN 2030 agenda on environmental sustainability and quality of the spaces, for health and for the responsible consumption of resources during the emergency. The aim of this case study is to achieve a reproducible model based on the criteria of economic sustainability of the public administration, potentially expandable in other sectors as cooperation and development.

Materials and Methods: A Rapid Response Team, trained with the WHO guidelines, was established for the definition of the essential requirements of the new vaccination centers, following a specific

checklist set up from a SWOT Analysis. The project was calibrated in all phases of the vaccination cycle process, through functional and metric relationships. The new centers have also been designed to ensure the social inclusion and privacy of users.

Result: The centers were set up in about 20 days. The checklist and data collection have allowed to optimize the process and the efficiency of the linear conformation, guaranteeing an increase of 15% of space for each phase of the vaccination cycle according to the length of stay of workers. All phases were fully digitized with a 100% accuracy of data management. In 9 months, the savings of paper filing, compared to CO2 emissions, were 40.19Kt.

Conclusions: Our model can be easily reproduced in other contexts, ensuring efficiency, exploiting new digital technologies and the quality of education.

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Periodic and Systematic review of Emergency Medical response in Indian Oil

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Introduction: IndianOil is 24/7 industry dealing with highly inflammable petroleum products. Safe and healthy working conditions for employees, with an effective first aid & emergency medical services are always a priority. To further strengthen and streamline these services, Indian Oil has taken a series of proactive initiatives, across the Corporation.

Materials and methods: An exhaustive inspection checklist was finalized for the audit of IndianOil Locations. As per the checklist, a dedicated team of HSE officers inspected areas of concern for emergency preparedness and response like first aid center, dedicated communication facilities, prominent display of siren protocol for accident/disaster, drug register with daily check of emergency drugs, resuscitation equipment, record of illnesses and injuries, record of 'at-risk' hazardous materials at the worksite, material safety data sheets, first aid boxes, ambulance van, disaster management plan, functional organogram in case of disaster situation, triage guidelines and first Aid training in wound management, burns, BLS, ACLS & CPR imparted to employees.

Result: Periodic and Systematic review of FA & EMS helped IndianOil in strengthening emergency response in the workplaces, ensuring safe and healthy working conditions for employees, improved emergency care in workplaces and reduced the gap between knowledge and action.

Discussion: Implementation of proactive First Aid & EMS management framework in the organization helped us to align our OHS objectives with business objectives of the organization, thereby minimizing & managing the incidents with a proactive approach.

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Digital simulation exercises to improve response management to infectious disease outbreaks in the maritime environment

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Introduction: Since the onset of the COVID-19 pandemic, the occurrence of mass incidents of infectious diseases has become more likely. Preparedness for and management of such outbreaks in the maritime setting onboard ships and in ship-shore interactions require profound knowledge of technical and organizational issues and communicational skills. Simulation and field exercises play a crucial role to internalize these capabilities among relevant stakeholders.

Material and Methods: Exercises were developed to train communication and collaboration among stakeholders within an outbreak. Coordinators and active players were connected on a digital platform that offered video conferences, an internal email-client, and a chat forum. Evaluators and observers followed the exercises simultaneously via non-listed youtube-channels. In hot- and cold digital debriefing sessions participants provided feedback including information on occupational stress level and coping during exercises.

Results: Three simulation exercises and one field drill were developed, performed and evaluated between June and October 2021 which targeted to train response management to mass incidents of different infectious diseases on large passenger ships. This format allowed coordinators of the exercises to initiate a steady enhancement of exercise settings (e.g. scenario and platform development) and the active participants to reflect and improve their performance and occupational processes during exercises.

Conclusions: Digital simulation exercises are an adequate format to exercise the response management of stakeholders to mass incidents in the maritime setting.

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Spreading BLS-AED skills in the schools involving teachers in the students training

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Introduction: Involving students in life-saving teaching programmes increases the percentage of the population able to respond to emergencies. However a different critical issue may also work against the widespread diffusion: teachers lacking awareness of the importance of life-saving manoeuvres, low finances and time availability. Focus on teachers training could ensure the continuity of learning paths and greater school autonomy. To this end, a BLS /AED teaching model was experimented in a lower secondary school (age 11-14) of central Italy, starting from the teachers and using a chain process.

Methods: A total of 117 students were trained and then assessed using an hands-on skill test with a QCPR manikin. The results obtained by the group of students trained by the teachers were compared to those of the group trained by the INAIL instructors. A statistical analysis was carried out. To detect the motivation to teach their students, a short focus group was organised including only the trainer teachers.

Results: The differences between the two trained groups were minimal and decreased over time (6 months apart). The training had a positive effect on the awareness and motivation of the

teachers that have considered this programme suitable and applicable to school organisation.

Conclusion: Chain teaching answers to the need to reach as many students as possible and sustain skills in the long term because it is less expensive in the long term, less time-consuming, simpler and more flexible.

07. EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

098

Migraine prevalence in a Brazilian company and its impact on productivity

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Introduction: To determine the prevalence of episodic and chronic migraine and their impact on productivity indicators, we did a cross-sectional study.

Materials and Methods: Service-based company from Brasília (Brazil), with a total of 831 employees were analyzed. After the initial screening, employees were identified with migraine and answered Brazilian versions of the following questionnaires: Migraine Disability Assessment (MIDAS), Work Productivity and Activity Impairment (WPAI-Migraine), and Beck Depression Inventory (BDI). Costs were calculated in Brazilian real (BRL) and converted to US dollar (USD), considering the Brazilian Central Bank's average of 3.990BRL per USD (exchange rate of data collection period).

Results and Conclusions: We observed a migraine prevalence of 5.9% (48 employees). Twenty-five patients (53%) reported pain in all months of the year. Migraine-related absenteeism monthly cost ranged from 55.01USD (220.00BRL) to 119.03USD (476.00BRL) per worker. Depression has a strong correlation with chronic migraine ($p = 0.024$). Regarding monthly loss due to presenteeism, estimates ranged from 119.03USD (476.00BRL) to 150.04USD (600.00BRL) per worker. Migraine prevalence was estimated as 5.9% and showed a relevant impact on health and well-being, in addition to a remarkable economic impact. Data demonstrates the importance of this condition which has a simple diagnosis framework and several treatments available.

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Creating awareness and screening Mumbai Police for Common cancers and other Non-Communicable Diseases (NCDs)

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Introduction: Lifestyle and work-related behavior of police particularly increase their risks towards several NCDs including cancers. An awareness and screening programme for NCDs and common cancers was initiated among Mumbai Police and their family

members in December 2019. The ultimate goal of the programme was to formulate demonstrable, sustainable and replicable model on prevention, control and early detection of NCDs among Police personnel.

Material and Methods: This cross-sectional interventional study was initiated among Mumbai Police after obtaining Institutional Ethics Committee approval in December 2019. Temporarily clinics were set up at various police stations and eligible participants were enrolled after obtaining informed consent. This was followed by risk factor assessment, health education programme, screening for common cancers (breast, uterine cervix and oral cavity) and NCDs (obesity, hypertension and diabetes). Screen positives were referred for further investigations and management.

Results: 16,608 police personnel have been covered till end of May 2021. 1543 clinical oral pre-cancers, 28 cervical pre-cancers, 1 breast, 2 uterine cervix and 6 oral cavity cancers have been diagnosed. Totally, (old and new cases inclusive) the prevalence of diabetes, hypertension and obesity was 20.3%, 36.4% and 50.7% respectively.

Conclusions: High prevalence of NCDs among police warrants urgent and periodic implementation of health education on life style modification and screening and institution of treatment in order to reduce morbidity and mortality among this special occupational health group.

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Epidemiological Investigation for Outbreak of Food Poisoning Among the Construction Workers

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Background: Food-borne illness due to food poisoning sometime occur at workplace. An epidemiological investigation was performed to find the cause and transmission route of a diarrhea outbreak occurred among workers in one construction site in a remote area in Indonesia. this study showed how important epidemiology for immediate action

Methods: In September, 2015, a diarrhea outbreak occurred among construction workers in a construction company which provide service to an oil and gas company. A questionnaire survey was conducted among 62 workers. The case was defined as a worker who consumed the meal from the company meal service and who had diarrhea more than one time. The relative risk (RR) of diarrhea was computed for each type of the meal provided. The catering providers were also inspected.

Results: The incidence of diarrhea among the employees was 56%. Among the nine types of meals served in that particular time, chicken was the most likely source of contaminant (RR = 3.14). During catering inspection, it was found that although the chicken was first processed until half well done in boiling water was exposed to room temperature for more than 4 hours before the next cooking process. Based on the data, we predicted that the exposure date was lunch on the same day which in accordance to the latency period of suspected contaminants.

Conclusions: Epidemiological assessment in combination with field inspection was able to determine the source of contaminant in a diarrhea outbreak at a workplace. Skill to investigate food poisoning is valuable for health care profession especially those who work in a limited resource area.

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Nitrogen Oxides and Diesel Exhaust in the Underground Salt and Potash Mining – A clinical epidemiological Health Study

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Introduction: In 2016/17, occupational exposure limits for nitrogen oxides (NO₂, NO) were significantly reduced (0.5 ppm, 2.0 ppm) by German authorities. For diesel particulate matter (DPM) a new limit was set (50 µg/m³). Because the new requirements could not be met immediately in underground mining, a German mining company developed a 5-year transitional action plan to reduce exposures. To investigate potential adverse effects on workers' health, a cross-sectional study was performed among salt and potash underground workers. Above-ground workers served as reference. The ethical committee of the Ruhr University Bochum approved the study. **Material and Methods:** Exposure measurements were collected for each participant during one shift, and associations between exposure levels and post- versus pre-shift measurements of biomarkers of cardiovascular, inflammatory, immune, and respiratory effects were assessed.

Results: Underground exposure levels exceeded the new limits for 19% (NO₂), 33% (NO) and 56% (DPM) of miners, but no meaningful associations with exposure levels were observed for biomarkers. Most biomarker measurements fell within the respective reference ranges, and the proportions of values outside the reference ranges didn't differ significantly between workers with exposures above versus below the new limits.

Conclusion: Among salt and potash underground workers, nitrogen oxide and DPM exposure levels exceeding the new exposure limits in Germany were not associated with clinically relevant changes of indicators of cardiovascular, inflammatory, immune, or respiratory effects.

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Occupational and work-related skin and respiratory diseases attributed to nickel, chromium and cobalt in the UK: findings from The Health and Occupational Research network 1996-2019

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Introduction: Occupational exposure to metals such as nickel, chromium and cobalt can be associated with skin and respiratory

problems. This study aimed to investigate the medically reported trends in the incidence of work-related skin and respiratory disorders attributed to nickel, chromium and cobalt in the UK. **Methods:** Incidence and trends in incidence of cases of occupational skin and respiratory diseases caused by nickel, chromium or cobalt between 1996 and 2019 (inclusive) reported to the EPIDERM and SWORD surveillance schemes were investigated.

Results: Of cases reported to EPIDERM and SWORD during the study period, 12% (2382 cases) of skin diseases and 1% (173 cases) of respiratory problems were attributed to nickel, chromium or cobalt. The predominant diagnoses were contact dermatitis and asthma. The highest annual incidence rate of skin diseases was observed in women (2.61/100,000 person employed), while the highest annual incidence rate of respiratory diseases was seen in men (0.14/100,000 person employed). A statistically significant decrease in the incidence of occupational skin diseases attributed to metals (1996-2019) was observed for all occupations (annual average change of -6.8% [95% CI -7.7, -5.9]), with much of the decrease occurring in 1996-2007.

Conclusions: Over 24 years, a statistically significant decline in the incidence of metal-related occupational skin diseases was observed in the UK. This could be attributed to improvements in working conditions which resulted in reduced metal exposure, but could also be due to closure of industries that might have generated case returns.

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Reliability and validity study on work safety culture questionnaire (WSCQ) among government office workers using Information Motivation and Behavior (IMB) Model

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Introduction: The work safety culture questionnaire (WSCQ) was developed to assess the level of information, motivation and behavioral change (IMB) on work safety culture among government office workers in Ikeja Lagos, South-West, Nigeria. The primary objective of this study is to determine the validity and reliability on the newly developed work safety culture questionnaire (WSCQ) using the IMB Model.

Methods: The questionnaire was self-administered to respondents two times, with an interval of ten days in between the sessions in order to evaluate the accuracy of the original findings with a retest. The study involved 44 participants.

Results: The Cronbach Alpha coefficient showed a considerable consistency of the items for each construct in the second pilot study. Information construct (Cronbach's $\alpha = 0.929$ and minimum Corrected Item-Total correlation (CITC)=0.399). Motivation construct (Cronbach's $\alpha = 0.932$ and minimum Corrected Item-Total correlation (CITC)= 0.450). Behavior change construct (Cronbach's $\alpha = 0.812$ and minimum Corrected Item-Total correlation (CITC)= 0.401). In the test-retest reliability Cohen's Kappa coefficients for information construct for all items was almost 70% between (kappa k = 0.689–1.000, $p < 0.001$). Intraclass correlation coefficient (ICC) for motivation construct for all items was 90% between (ICC = 0.810–1.000, $p < 0.001$) and (kappa k = 0.944–1.000, $p < 0.001$) for behavioral change construct 71% for all items.

Conclusion: This research, introduced the work safety culture questionnaire (WSCQ) using the IMB Model among government office workers as the first formal validation of the WSCQ.

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Epidemiology of fine particles (PM 2.5) in Thailand: Situation in the year 2020

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Introduction: Fine particles (pm 2.5) is a significant air pollution problem in Thailand, which affects public health. But no one has studied the epidemiology of fine particles (pm2.5) in Thailand, which can be used as a self-defense and warning guide for the general population. This study aims to investigate the epidemiology of fine particles (pm 2.5) in Thailand by study situation in the year 2020.

Method: This study used descriptive research. Secondary data were collected about ambient pm2.5 levels from the pollution control department (Air4thai website) in January to December 2020, and collected from 12 Thailand air quality station of pollution control department all over in Thailand. Descriptive statistics analyzed data.

Results: There were 105,896 data points obtained from 12 air quality stations in Thailand in January to December 2020. The average of ambient pm2.5 level in this period was 23.67 ± 15.56 (Median 17.32) $\mu\text{g}/\text{m}^3$. The month of the year that has the highest pm 2.5 level is December and January. The month of the year that has the lowest pm 2.5 level is April to May. The highest average ambient pm2.5 level air quality station is Dindaeng(Bangkok) air quality station. The lowest average ambient pm2.5 level air quality station is Narathiwat air quality station. The direction of pm2.5 level is from Narathiwat in July to MaeSai in March.

Conclusion: This study is project about the epidemiology of pm2.5, which is useful to make information to people in this period to protect themselves, and policy maker will use this data for make warning guide to people.

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Occupational Heat Stress, Heavy Workload and Adverse Renal Health Outcomes—A Cross-Sectional Study Among Stone Quarry Workers in South India

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Introduction: Direct sun exposures and physical exertion are crucial risk factors for Heat-Related Illnesses(HRI), and dehydration leading to Acute Kidney Injury.

Aim: The study determines the HRI and adverse renal health outcomes among stone quarry workers exposed to heat stress and heavy workload.

Materials and Methods: A two-year cross-sectional study was conducted with 211 workers in 5-stone quarries across South India using mixed methods. Wet Bulb Globe Temperature(WBGT) exposures and physiological heat strain indicators were monitored throughout the work shift. Post-shift serum creatinine was

collected to calculate the estimated Glomerular Filtration Rate(eGFR).

Results: The WBGT exposure ranged between 23.0-34.1°C. 80% of workers with heavy workloads experienced HRIs that were significantly associated with the heat exposures (Adjusted Odds Ratio:2.0; 95%CI: 1.1-3.7). The heat strain indicators were above the normal limits for 63.5% of workers, which correlated well with the dehydration symptoms(30%). The prevalence of low eGFR was 22% for $<90\text{ml}/\text{min}/1.73\text{m}^2$ and 10% for $<80\text{ml}/\text{min}/1.73\text{m}^2$ with the odds of risk of low eGFR being 3.9 times significantly higher (95%CI: 1.2-12.7) for workers exposed to WBGTs higher than the Threshold Limit Value and heavy workload.

Conclusion: The results suggest that the risk of low eGFR is higher for stone quarry workers and that in-depth seasonal cohort studies are warranted to further strengthen the evidence that may help formulate the protective policies to avert renal health risks for a few million workers in tropical countries.

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Occupational heat exposures, physiological responses and renal health outcomes among agricultural workers in South India

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Introduction: Strenuous work and hot working environments are known risk factors for adverse renal health without adequate interventions for outdoor workers, like in agriculture.

Aim: To investigate the renal health implication of workers' exposures to heat stress and physical exertion in agriculture.

Methodology: We conducted a cross-sectional survey with 470 agriculture workers between 2017-2019. We collected Wet Bulb Globe Temperatures(WBGT°C), pre-and post-shift Core Body Temperature(CBT), Urine Specific Gravity(USG), post-shift Sweat rate(SwR), and serum creatinine for calculating estimated Glomerular Filtration Rate (eGFR), in both hot and cooler seasons. Results: Workers were exposed to an average WBGT of $28.4 \pm 2.5^\circ\text{C}$ with more than 63% of measurements above the ACGIH-Threshold Limit Value(TLV). About 90% workers reported heat-strain symptoms and the risk was significantly higher among the heat-exposed workers (Adjusted Odds Ratio: 2.5; 95%CI:1.20-4.6). About 20% workers had $\text{CBT}>1^\circ\text{C}$, 7% had $\text{SwR}>1\text{lit}/\text{hr}$, and 33% had $\text{USG}>1.020$, which was significantly associated with WBGT exposures. Dehydration was significantly associated with the type of work performed by the workers. With an 11% prevalence of reduced eGFR($<80\text{ mL}/\text{min}/1.73\text{m}^2$), the risk was significantly higher among workers with above TLV-WBGT exposures and heavy workload(AOR: 2.51; 95%CI: 1.002-6.32).

Conclusion: The preliminary results warrant further epidemiological investigations with stratification for various personal and exposure factors that determine the disease etiology to obtain conclusive evidence of heat and workload impacts on agricultural workers.

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The impact of the COVID-19 pandemic on occupational morbidity in Russia

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Introduction: The COVID-19 pandemic has affected the levels and structure of morbidity worldwide. The indicators of occupational morbidity in Russia are no exception.

Material and Methods: In order to identify the features of the impact of the pandemic on occupational pathology in the country, an analysis of the statistical data of the annual State reports "On the state of sanitary and epidemiological well-being of the population" has been carried out.

Results and Conclusions: In 2020 the level of occupational morbidity in the Russia was 0.78 per 10 thousand employees, which is significantly less than in the previous years. In 2011-2019 this indicator was 1.03-1.92. This is due to the fact that the COVID-19 pandemic required the involvement of reserves and the reorientation of medical services, including professional pathology centers, to combat mass cases of infection. Under these conditions, the expert work of the centers of professional pathology was suspended. Numerous cases of coronavirus infection among medical workers, including those that ended in fatal outcomes, required an examination of the connection of the facts of infection with working conditions. Occupational diseases from the influence of a biological factor for the first time took the second place in the structure of occupational pathology, reaching 20.2% and were mainly represented by cases of COVID-19 (92.6%). In 2018-2019 the share of occupational diseases from the impact of a biological factor varied from 1.73 to 1.99%. The analysis of the occupational incidence of COVID-19 in various regions of the country showed that the features of the industrial

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Study to Assess the Impacts of Heat Stress on Productivity Losses in India

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Introduction: Heat-induced Productivity Loss (PL) is a significant economic cost, an undeniable consequence of Climate Change (CC). Sparse data on the unequal and unjust adverse impact of this climate-driven economic loss across nations, regions, and vulnerable populations demands evidence-based case studies better to understand climate impacts at the regional and local levels.

Aim/Materials and Methods: We aimed to quantify the risk of heat-induced health, PL, and wage loss (WL) to identify vulnerable occupations among the 17-sectors in 20 districts across South India. We collected data on heat stress, Heat-Related Illnesses (HRIs), wage loss, and PL from 2900 workers between 2013-2019 using a validated questionnaire. Furthermore, we estimated national economic loss from heat-related PL for three sectors for 2015 and 2017,

including direct cost and the corresponding indirect cost due to sectoral interdependence using an input-output (IO) model.

Results: Workers reported being impacted by 1) HRIs (84%), 2) PL (16%), and 3) WL (8%) and HRIs and PL were 1.9 times significantly higher during summer (95% CI:1.5-2.3) and among workers with heavy workloads (95% CI:1.6-2.1). Our estimates of the direct cost due to PL for the nation were an average of 1763 & 360 million \$/annum for outdoor and indoor sectors, respectively. The indirect cost amounts to about 280 for outdoor & 1380 million \$/annum for indoor sectors.

Conclusion: The humungous climate cost calls for urgent adaptation & prevention strategies and CC mitigation actions to improve regional economics and protect individual losses for a few million workers toiling in heat.

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Post COVID Syndrome in patients with COVID -19 : A Cross-Sectional study

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Background: Long COVID is defined as the persistence of symptoms beyond 1 to 3 months after SARS-CoV-2 infection. To better understand the long-term course and etiology of symptoms we analysed data of COVID-19 patients post discharge prospectively.

Methods: A home care cell monitored COVID-19 patients post discharge. A paramedical staff interviewed the patient using the pretested questionnaire and refer the patient to doctor if required. The doctor spoke with these select cases and offered them treatment, counselling, referral to consultant/ hospital as per the need.

Results: We followed up with 4354 (2724 employees and 1630 dependents) patients for 3 months. 592 (13%) patients were hospitalized for COVID and others were under home isolation. 4108 (94%) patients did not have any symptoms post COVID and 239 (6%) were known to have either one or more post COVID symptoms. For 153 (64%) patients symptoms lasted for more than a month post discharge and 86 (36%) patients were symptomatic for more than 2 months post discharge. The most common symptoms identified were fatigue and weakness (69%), dry cough (39%) body ache (31%), fever (23%) shortness of breath (15%) etc.

Interpretation: Long COVID symptoms can persist for 1- 3 months after recovery, this may lead to long absenteeism and may reduce productivity and quality of life significantly. Post COVID syndrome can also have an adverse effect on the mental health of an individual. Post COVID complications can be severe leading to hospitalization and disability. The continued assessment of patients with PCS is an important and effective step to reduce complications.

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Occupational health and safety outcomes among municipal solid waste collectors in Grenada

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Introduction: The collection of municipal waste by workers who work from behind garbage trucks has been found to be associated with several adverse health and safety outcomes. A comprehensive review of the occupational hazards experienced by waste collectors in Grenada has never been done; neither has their health status been reviewed to determine the prevalence of various diseases and disorders.

Material and Methods: A survey was conducted on all municipal solid waste collectors in Grenada, as well as the managers who manage them, to determine the main occupational hazards they are exposed to and their health status.

Results and Conclusions: Waste collectors are exposed to occupational hazards that are far more numerous and inimical to health compared to the managers. Further there is non-congruence between the perception of managers and waste collectors on what are the hazards and risks associated with handling municipal waste. The most reported health problems by waste collectors were musculoskeletal problems (50.6%), accidents and injuries (29.9%), and skin problems (20.8%). Only 57.9% of waste collectors reported having access to appropriate personal protective equipment when needed and most do not know whether their company has a written health and safety policy. These findings indicate that there are a range of occupational hazards waste collectors in Grenada are exposed to which are most likely related to the high prevalence of musculoskeletal and other organ system dysfunction observed. There are multiple intervention points that can be pursued to improve the working conditions for waste collectors in Grenada.

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Occupational factors and breast cancer incidence and stage at diagnosis among French-speaking Swiss women (1990-2014)

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Introduction Although health system utilization and screening intensity may influence breast cancer (BC) incidence, its burden is high and the impact of occupational factors on this disease is of increasing concern. We aimed to assess the effect of some occupational factors on BC incidence and stage at diagnosis in French-speaking Switzerland.

Material and Methods Swiss female residents from the Swiss National Cohort with available occupation were matched with data from four Swiss cancer registries over the period 1990-2014. We calculated BC Standardized Incidence Ratios (SIRs) by occupation and analyzed the association between occupational factors and BC incidence using negative binomial regression, and on the stage at diagnosis using multinomial logistic regression.

Results The cohort comprised 381,873 women and 8,818 incident BC cases. We observed the highest SIRs in Physicists, chemists and related professionals (2.10, 95%-IC: 1.22-3.36), Legal professionals (1.87, 95%-IC: 1.42-2.48), and College, university, and higher education teaching professionals (1.61, 95%-IC: 1.07-2.33). When adjusted for age, calendar period, canton, civil status and nationality, we identified occupation, skill level, and socio-professional category as significantly associated with BC incidence. In addition, women with the lowest skill level were more likely to

be diagnosed at the late stage (3-4) than those with the highest level, while we identified the opposite for women diagnosed at stage 1.

Conclusions These findings call for further research on occupations with a high incidence and on the differences in stage at diagnosis by skill level.

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Systematic scoping review of occupation health injuries and illnesses among Indigenous workers in Australia, New Zealand, United States of America and Canada

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Introduction: Despite the knowledge of injury effecting Indigenous populations worldwide, and the greatest disparity occurring in working age populations, little is known regarding the disparity between Indigenous and non-Indigenous workplace injuries.

Methods: A Systematic scoping review was undertaken using the methodological framework initially proposed by Arksey and O'Malley. Country, Indigenous participants, study type, exposure, adverse health outcome, occupation and industry were identified for each paper. Study quality was assessed using the relevant Joanna Briggs Institute or Newcastle Ottawa Scale checklist depending on study design, which enabled assessment of included studies in relation to risk of bias, rigor, and transparency.

Results: 1272 research papers were identified: 51 citations were included in this scoping review. The United States of America produced the most literature (n=32, 62.7%) and approximately half (n=25, 49%) were published after 2010. Physical trauma was the most common occupational exposure (n=23, 45.1%) followed by all occupational exposures (n=11, 21.6%) and uranium and other mining exposures (n=10, 19.6%). Generally, the quality of the full texts reviewed was poor and the rigor of epidemiological methods varied substantially.

Conclusions: Given the paucity of research an immediate requirement is ensuring Indigenous status is reported on occupational health surveillance and workers compensation records with encouragement of reporting by health professionals and separate analysis in surveillance reporting to develop adequate baseline data for targeted future interventions.

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Investigating exposure of Belgian employees to hazardous chemicals through sentinel surveillance

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Introduction: There is a need for non-expert-generated dependable data about occupational exposure to hazardous chemicals to develop effective prevention strategies for occupational diseases.

Methods: In the PROBE study (Hazardous chemical Products Register for Occupational use in Belgium), a group of 47 occupational physicians was recruited as a sentinel surveillance network. During periodic health assessment, a web-based survey was conducted in a random sample of employees (n=666), assessing their past week exposure to a selection of 22 hazardous chemicals.

Results: 47% of the employees were exposed to at least one chemical during the preceding working week. The most frequently reported exposures were to diesel exhaust (n=91; 14%), welding fumes (n=77; 12%), and toluene (n=67; 10%). The exposed employees were mostly older men (≥ 50 years), with the majority of them being exposed during production and manufacturing. In smaller companies (21–50 employees) employees reported higher exposure rates. For diesel exhaust, wood dust, and crystalline silica, 54%, 32%, and 20% of the exposed employees, respectively, did not make use of collective or personal protective equipment.

Conclusion: Sentinel surveillance is a feasible method for obtaining high-quality data on the exposure of Belgian employees to hazardous chemicals. In the next phase of the study, the sentinel surveillance approach will be used on a European level. We are establishing a European Network of Occupational Physicians to collect data on work-related diseases and exposure to relevant occupational risk factors.

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Loss to follow-up in the employee sample of the Gutenberg Health Study between baseline and 5-year follow-up

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Introduction: In the population-based prospective Gutenberg Health Study (GHS), 5-year longitudinal associations of occupational factors and cardiovascular health were not as strong as expected from cross-sectional analyses. As selection bias due to loss to follow-up (LTFU) may be a possible explanation, LTFU and

its determinants were explored in the sample of employed adults.

Material and Methods: Extensive baseline examinations took place at the GHS study centre in Mainz 2007–2012. Persons employed at baseline and aged 35–64 years were included in the analysis. LTFU 5 years after baseline was defined as individuals who declined further participation, were no longer accessible, or met exclusion criteria. The influence of selected sociodemographic, lifestyle, work, and health-related baseline characteristics on LTFU was investigated using bi- and multivariate logistic regression models.

Results and Conclusions: LTFU in the employee sample was moderate (11.9% of n=8306). The probability of LTFU showed a U-shaped curve over age and was higher for women than for men. As a work-related variable, especially low job complexity level was associated with LTFU (sex- and age-adjusted odds ratio for helpers vs. skilled workers 2.26, 95% confidence interval 1.70–2.99). Work-related exposures, such as night shift, overtime, and psychosocial risk factors at work, showed no effect on LTFU in multivariate models. Employees lost to follow-up were in poorer health than further participating employees. The results can contribute to future occupational health analyses in terms of better interpretation of estimates and planning of bias analysis.

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Occupational inhalation accidents in the UK: findings from the Surveillance of Work Related Occupational Respiratory Diseases (SWORD) scheme 1999–2018

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Introduction: Although inhalation accidents are important occupational cause of preventable lung injuries, little is known about their cause and epidemiology. This study aimed to investigate changes in the incidence of medically reported occupational inhalation accidents and their potential causes over time in the UK.

Methods: Data on incident cases of occupational inhalation accidents reported to SWORD surveillance scheme between 1999 and 2018 (inclusive) were extracted and analysed in groups of four 5-year time periods. Descriptive analyses of causative exposure, occupation and industrial sectors were conducted and incidence rates were estimated.

Results: A total of 172 cases were reported. The average annual incidence rate (1999–2018) was 0.9 cases/million employed, with estimates falling from 1.7/million employed in 1999–2003 to 0.5 in 2014–2018. Cases were reported most frequently from the public administration and defence sector (13%), followed by the medical sector (9%), with domestic cleaners (4%) and fire service officers (4%) the most frequently reported occupations. Certain historic

causative exposures (e.g. smoke inhalation) were no longer reported by the end of the study period, while many known causes (e.g. cleaning agents) were persistently linked to reported cases over the study period.

Conclusions: Whilst the incidence of inhalation accidents appears to have fallen, certain established causative exposures appear to be persistently linked to reported cases. Awareness of current causative exposures is necessary in order to define evidence-based

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Prevalence of consumption of psychoactive substances (PSA) of handicraft tanners

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Introduction: The prevalence of consumption of PSA is constantly increasing in developing countries, and all occupational sectors are concerned. Handicraft sector is a particular target because of the collective consumption is part of the sociability of the group. The aim of this study was to determine the prevalence of PSA consumption, use, and misuse amongst handicraft tanners and to appreciate the poly-consumption according to socio-demographic and occupational parameters.

Methods: This cross-sectional study was included 723 handicraft tanners in Fez and Marrakesh. The individual interview was conducted with each person. The questionnaire covered socio-demographic and occupational parameters, toxic habits (tobacco, alcohol, cannabis and others psychotropic substances). The misuse was assessed by specific tests: dependence on smoking tobacco (Fagerstrom), Cannabis Abuse Screening Test (CAST) and Alcohol Use Disorders Identification Test (AUDIT).

Results: The prevalence of consumption was 43.4% for smoking tobacco, 21.7% for cannabis, and 21.6% for alcohol. Amongst consumers, the prevalence of dependence or misuse was 63.1% for smoking tobacco, 65.7% for cannabis and 22.4% for alcohol. 33.5% of tanners had no toxic habit, 40.5% one toxic habit, 23.5% two toxic habits, 2.5% three toxic habits and 1.4% four toxic habits. The most frequent associations were tobacco-cannabis (6.9%), cannabis-alcohol (6.3%), and tobacco-alcohol (3.5%).

Conclusions: The prevention approach needs a cooperative spirit. It will be more accepted and applied if all handicraft tanners and their representatives are involved in its elaboration.

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Network on the Coordination and Harmonisation of European Occupational Cohorts (OMEGA-NET): Achievements after 4 years of networking, collaboration and training

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Introduction OMEGA-NET (2017-2022) is a COST Action network, funded by EU, involving about 200 occupational health researchers in 40 countries, including non-European partners. The goal is to create a network to optimize the coordination and use of occupational, industrial, and population cohorts in Europe and beyond, to inform evidence-based interventions and policy.

Material and Methods A range of networking tools are available for COST Actions, such as meetings, workshops, conferences, training schools, short-term scientific missions (STSMs) and dissemination activities.

Results Despite COVID-19 restrictions, the network has made great achievements, including two online searchable inventories: the Inventory of Occupational Cohorts, with more than 140 cohorts registered, and the Inventory of Occupational Exposure Tools, with about 75 tools, of which half are Job-Exposure Matrices. Working groups have discussed and written papers on harmonisation and standardisation of occupational exposure and health outcome information. So far, 15 papers are published, some as editorials or position papers, others are accepted or in progress. A webinar series, available on YouTube, present work of OMEGA-NET. The Action also includes opportunities for networking, leadership and training for early career researchers in occupational epidemiology and exposure assessment, and visits to other research institutions (STSMs), as well as stakeholder engagement.

Conclusions OMEGA-NET is the largest coordination activity on occupational health globally and will substantially enhance future European and international research.

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Working from home during the COVID-19 pandemic and its longitudinal association with physical activity and sedentary behavior

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Introduction: Working from home during the COVID-19 pandemic has affected many workers' daily life, and possibly their physical activity behavior. We studied the longitudinal association of working from home during the pandemic with physical activity and sedentary behavior.

Methods: Longitudinal data from 17 questionnaire rounds of the Lifelines COVID-19 cohort (March 2020–February 2021) were used. In total, 33,325 workers were included. In every round, participants reported their current work situation: location, home, or hybrid (working on location & from home). Physical activity levels and sedentary behavior before and during the pandemic were asked. Logistic Generalized Estimating Equations were used for analysis. Approval was obtained by the ethics committee of the University Medical Center Groningen.

Results: Home workers were less likely to meet the recommended ≥ 150 minutes/week of moderate-to-vigorous-intensity activity during the pandemic than location workers (OR: 0.93, 95% CI: 0.90–0.96) and more likely to be less physically active than before the pandemic (OR: 1.09, 95% CI: 1.04–1.14). Furthermore, home and hybrid workers were more likely to be more sedentary on workdays during than before the pandemic (OR: 1.51, 95% CI: 1.39–1.64/1.36–1.68, respectively).

Conclusions: Compared to location workers, home workers (and to a lesser extent hybrid workers) were more often physically inactive and sedentary during than before the pandemic. As many workers may continue to work (partly) from home after the pandemic, workers should be supported to increase activity levels and reduce sitting while working from home.

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Burnout Syndrome in Basic Education Teachers in the city of Sorocaba/SP

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Introduction: The work in teaching has an important social role in society and recognition is a factor of satisfaction, however, organizational and psychosocial factors at work, which can trigger stress and physical and mental illness of teachers. **Objective:** To identify the prevalence of Burnout Syndrome (BS) of teachers in the state's basic public education system in the city of Sorocaba, São Paulo state-Brazil, and to analyze the association of sociodemographic, psychosocial and organizational factors of teaching work with the dimensions of burnout.

Method: This is a cross-sectional epidemiological study of 107 teachers which answers the "Maslach Burnout Inventory-Educators Survey" (MBI-ES) and a biopsychosocial form. Descriptive analyzes were performed, in addition to Pearson's chi-square test and logistic regression, with a significance level of 5%.

Results: 29% of the participants had high Emotional Exhaustion, 33.6% high Depersonalization and 18.7% low Professional Achievement. The prevalence of BS was 4.7%. There were positive associations between poor classroom infrastructure, lack of recognition by society and students, dissatisfaction with work and professional growth, and situations of harassment with the dimensions of burnout.

Conclusion: The prevalence of BS was 4.7% and a third of the teachers had high levels of emotional exhaustion. Poor classroom infrastructure, low recognition and situations of

harassment with the dimensions of burnout were associations with Burnout.

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Road traffic accidents and injuries through the analysis of the Italian hospital discharge records: preliminary results

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Introduction: The WHO estimated around 1.3 million fatal vehicle crashes per year; motor vehicle are the leading cause of traumatic workplace deaths. The aim of the study is to improve the road accidents knowledge, by analysing the Italian hospital discharge records (HDRs) data.

Materials and methods: The study involved the analysis of the data related to 2019 with code "injuries and poisoning" by ICD-9-CM with the indication of the external causes. Data descriptive analyses and frequencies were carried out on "Traffic accidents" records including motor vehicle (E810-E825) and other road vehicles (E826-E829) i.e. road transport accidents (RTAs).

Results: In 2019 868,185 patients with at least one diagnosis of "injuries and poisoning" and 35,353 RTAs were discharged from hospitals (the 10.6% and the 0.4% of the total number of patients discharged). The regions with the highest incidence of RTAs discharges were: Lombardia (15.0%), Veneto (10.4%) and Lazio (9.7%) of which the 71.0% male and 29.0% female. The 80.3% are recorded as road traffic accidents and only 2.8% as accidents at work. The 100% of the principal diagnoses describe the consequence of RTAs, while some comorbidities are described in the first secondary diagnosis, i.e. hypertension (1.2%), diabetes (0.5%), atrial fibrillation (0.2%), hypertensive heart disease (0.1%), ischaemic heart disease (0.1%), cerebrovascular disease (0.1%), urinary tract infection (0.1%), cardiac arrest (0.1%), COPD (0.1%) and hypothyroidism (0.1%).

Discussion: The study highlights the importance of HDRs as a source of epidemiological information useful to assess hospital activity and to impr

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Mild steel welding is associated with alterations in circulating levels of proteins involved in carcinogenic processes

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Introduction: IARC has classified exposure to welding fumes as carcinogenic to humans (Group 1), but biomarkers of welding-related lung cancer are unknown.

Material and Methods: Data from 338 non-smoking males (171 welders, 167 controls) was evaluated, of whom 174 (78 welders, 96 controls) were assessed twice. Exposure measures were welding years, cumulative exposure and personal respirable dust. A panel of

70 cancer-related proteins was analyzed in serum by proximity extension assay. Oxidative stress biomarkers 8-oxodG (DNA oxidative damage) and 4-HNE (lipid peroxidation) were measured in urine by LC-MS/MS. Linear mixed models were used for the longitudinal analysis.

Results: Median respirable dust exposure was 0.7 mg/m³ at both timepoints for the welders. Welders and controls had different protein expression of CD84. Dose response relationships were found for CD84, BOC and RAGE in association with welding years, and SRC and CXCL1 with respirable dust. These findings could be replicated when analyzing never-smokers. The above-mentioned proteins are involved in cell adhesion (CD84, SRC, BOC, RAGE), immune response (CD84, SRC, RAGE), inflammatory response (CXCL1, RAGE), proteolysis (SRC), and response to hypoxia (SRC). The analysis of oxidative stress biomarkers is ongoing.

Conclusion: Exposure to welding fumes at levels below the Swedish occupational exposure limit (2.5 mg/m³) was associated with changes in protein expression involved in biological processes related to carcinogenicity. Further research is warranted to evaluate if these proteins could serve as biomarkers for carcinogenesis in welders.

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Comparison of self-reported occupational exposure to solvents with a job exposure matrix (JEM) in a French case-control study of testicular germ cell tumors

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Introduction: Some occupational exposures are suspected to be linked to testicular germ cell tumors. However, their retrospective assessment remains problematic for population-based case-control studies. To assess potential measurement bias, our objective was to compare self-reported (SR) exposures obtained by specific questionnaires to exposures obtained by job exposure matrices (JEMs). Material and Methods: Participants from the TESTIS national case-control study provided information on their job histories. SR exposure to solvents was obtained from 478 workers. Participants' job histories were coded (ISCO-1968, NAF-1993). JEMs from the French National Matgéne program were applied. Comparison between SR exposure and JEMs was calculated by sensitivity, specificity and predictive values.

Results: Overall, the analysis included 1124 subjects (454 cases, 670 controls) and was carried out for 4083 job periods. Preliminary results showed that using JEMs as a gold standard, sensitivity from SR exposure was low (0.00 to 0.39) whereas specificity was high (0.89 to 0.99). Positive predictive values ranged from 0.00 to 0.64 and negative predictive values ranged from 0.75 to 1.00.

Conclusions: Exposure assessment methods applied may over- or underestimate exposure prevalence. According to JEMs, a significant number of the subjects seems to underreport their exposures.

Our results suggest that combining JEM with SR exposure data could be an interesting approach to limit measurement bias. However, this process requires a specific analysis by an expert to rule on exposure assessment for subjects with disagreements between the two methods.

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Observed versus predicted mesothelioma cases in Lombardy, Italy, 2013-2017

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Introduction: Lombardy is the most populated (10 million people) and industrialised Italian region, where asbestos had been extensively used until the national ban in 1992. Almost one fourth of malignant mesothelioma (MM) cases are recorded in Lombardy. Using data from the Lombardy Mesothelioma Registry (RML) we previously predicted trends and numbers of MM in men and women for the period 2013-2029 (Mensi et al. Occup Environ Med 2016;73:607-613). Aim of this work is to verify accuracy of projections in 2013-2017.

Material and Methods: RML is part of a national MM registry (ReNaM). It records MM cases among Lombardy residents using several sources, including hospital admissions, pathology records, mortality, and compensation claims. Confirmed cases are interviewed about past asbestos exposure. We extracted data for the period from 2013 to 2017 (year in which data collection and quality controls have been completed), and compared the number of predicted and observed cases.

Results: We had predicted 1303 cases in men (average 261/year) and 728 in women (146/year). The number of recorded MM cases was 1501 in men (300/year) and 726 in women. Occupational exposure to asbestos was reported by 1002 men (66.8%) and 129 women (30.2%). Non-occupational asbestos exposure was found in 47 (3.1%) of men and 84 women (11.6%).

Conclusions: In 2013-2017 there was perfect agreement between predicted and observed MM cases in women, while in men we recorded on average 198 more cases than predicted (40/year). The MM burden in Lombardy is still high 25 years after the asbestos ban.

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Prevalence of occupational burnout in Swiss workers: a systematic review and meta-analysis

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Introduction: Occupational burnout (OB) has been associated with job dissatisfaction, lower productivity, intentions to leave the job, increased turnover and health-care costs, as well as other socio-economic issues. Despite such negative consequences, the prevalence of burnout among Swiss workers remains unknown.

Material and Methods: We interrogated international databases such as Medline (Pubmed), EMBASE, and PsycINFO, and 15 Swiss universities' databases from 2010 up to July 6, 2021 to identify studies reporting the prevalence of OB and/or emotional exhaustion (EE) - the core OB dimension- in Swiss workers. Data were summarized descriptively and quantitatively using random effects meta-analysis.

Results: We identified 23 studies that used different outcome assessment methods: hetero-assessment by physicians and self-reported, using a specific question or one burnout inventory scale (frequently used: Maslach Burnout Inventory (MBI) and Copenhagen Burnout Inventory (CBI)). We estimated the prevalence of clinical/severe burnout, overall burnout and emotional exhaustion (EE) at 4%, 18% and 18%, respectively, with considerable heterogeneity (I-square >90%, $p < 0.00$).

Conclusions: Despite between-study heterogeneity, our overall estimate of OB in Swiss workers is high enough to reinforce the current efforts to detect it better and earlier and reduce its negative consequences at individual and societal levels.

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The AMINAVI database: a tool for knowing the presence of asbestos in ships and cases of seafarers' pathologies

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Introduction: Nowadays for seafarers there is still exposure to asbestos/seafarers are still exposed to asbestos because asbestos was widely used for shipbuilding, both, in a friable and compact form 11% of the ships still in circulation were built before the law that banned the use of asbestos (Law 257/92), therefore they are potentially dangerous the seafarers' working environment matches with their living environment maintenance, removal and scrapping of ships is continuously increasing, and exported to developing countries. The AMINAVI database, still in progress, deepens the knowledge about asbestos in ships from 1900 to today: it collects, catalogues and reports the information about each vessel (launch, radiation, reclamation activities) also through the cases of asbestos-related pathologies of seafarers

Material and Methods: The information is stored in a Relational Data Base Management System (RDBMS), which allows you to explore the data using the SQL query language.

Results and Conclusions: With the aim to create a network between the bodies responsible for health and environmental protection, through the consultation of Aminavi, it is possible to reconstruct the career of, to date, 623 cases (621 men and 2 women) with asbestos-related diseases. Of these, 31.92% are Officers (Commander, Doctor, etc) and 68.08% are non-commissioned officers and Sailors (Mechanic, Electrician, Radio-telegraphist, etc, more exposed for their job duties). The main pathology is Mesothelioma 56.25%, then Neoplasia 8.81% and Lung Carcinoma 7.69%, 72.39% of the collected cases have died. The recognized diseases are 25.84%.

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Mitigating Injury and Illness Through A Pandemic: A Mid-Size Organization Demonstrates the Power of Integrating Occupational Health and Safety with Business Operations

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Introduction: In 2017, Parking Concepts, Inc (PCI) implemented a corporate prevention plan to reduce injuries and illnesses by integrating occupational. Health and safety (OHS) with business operations. By 2019 PCI had significantly reduced all key metrics. In 2020, COVID-19 brought challenges to their frontline essential workers. Ultimately PCI'S OHS plans proved powerful in effectively mitigating injury and illness across their 185 worksites, resulting in further reduction in injuries and illness, including:

- Total Injuries 78%
- Litigated Claims 89%
- Direct Cost 81%

Measurement and Methods: Risks identified through a 5-year retrospective analysis were used as baseline measurements and to identify and target risks. Specificity in risk reduction methods was essential in reducing targeted risks:

- Leadership direct participation
- Innovative communication methods and technology to deliver OHS materials increased employee confidence and trust
- COVID-19 corporate policies, procedures, and training by state and local delivered to each employee through multiple communication channels in various languages to accommodate all employees
- Strategic and efficient execution in OHS methods hit the targeted risks

• Annual PCI Wellness Challenges enhanced employee morale
Results and Conclusions: The power of leadership commitment, execution of methods, use of technology, and innovative communication strategies proved successful before and during a global pandemic. PCI, poised to seamlessly respond to the pandemic while continuing to reduce all injuries and risks, demonstrates the sustainability of its OHS model.

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A study of morbidities among food manufacturing industry workers in Goa, India

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Introduction: Food manufacturing industry units are among the most common industries all over the world. It involves a large number of employees required for the processing, manufacturing, storage, and transportation of food items. Workers are usually sedentary and involve very little physical movement. Chronic illnesses are common among these sedentary workers. The study was done to assess selected morbidities among workers of food manufacturing units in Goa.

Materials and methods: The retrospective record-based cross-sectional study was conducted over 3 months and was commenced after obtaining approval from the Institutional Ethics Committee of Goa Medical College. Periodic medical check-up of the workers was conducted. Data included sociodemographic details of the workers and details of periodic medical check-ups. The data was analyzed using SPSS version 23.

Results: It was observed that 11.1% of workers had obesity with a BMI >30, 19.28% had Hypertension (>140/90) and 24.4% had Diabetes mellitus with HbA1C >6.5. In addition, 5.28% had far vision

defects and 9.57% had near vision defects and none had color vision defects. 6% had hemoglobin less than 11 gm%. 21.14% had deranged lipid profiles and 2.1% had abnormal ECG findings. 4.5% had abnormal audiometry tests. 4.28% of workers were detected with uric acid crystals, 2.4% were detected with calcium oxalate crystals and 10.5% were detected with glucose in urine.

Conclusion: This study highlights need of health interventions and periodic medical checks up of the food manufacturing industry workers for timely detection and early management of their health problem.

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Global burden of pancreatic cancer incidence and mortality attributable to residential exposure to the petrochemical industry in 2030

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Introduction: Several towns around the world are located near large-scale petrochemical industries, indicating a possible danger of exposure to carcinogenic chemicals, some of which can induce pancreatic cancer development or death. We aimed to estimate the pancreatic cancer burden in 2030 due to residential exposure to the petrochemical industry by population attributable fraction (PAF). **Materials and methods:** We applied ArcGIS, a multiple ring buffer and intersect tools, to estimate the population exposed to the petrochemical industry. The risk of pancreatic cancer related with residential exposure to the petrochemical industry was calculated using a random-effect meta-analysis model.

Results: In 2030, 3.1% of the residents living near petrochemical industry globally. Residents living near the petrochemical industry had a 32% (95%CI: 1.17–1.50) and 30% (95%CI: 1.17–1.44) increased risk of pancreatic cancer incidence and mortality compared to people living farther away. We estimated the proportion of pancreatic cancer that may have been reduced if residents had lived farther away. PAFs for pancreatic cancer due to residential exposure to petrochemical industry was estimated at 1.17% for incidence and 1.01% for mortality. The highest PAFs were found in Latin America and the Caribbean, as well as high-income regions.

Conclusions: Our findings suggest that residents living farther away could reduce pancreatic cancer up to 2.18% by 2030. The strategies for preventing pancreatic cancer among those population are needed to reduce the global cancer burden, particularly in the places with a high cancer burden.

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Three-year trajectories of body mass index before a diagnosis of sleep apnea syndrome: A nested case-control study in middle-aged male Japanese workers

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Introduction: Sleep apnea syndrome (SAS) is a common disorder in working-aged males, and a higher body mass index (BMI) is one of the established risk factors for SAS. The trajectory of BMI before a diagnosis of SAS is not clear, especially in working populations.

Subjects and Methods: We used the medical claims and health checkup data of the Shinshu Study in Occupational Health participants to conduct a nested case-control study of male workers. A total of 108 males with SAS were identified and matched with 324 controls by age. We used linear mixed models for repeated measurements to evaluate the 3-year trajectories of the subjects' BMI before the diagnosis of SAS, with adjustment for covariates.

Results and Conclusions: Compared to the controls, the workers diagnosed with SAS had significantly higher BMIs from 3 years before to the year of diagnosis (at 3 years pre-diagnosis, 24.4 [95% CI: 23.8–25.0] vs. 23.4 [95%CI: 23.0–23.8] kg/m², respectively, $p=0.003$) and significantly larger increases in the mean BMI before the SAS diagnosis (annual change rate, 0.20 [95%CI: 0.12–0.28] vs. 0.05 [95%CI: –0.01 to 0.11] kg/m² per year, $p<0.001$). In addition to the higher BMI in this SAS population, our analyses revealed that an increase in BMI was significantly associated with a new diagnosis of SAS in middle-aged Japanese workers. Early interventions focusing on BMI by occupational health systems may help decrease the onset of SAS among workers.

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Sunlight exposure, occupational group and eye disorders in an economically active population: data from the KNHANES 2008–2012

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Introduction: Sunlight is a major risk factor for eye disorders. This study aimed to analyze the relationship between sunlight exposure, occupational group and eye disorders in an economically active population (EAP).

Materials and Methods: This study analyzed the 2008–2012 Korea National Health and Nutritional Examination Survey data. Sunlight exposure was categorized as < 5 hours and ≥ 5 hours. We also analyzed the dose-dependent relationship between exposure to sunlight and eye disorders (cataracts, pterygium, and age-related macular degeneration [AMD]) using data from 2010 to 2012 by subdividing the exposure groups into < 2 hours, 2–5 hours, and ≥ 5 hours. The study participants were stratified by sex, and the results were analyzed using the χ^2 test and multiple logistic regression analysis.

Results: In the female group, the odds ratios (OR) of pterygium in the high-level sunlight exposure group was 1.47 (1.15–1.89). Regarding AMD, the OR were 1.42 (1.16–1.73), 1.33 (1.03–1.73), and 1.58 (1.15–2.16) in the total, male, and female groups, respectively. Analysis of the dose-response relationship revealed that the OR of pterygium in the high-level sunlight exposure subgroups of the female groups were 2.00 (1.39–2.88), respectively. When the white collar was used as a reference group, The OR for cataract was 0.96 (0.80–1.16) for pink collar, and it was 1.06 (0.85–1.31) and 1.00 (0.83–1.19) for green collar and blue collar, respectively.

Conclusions: This study demonstrated a relationship between sunlight, occupational group and eye disorders in an EAP. Women were found to be especially vulnerable to pterygium.

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Exposure characteristics and neurological health concerns among e-waste recycling workers in Hong Kong: preliminary findings

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Introduction: Previous studies showed that e-waste recycling workers had poor exposure prevention behavior and thus higher chemicals burden which may consequently relate to neurobehavioral alterations. This abstract presents the first surveillance data among e-waste recycling workers in Hong Kong from an ongoing study.

Material and Methods: We are recruiting 200 e-waste recycling workers and 200 office workers from 2021 to 2022. E-waste recycling workers must work in the e-waste recycling industry with the job designation of handling e-waste at the time of recruitment. Information on demographic characteristics, recycling working profile, and exposure prevention behavior was collected by validated questionnaires. Neurobehavioral alterations and mental health were assessed by the questionnaire 16 and Hospital Anxiety and Depression Scale. All subjects were also invited to donate 50ml urine sample for measuring chemical burden.

Results: By the time of abstract submission, we had recruited 49 e-waste recycling workers involved in collecting, disassembling, and packing e-waste. Of these, 25 are male and 39 are full-time workers. The age of these subjects was 49 ± 12 years. Overall, 26.9% reported cigarette smoking and 11.5% drinking alcohol. The prevalence of self-reported neurotoxic symptoms, depression and anxiety in these workers was 50.0%, 11.5% and 11.5%, respectively.

Conclusions: This ongoing study provides preliminary results describing the basic characteristics of e-waste recycling workers in Hong Kong and potential health concerns. Future work will explore chemical burden and their association with neurological outcomes.

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Educational and gender differences in duration of work participation and working years lost among young to middle-aged Norwegians

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Introduction: This study estimated the duration in employment and working years lost, by gender and highest attained education, among individuals in Norway.

Material and Methods: This registry-based cohort extracted data from the FD-Trygd database (Statistics Norway). All individuals living in Norway the year they turned 30, 40, or 50 between 2000-

2005 were followed for 10 years. A hierarchy identified precedence in eight states: death, disability pensioning >50%, sickness absence >50%, employed, unemployed, education, emigration, and non-employed (no registration in another state). Average time spent in each state was calculated.

Results: The sample included 1,143,543 individuals. On average, most time was spent in employment (6.0-6.6 yr); women worked one year shorter than men. Most years were lost to non-employment (1.1-1.5 yr) and sickness absence (9.5-10.0 mths); least was lost to education, unemployment, and emigration (1.0-5.0 mths each). Disability pension increased by age, from 3.0 mths (age 30) to 1.6 years (age 50). Educational gradients were seen for men and women in most states; the largest differences were for employment and disability. Highly educated individuals spent up to 3.3 yr longer in employment and up to 3.1 yrs shorter in disability than those with a lower education.

Conclusions: Young to middle-aged Norwegians spent most of their time in employment; women worked shorter than men. Years were mostly lost to non-employment and sickness absence, plus disability with increasing age. Women and individuals with lower education could benefit most from interventions to increase work participation.

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Cancer incidence and mortality in the Norwegian Fire Departments cohort: Are incidence versus mortality outcome measures contributing to variability in risk estimates?

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Introduction: Internationally, elevated risks for specific cancers have been reported among firefighters, although with some mixed findings. We examined cancer incidence and mortality in the recently established Norwegian Fire Departments cohort.

Materials and methods: The 4295 male employees in the cohort from 15 fire departments across Norway provided firefighting services for approximately 50% of the population. The cohort was linked to national registries for the period 1960–2018. National background rates were used to derive standardized incidence ratios (SIR) and standardized mortality ratios.

Results: For all sites combined, cancer incidence was 15% higher than expected while cancer mortality was close to unity. Incidence was elevated for colon cancer (SIR; 95% confidence interval: 1.27; 1.01–1.58), mesothelioma (2.59; 1.12–5.11), and prostate cancer (1.18; 1.03–1.34). We observed more deaths than in the general population and more deaths than incident cases for oesophagus cancer, and cancer of the gallbladder and bile ducts. Mesothelioma was recorded as cause of death for only two out of eight cases.

Conclusions: Cancer sites with elevated incidence were largely in line with findings from other countries. We found causes of death that did not reflect the anticipated and more correctly recorded cancer diagnosis, contributing to misleading estimates of cancer mortality risk. Selection of mortality as the outcome measure rather than incidence may partly explain some of the differences in risk estimates observed in studies assessing firefighters' cancer risk.

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Comparative Global Estimates on the Work-related Burden of Accidents and Diseases

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Introduction: The ILO has made Global Estimates on Occupational Accidents and Work-related Diseases since 1999 and supported by WHO, ICOH and ISSA. The recent joint estimates of WHO and ILO have been based on 19 exposure-outcome pairs. All estimates show considerable increase in fatal and non-fatal occupational burden over the past 20 years. Although, occupational safety has improved in many developed countries, work-related diseases have a rising trend globally.

Materials and Methods: We followed the method originally established and enhanced by the ILO. The method and results are well documented and included some 115 exposure-outcome relations for work-related diseases, and a sectoral analysis of fatal and non-fatal injuries. A limited official data is reported on occupational accidents and diseases. We therefore used proxy fatality frequencies from comparable countries. For work-related diseases we reviewed data reported to ILO and WHO, European Union and member State statistics, Labour Force Surveys including ad-hoc occupational modules, related papers, and available population attributable fractions.

Results and Conclusions: The global occupational fatal injuries and work-related diseases have grown from 1.1 million deaths in 1999, to 2.3 million in 2014, 2.8 million in 2017, and the latest estimate is 2.9 million deaths in 2021. Cardiovascular diseases contributed to 956,000, occupational cancer to 799,000, and respiratory diseases to 493,000 deaths. Occupational injuries caused 312,000 deaths. Prevention and preparedness are vital.

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Agricultural exposures and risk of breast cancer in the AGRiculture and CANcer (AGRICAN) cohort

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Introduction: Breast cancer is the first common cancer and the first cause of mortality by cancer among women worldwide. Some risk factors are established like alcoholic beverages, estrogen-progestogen contraception and replacement therapy, exposure to x or γ radiation and genetic factors. Others are suspected, particularly endocrine disruptors like many pesticides. However, this cancer has been little studied in agriculture because studies in this activity have focused mainly on men.

Material and methods: Our analysis included 83,000 women, enrolled in AGRICAN cohort in 2005-2007 in France, who completed an enrollment questionnaire on lifelong agricultural exposures and reproductive life. Breast incident cancer, were identified by cross-linkage with population-based cancer registries. **Results:** Until 2017, 1,836 breast cancers were identified (284 before menopause). In our population, established risk factors were confirmed. Increased risk of breast cancer before menopause were observed for women involved in vineyard for various tasks: re-entry (HR=1.79*), harvesting (HR=1.72*) and working in cellars (HR=2.29*). For breast cancer after menopause, the risk was decreased in women who had grown cattle (HR=0.86*) or grassland (HR=0.87*), but increased in those who performed re-entry tasks in vineyard (HR=1.39*) or worked in greenhouses (HR=1.32*). (*p-value<0.05)

Conclusion: Breast cancer risk in female farmers was different according to the menopausal status and to the types of crops and livestock grown. Our study suggested that there were increased risk among non-menopausal women and in vineyard activities.

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A nationwide program for lung cancer screening by low-dose CT among formerly asbestos-exposed workers in Germany: concept and participation

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Introduction: Occupational asbestos exposure (OAE) is a risk factor for lung cancer (LC) and can cause malignant diseases decades after exposure. Recent guidelines advocate lung cancer screening with low-dose CT (LCS) in high-risk populations with OAE and additional smoking history.

Material and Methods: A structured program on LCS has been introduced by the German Social Accident Insurance until end of 2019. Eligibility criteria are: OAE ≥ 10 years starting before 1985 or OAE-related benign lung disease (occup. disease no. 4103), age ≥ 55 years and smoking history ≥ 30 pack years. Eligible persons are centrally identified and invited for annual LCS. Participants receive obligatory physician counselling before LCS. CT scans are performed as close to home as possible using a network of radiological institutions and follow a standardized protocol including technical quality assurance, independent double reading of suspicious findings and of a random sample of CT scans.

Results: As of Aug. 2021, 20,253 out of 24,787 eligible beneficiaries were invited to physician counselling for LCS. A total of 10,306 (first round), 5,476 (second round) and 1,725 (subsequent rounds) CT scans were performed out of which 9.4% and 4.5% were early controls (scheduled ≤ 6 months) in first and second rounds, respectively. Preliminary assessment showed 133 (0.8%) recognized LC cases due to OAE, yet detection rates at screening need to be determined in more detail.

Conclusions: A substantial group of beneficiaries with OAE participated in LCS after physician counselling. The effectiveness of early detection of LC in OAE needs to be further evaluated.

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Reliability of baseline self-reported information in the AGRICAN cohort

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Introduction. An important challenge in epidemiology is to ensure the reliability of collected data. Few studies have been conducted in farming populations. We assessed the reliability of self-reported data on lifestyle, reproductive history, health and agricultural activities and tasks from the Agriculture and Cancer (AGRICAN) cohort.

Materials and Methods. Our analysis focused on 739 individuals from the 181,842 cohort members who inadvertently completed the enrollment questionnaire twice between 2005 and 2007 (median time interval: 452 days). Reliability of data (lifestyle, health and agricultural activities/tasks including pesticide treatments) was assessed by the percentage of exact agreement, Cohen's Kappa value (K) and the intraclass correlation coefficient (ICC).

Results. Agreement was (1) substantial to almost perfect for smoking, reproductive history and most health data (K/ICC>0.61); (2) moderate for alcohol consumption and fair for diet; (3) mostly substantial for lifetime work in 18 agricultural activities; (4) substantial for pesticide use on each of 11 crops; (5) moderate for insecticide use on animals and seed treatment and (6) substantial to almost perfect for exact start and end years of tasks. Most other tasks showed moderate to substantial agreement.

Conclusions. Although older and less educated, farmers provided (1) information on most confounders as reliable as non-farming populations and (2) reliable information for occupational and long ago exposures, including data used to assess individual exposure to specific pesticides by the crop-exposure matrix PESTIMAT.

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Smokeless tobacco abuse among public transport bus employees in Mumbai, India.

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Background: Consumption of smokeless tobacco products is a public health problem. Measures of tobacco control along with promotion of tobacco cessation can have great impact in reducing the burden tobacco related diseases.

Objectives: To create cancer awareness and understand the predictors influencing use of smokeless tobacco among the public transport bus employees.

Methods: 4000 public transport bus employees were enrolled after obtaining written informed consent and randomized in four arms. Pre and post-test were conducted to assess their knowledge attitudes and practices regarding tobacco use. Employees were given health education regarding hazards of tobacco and were invited for oral cancer screening. Four different tobacco cessation interventions were provided to tobacco users in each of the four arms. Results: 2118 (52.95%) of employees enrolled consumed tobacco, mainly in the smokeless forms. Only 174 (8.21%) tobacco users used smoking forms. Khaini was the most common form of tobacco used, followed by Masheri/ Gul. The median frequency of use of different tobacco products varied from 2 to 4 per day. The mean age at initiation of tobacco was 25.76 ± 8.46 years. According to the results of the multivariate logistic regression analysis, married males, above 40 years of age, working as bus driver, belonging to Hindu community, consuming alcohol and with no history of tobacco use among family members were at higher risk of being chronic tobacco user.

Conclusion: Smokeless tobacco use in different forms was seen among the public transport bus employees. Stringent laws should be implemented to curb the use.

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Kidney cancer and occupational agricultural exposures in the AGRICulture and CANcer (AGRICAN) cohort

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Introduction Kidney cancer (KC) has been little studied in relation to agricultural exposures. We aimed at assessing the risk of KC in various agricultural activities and tasks.

Material and Methods Participants belonged to the French AGRICAN cohort ($\approx 180,000$ subjects). Incident KC were identified from enrollment (2005-2007) through December 31st 2017 using cancer registries. Occupational exposures (5 breedings, 13 crops, 2 to 5 tasks for each) and potential confounders (smoking, BMI, hypertension) were identified from enrollment questionnaires. Cox models with age as time scale were used, stratified on sex.

Results We observed 753 cases of KC (72% men, 83% renal cell carcinomas (RCC)). We reported positive associations: (i) for men for 3 crops: corn (HR 1.2(1.0-1.5)), sunflower (HR 1.5(1.1-2.1)) and rapeseed (HR 1.4(1.1-1.9)) with duration and surface effect

relationships for corn and sunflower. Pesticide use, sowing and harvesting were particularly associated (HR 1.3 to 1.7). (ii) For women in vineyard: HR 1.4 (1.0-2.0) (with a surface effect relationship), specifically working in cellars (HR 1.9) and re-entry tasks (HR 1.4). We observed inverse associations with some duration effect relationships for most livestock (risk deficit up to 40% for both sexes) and other crops (grassland, beet, fruit, potato for both sexes – risk deficit up to 30% –, and wheat/barley and tobacco for women – risk deficit up to 60%).

Conclusion We observed different associations with agricultural activities between men and women, which could account for biological or occupational exposures differences. Analysis for RCC will also be presented.

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Incidence of Voice Disorders among Private School Teachers in Taiwan: A Nationwide Longitudinal Study

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Introduction: Teachers were more likely to seek medical treatment for voice problems, but few studies described the development of voice disorders among teachers under longitudinal observation. We estimated the occurrence of voice disorders in private school teachers by using National Health Insurance Research Database between 2000 and 2010 in Taiwan.

Material and Methods: Private school teachers under 35 years old and newly employed between 2000 and 2010 were included, while people with other occupations were selected as comparison. Patients visiting Outpatient clinic with diagnosis of vocal polyps and vocal granulomas (ICD-9-CM: 478.4, 478.5) were identified. Survival analysis and Cox proportional hazard regression model were applied for risk estimation.

Results: In the 11 years follow up, the incidence rate of voice disorders was 27.3 per 1000-person-year in private high school teachers, 13.4 in private college teachers, and 8.6 in comparison group. After adjusting age, gender, income, work duration, sinusitis and laryngitis history, private school teachers were associated with higher risk of voice disorders (hazard ratio 1.58 [95% confidence intervals: 1.43-1.75]). About 50% cases happened during first three years of being private high school teachers.

Conclusions: The incidence and risk of voice disorders in private school teachers were higher than general population in Taiwan. This study added information to causality between occupation and voice disorders as well as the burden of voice disorders in Taiwan.

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The impact of apparent temperature on occupational injuries in Australia

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Introduction: Hot temperatures are associated with an increased risk for work-related injuries increases. But nation-wide estimates for this risk are underexplored, particularly when indoor and outdoor heat exposure and the effects of cold. This study aimed to explore how this risk are affected by apparent heat stress.

Materials and Methods: Workers' compensation claims from Adelaide, Brisbane, Darwin, Melbourne, Perth and Sydney from 2005 to 2018 were merged with weather station and workers' demographic data. Workers and heat exposure were classified as indoors or outdoors. The daily risk of occupational injuries from wet bulb globe temperature (WBGT) and Steadman's apparent temperature were quantified separately using time series analysis and distributed lag non-linear models. National estimates were obtained using meta-analysis.

Results and Conclusions: The relative risk for occupational injuries was similar within the middle 50% of WBGT values but otherwise increased curvilinearly. 26852 (95% CI: 16890 - 36203) of injuries were attributed to non-optimal WBGT, equivalent to an attributable fraction of 1.63% (95% CI: 1.03 - 2.2%). Nearly three times as many injuries were due to hot (1.21%, 95%: 0.75 - 1.64) instead of cold exposure (0.42, 95% CI: 0.04 - 0.83). Only small differences were observed between outdoor and indoor workers. Similar results were obtained using Steadman's apparent temperature. Global warming will likely exacerbate the risk of occupational injuries. Workplace heat adaptation and prevention measures are imperative to reduce the risk of injuries.

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Longitudinal study of DNA in lymphocytes of female farmers measured using the alkaline comet assay and link with cancer development.

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Introduction: Occupational exposure in the agricultural field is vast, including exposure to pesticides or dust. Literature shows a link between occupational exposure to pesticides and DNA damage, though few studies focus on females. This work aims to study the relation between agricultural exposure and DNA damage at two time points and the link between DNA damage and cancer development.

Material and Methods: 99 female agricultural workers gave blood samples at enrolment, and 10 years later. Questionnaires were completed at every donation. DNA damage was assessed by visual scoring of the alkaline comet assay on PBMCs. Longitudinal score was calculated by subtracting the enrolment score from the follow-up score. The link with cancer development was studied using data

obtained from the population-based cancer registry of the French department of Calvados.

Results: Overall, an increase in DNA damage was found at follow-up ($p < 0.05$). Decrease in DNA damage tended to be associated with weight loss ($p = 0.06$) and change in professional status ($p = 0.06$). However, retired females didn't have less damage than those still in activity ($p = 0.79$). Increase in DNA damage was found with continued use of rodent poison ($p = 0.05$). By the end of 2017, 13 females were diagnosed with cancer. A Cox model, with attained age as time scale, showed that cancer diagnosis after follow-up was associated with a higher DNA damage score difference ($HR = 1.8$ [0.89-3.67], $p = 0.10$).

Conclusions: DNA damage was found to be higher at the 10-year follow-up than enrolment. In our study an increase in DNA damage difference tended to be associated with cancer incidence.

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Alcohol, Tobacco, Obesity and Sleep (ATOS): Occupational Health surveillance of major determinants of public health associated with socio-professional variables, in 6840 Lisbon municipality workers.

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INTRODUCTION: No communicable diseases cause 41 million premature deaths globally (71%), every year, having as its main risk factors (avoidable risk behaviors) tobacco consumption, hazardous alcohol consumption, obesity, sedentary and sleep disorders, associated with the socio-professional variables.

MATERIALS AND METHODS: Cross-sectional observational study based on OH Indicators that compared different professional behaviors (firemen, cleaners, drivers, police, gardeners, gravediggers, administrative, etc; April 2018 to March 2021; sample $n = 6,840$; men: 58%; 62.3% of the total universe of municipal workers $N = 10,972$). Dependent variables: alcohol consumption (AUDIT), tobacco dependence and motivation for smoking cessation (Fargerstrom and Richmond Test, respectively), drowsiness questionnaire, risk of Sleep Apnea (STOP-Bang) and Obesity (BMI). Associations with professional variables, comorbidities and protective factors (physical exercise) were evaluated.

RESULTS

OBESITY: 64.3% were pre-obese or obese;

TOBACCO: 25% smoked regularly (45.9% smoked 11 to 20 cigarettes per day);

SLEEP: 39.6% sleep less than 7 hours; 21% have night work; 29% feel their sleep is not enough; 11% take sleeping pills; 5.5% fallen asleep while driving.

ALCOHOL: 9.5% (95% CI: 8.9%-10.3%) have risky consumption (8.8% female; 10.1% men)

PHYSICAL EXERCISE: 39% practice physical exercise 2 or more times a week;

CONCLUSIONS: The results of this study confirmed different risk behaviors among the various professional groups, the relationship with professional factors, and allowing useful predictive indicators for more effective and specific interventions.

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Chloroacetanilide use and prostate cancer risk among agricultural French pesticide users in the AGRiculture and CANcer (AGRICAN) cohort.

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Introduction: Prostate cancer (PC) is one of the most frequent cancer worldwide. Few risk factors are established. Risk is higher for farmers, particularly those using pesticides. Literature is scarce about specific pesticides effects, especially those heavily used in France like some chloroacetanilides herbicides.

Material and Methods: 98,794 men were enrolled in 2005-2007. Chloroacetanilides exposure was estimated crossing lifelong history of pesticide use on 11 crops and data from the Pestimat crop-exposure matrix. Probability, intensity and frequency of use were integrated in a quantitative score, calculated for 11 chloroacetanilides. Use of 5 out of 9 molecules began in the 1970-1980s. Results: Until 2015, 3,535 incident PC were identified by cancer registries. Chloroacetanilides use was observed in 7 crops, mainly on corn, sunflower and rape. Proportion of users by molecules ranged from 5 to 22.71%. Exposure scores differed widely among molecules: from 4-6 kg-years for napropamide to 1,375 for alachlor. No association was observed between chloroacetanilides use and PC globally or for individual molecules (reference: farmers non exposed to pesticides), with HRs from 0.96 to 1.00. Estimates raised when non-farmers were the reference (HRs from 1.10 to 1.14).

Conclusions: We could not observe clear pattern of association between chloroacetanilides use and PC risk even if positive associations appeared for some level of scores and with non-farmers as reference. Some chloroacetanilides were used since the 2000s, and/or were not heavily used, possibly precluding the detection of any effect at this step of the cohort.

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Comparative assessment of cancer mortality of the population living in two territories under the influence of enterprises for the blister copper production

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Introduction: The aim of the study is to compare cancer mortality structure and rates of the population living in urban districts of the Sverdlovsk region, where enterprises for the different ways of the blister copper production are located.

Materials and Methods: The data on cancer mortality of the population and absolute population size by sex and age structure from two districts obtained for 20 years period. A retrospective method was used. To determine the reliability of the differences between two unrelated samples, the odds ratio (OR) was used with the 95% confidence interval (CI) and the p-value <0.01.

Results: The mortality rates in urban district #2 are statistically higher than in #1 (OR=1.156, 95% CI=1,067-1,253, p<0,01). The urban district #2 is characterized by a higher mortality rate in women, that is due to the high mortality rate from breast cancer (OR=2,8, 95% CI=2,17-3,62, p<0,01). Though it should be noted the cancer mortality rate for central nervous system (both sexes) is higher in urban district #1 (OR=3,06, 95% CI=1,4-6,66, p<0,01).

Conclusions: This study is a first key point of an ongoing epidemiological research on cancer mortality in workers of blister copper production enterprises. The results obtained are expected to be explained by further calculated connections (risk ratio) in cancer mortality rates and structure between workers and control group, as well as due to differences in the enterprises technological processes.

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Relationship between depression and cardiovascular risk factors in the general Japanese population: the Watari study

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Introduction: Previous studies have shown that depression is an independent risk factor for cardiovascular disease, however, the mechanism underlying this association is yet unclear especially in Asian populations. The aim of this study was to evaluate the association of depression and cardiovascular risk factors including moderately increased albuminuria (30-299 mg/gCr) with the presence of hypertension in the general Japanese population.

Materials and Methods: A total of 1461 inhabitants of Watari town who participated in a medical check-up in 2019 was enrolled in this study. Fasting blood and urinary samples were taken for biochemical analysis, and depression was assessed by using Self-rating Depression Scale (SDS). Logistic regression model was used to calculate odds ratios for the presence of hypertension (more than or equal to 140/90 mmHg or use of anti-hypertensive drugs).

Results and Conclusions: After excluding participants with missing data or overt albuminuria, 1033 individuals were included in the final analysis. Multivariate logistic regression analysis showed that moderately increased albuminuria was significantly associated with the risk of prevalent hypertension (odds ratio: 3.292, 95%CI: 1.679-6.453, p<0.001 vs. normoalbuminuria) after adjustment for age and sex. Similarly, mild depression (SDS score of 40 to 47) was found to be a significant predictor of prevalent hypertension (odds ratio: 1.386, 95%CI: 1.008-1.906, p=0.044 vs. normal). In conclusion, moderately increased albuminuria and mild depression were possible predictors of prevalent hypertension in the general Japanese population.

08. HISTORY OF PREVENTION OF OCCUPATIONAL AND ENVIRONMENTAL DISEASES

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The First List of Occupational Diseases in Russia

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Introduction: In 1924, the creation of a list of occupational diseases began in Russia, which gave the worker the right to benefits and, if necessary, to a disability pension.

Materials and methods, development analysis. The draft list, prepared by the employees of the USSR People's Commissariat of Labor, consisted of several blocks, which included occupational poisoning (lead, mercury and phosphorus), pathologies arising from the effects of physical factors (decompression sickness, chronic inflammation of synovial bursae, deafness, cataracts, inflammation retina, etc.), and severe anemia due to ankylostomyiasis. Representatives of trade union organizations proposed expanding this register for all groups, to include poisoning with arsenic and gasoline, blindness, varicose veins, as well as completely different nosologies, such as pneumoconiosis and neurasthenia. However, only two pathologies were included in the list: severe injuries in workers of X-ray machines and severe neurosis in workers in psychiatric hospitals. The list of occupational diseases was later modernized due to the extension to doctors of the concept of "labor injury", obtained only after the elimination of a number of epidemics (cholera, typhus, scarlet fever, leprosy, malaria, etc.).

Results and conclusions: The first list of occupational diseases (1925, with the additions of 1928) laid the foundations of Soviet legislation on the social security of disabled workers. The discussion around the inclusion of specific pathologies in the list indicated the most important directions of its development, which were implemented when creating updated registries.

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The Historical Perspective of the Themes Addressed in the Romanian Journal of Occupational Medicine during 1991-2021 as an Educational Resource for Occupational Health Professionals

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Introduction: At <https://sciendo.com/journal/RJOM> reaches a scientifically compatible level with other medical international journals, assuring international participations, represents a space for the scientific activities of the professional body of O.M. doctors. **Material and method:** In the 71 paper journals near online ones, we reviewed the team structure, interdisciplinary collaborations, the industry growth and decline, the O.D. prophylaxis/detection/recognition/statistics, standards' proposal, new methods of hazards' measurements, doctoral releases, the continuous effort to

participate-collaborate in international events, networks, legislative projects, COVSARS2 pandemic involvement.

Results: The actual cover format went through many model changes and the content continues the Romanian Journal of Hygiene, Social Medicine and Labour Medicine(1988-1990) from which it detached itself in 1991. Until then, the O.M. articles appeared in the Hygiene Journal(1951-1987). The structure of content varied relatively little, but there is a shift in concerns, from those focused on the type of industry (construction, sanitation, metallurgy, mining, agriculture)/geographic area/job characterized by professional exposure supported by measurements, to thematic, scientific-medical presentations where more frequent are occupational cancer, respiratory and dermatological pathology, solvent poisoning, lead, bronchial asthma and obstructive sleep apnea.

Conclusion: We documented the relevance of a new resource and ways of use it for the education oriented on the evolution of medical thinking without reaching the university curriculum of O.M.

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Luigi Parmeggiani and the International Labour Organization in the "Development turn" years (50s-70s)

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Introduction: The research is part of a wider project concerning the contribution by Italian physicians to the ILO. The paper outlines the role of Luigi Parmeggiani (1918-1989), chief of the Occupational Safety and Health Branch of the ILO from 1962 to 1973, then Secretary of ICOH.

Material and Methods: Historical research on the ILO has recently undergone a phase of further scientific maturity. It is now possible to put the story of individual officials into a more complete historical picture. Grounding on Italian and ILO archives and on official printings, the paper aims to include Parmeggiani's case within the overall effort of the ILO during the years of the "Development turn". Results: Parmeggiani's appointment at the head of the Occupational Safety and Health Branch sanctioned, on one hand, the international recognition of the Italian school of Occupational medicine; on the other hand, the international experience of a professional figure who had been recognized for his ability in missions both in Europe and in less industrialized countries, collaborating with different institutions. He had distinguished himself for a discreet international activity even before his arrival at Geneva. Since his first ILO mission in Turkey (1960), Parmeggiani has been also involved in the new task that the Organization took on after World War II: the technical cooperation in the developing countries.

Conclusions: Parmeggiani's appointment represented the return of Occupational Medicine to lead the Occupational Safety and Health Branch, after engineer Marcel Robert. Carozzi's legacy proved useful even in the new times of post-WWII

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Luigi Carozzi and the International Labour Organization between the World Wars

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Introduction: The research, concerning the contribution by an Italian physician to the International Labour Office (ILO), has been motivated by the centenary from the foundation of the organization. In this context, Luigi Carozzi (1880-1963), who was also secretary of ICOH, stands out since he was chief of the Industrial Health Service from 1920 to 1940.

Material and Methods: The study is based on the examination of largely unpublished documents from the Italian Central State Archives, the ILO Historical Archives and his personal papers. The research also examined the collections of printed materials edited by ILO and available online, such as bulletins, studies and reports, reviews and resolutions adopted by their conferences.

Results: Since the beginning of his activity as clinician in Milan, Carozzi has highlighted the importance of industrial hygiene, as a reasonable point of contact between medicine and work organization. In ILO his contribution was expressed into the elaboration of protocols for the minimization of the pathogenic risk, especially linked to exposure to lead and silica dust. In order to apply those prevention measures, he also established relationships with ILO state members. Subsequently Carozzi focused on the protection models for workers, making proposals for the expansion of state compensation for emerging occupational diseases.

Conclusions: The contribution of Carozzi within the ILO appears significant for his ability in developing political and social tools and in mediating with many governments, including Fascism in Italy, balancing productive interests with the health protection.

09. INDOOR AIR QUALITY AND HEALTH

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Noise exposure and thermal comfort in call centre employees: difference between measurements and perception

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Introduction: Call centre employees, often, express dissatisfaction due to unfavourable working conditions. In this work are analysed two aspects that induce discomfort and stress: noise exposure and thermal comfort.

Material and Methods: The evaluation of thermal comfort conditions (ISO 7730 standard) and noise exposure (ISO 11904-1 - MIRE technique) in Call Centre was carried out in 6 different plants hosting, in total, 1400 employees engaged in inbound and outbound sectors. In addition to the measurements, questionnaires were issued to 314 workers, equally distributed, to investigate the degree of satisfaction perceived during work execution.

Results: The overall average values of the Fanger's indexes (PMV-PPD) outline a condition of neutral thermal sensation with few cases of slight discomfort from cold or heat. Instead, the results of the survey on the perceived thermal comfort, have pointed out a partial disagreement with the data predicted by Fanger's model, since a non-negligible percentage of workers expressed a marked dissatisfaction (cold 24% - hot 18%). It was also verified that outbound employees are more exposed to the background noise of the open-space environments that, in 30% of cases exceeding 70 dB(A), but, in general, have lower levels of daily personal exposure. **Conclusions:** It is possible to assume that the sensations of thermal discomfort perceived from employees, even in environments where the Fanger's indexes describe a comfort condition, are presumably associated with work related stress conditions, also due to noise annoyance, with the consequent alteration of sensory perception.

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Cabin fever syndrome: the emerging indoor environment quality related problems during lockdown in the pandemic era

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Introduction: Cabin Fever Syndrome(CFS) describes a group of mental health symptoms that people may experience when they are confined over weeks in their residence for extended periods, such as the lockdown during the COVID-19 pandemic. Meanwhile, Indoor Environment Quality(IEQ) may also affect psychological health problems. Therefore, the hypothesis of this study is that IEQ problems may be related to the occurrence of CFS.

Methods: A cross-sectional study was conducted among 360 full-time working-from-home workers during lockdown in Bangkok, who were selected via the occupational health(OH) of the work from home project. The data was obtained by a self-administrated online questionnaire. The demographic data and the eight self-perceived IEQ problems, the occurrence of CFS and coping methods were analyzed. **Results:** CFS was commonly and significantly found among younger people, but there were no differences in terms of gender, education, personality type and accommodation type. The most common IEQ-related problem was an inappropriate temperature. The perception of IEQ problems was risky in terms of CFS occurrence with $p < 0.05$. This study also found the dose-response between a number of IEQ problems and CFS with p for trend < 0.001 , but did not identify the specific association with any IEQ problems. There were various coping activities that could decrease CFS, but only their time management was significant at $p < 0.05$.

Conclusions: IEQ problems may be an important factor that may be related to occurrences of CFS. OH providers should be concerned and give advice to resolve this problem in terms of mental health well-being.

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Urinary biomarkers for secondhand smoke and heated tobacco product exposure

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Introduction: Concerns have recently grown about the health effects of exposure to secondhand smoke and heated tobacco products. The analysis of tobacco smoke biomarkers is critical to assess the health effects of tobacco smoke exposure. For this purpose, the simultaneous determinations of exposure markers and health effect markers would provide a better evaluation of smoke exposure.

Material and methods: Nicotine metabolites (nicotine, cotinine, trans-3'-hydroxycotinine) and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol in urine were analyzed as exposure markers by LC-MS/MS. The DNA damage markers, 7-methylguanine and 8-hydroxy-2'-deoxyguanosine, were simultaneously measured as health effect markers by HPLC-ECD. The study was approved by the Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan.

Results and Conclusions: Significant levels of urinary nicotine metabolites and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol were detected in the subjects exposed to secondhand smoke and heated tobacco products. In addition, the urinary levels of 7-methylguanine and 8-hydroxy-2'-deoxyguanosine tended to be higher for secondhand smoke and heated tobacco product exposures, as compared to those of non-smokers. These biomarkers will be useful for evaluating tobacco smoke exposure. This work was supported by JSPS KAKENHI Grant Number JP17H01908.

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Combating with poor Indoor air quality to improve work environment at IndianOil

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Introduction: Indoor air quality have a great impact on physical and psychological health of employees working in buildings. IndianOil Institute of Petroleum Management (IIPM), located in National Capital Region of Delhi(NCR) is a premiere institute consisting of multiple training halls & auditoriums. In view of COVID-19 pandemic, modifications were carried out in air handling unit system at IIPM.

Materials and methods: A detailed study of air movements, intake and return path was carried to find out measures to ensure adequate air exchanges. Additional air inlets with Dual PM10 filters were fixed on all air intake paths to reduce the pollutant level in air entering the building. The air handling unit at the institute was also fitted with special grade air filter for bringing down the PM2.5 level below 60. Special grade filters filtered the pollutants and reduced the pollutant level of air. An online air image sensor was installed to measure the quality of ambient air after filtration. Stand-alone air cleaner/filter units were also installed in training halls, lobbies and waiting areas.

Result: Following modifications there was improvement in air quality by 90%. This resulted in building confidence level and provided a stress-free safe environment for employees working at the institute. Employees working at IIPM confirmed reduction in eye irritation, headaches and fatigue due to air pollution.

Discussion: Installation of air filters inside the building helps in improving air quality which in turn prevents common health issues at workplace. This has prompted us to provide similar solutions in other office buildings in NC

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The prevention from infection with COVID-19 of students in auditoriums through carbon dioxide measurements – an evidence from Estonian and Latvian high schools

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Introduction: Many studies focusing on the way how continually monitor COVID-19 infection risk indoors by verifying the efficiency of indoor ventilation and monitoring of CO₂ (carbon dioxide) are published. In order to increase evidence of CO₂ levels in schools and correlate them with the airborne spread of COVID-19 infection is the aim of the current study. When level of CO₂ is low, there are no aerosols and viruses (COVID-19) that spread with finest particles.

Material and methods: Study includes CO₂ measurements in four high schools in Estonia and Latvia. Additionally, questionnaire survey in order to explore students' attitudes, perception towards health and safety, restrictions, information dissemination and risk awareness were conducted in three high schools in Estonia and one in Latvia, during autumn of 2019 and 2021. ANOVA statistics used for questionnaire ($p < 0.001$, $\alpha = 0.93$).

Results: The high levels of CO₂ inside the auditoriums (rooms) are related to the outside ones. Concentration of CO₂ outside the buildings (2019) in towns was 500 ppm (measured near busy street), this decreased in 2020 (from 500 to 350 ppm) after COVID-19 Pandemic began and according to this, the CO₂ decrease also indoors. Results of the study showed differences between high schools in Estonia and Latvia. Survey showed that students are more disciplined to follow demands in Latvia.

Conclusions: The study showed signals of getting virus in CO₂-rich air. Several recommendations for studying environment and restrictions because of COVID-19 is provided based on the results.

Study reinforces prominent role of CO₂ measurement in high schools.

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The right to opt for natural ventilation (ventilation by opening windows) in the work place strongly reinforced by the realities of the SARS-CoV-2 pandemic

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Introduction: The presentation builds on previous papers about the right to choose between air conditioning-based ventilation and open-windows ventilation, above all to ensure that persons with high sensitivity to the factors causing sick building syndrome be given the possibility of avoiding them (an objective achieved by some firms through areas-partitioning). The SARS-CoV-2 pandemic has strongly highlighted the need for efficient air-recycling-free ventilation in indoor spaces, with experts emphasizing that opening windows is more effective for contagion prevention than the currently-ubiquitous disinfection. This work investigates selected features of the implementation of such recommendations.

Material and Methods: The study utilised online interviews with teachers (mostly, secondary schools) and some persons working in other set-up types. The interviews focused on the practice of opening windows when working in-person. Information on feasibility and challenges, as well as suggested recommendations, were collected.

Results and Conclusions: All the interviewed persons agree on the importance of opening windows, and practice it as much as possible under their work circumstances. They recommend the provision of extensive information at all levels, so that more students and co-workers can appreciate the practice. They hope that more attention is given to the indoor-air quality also after the end of the pandemic. Some discussions raised the point of the impact of poor indoor-air quality on the body's resistance to pathogens causing respiratory diseases – an issue deserving thorough specific investigation by specialist.

10. INDUSTRIAL HYGIENE

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Assessment of professional judgement in the field of occupational hygiene: comparison of expert and observed data distributions

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The concept of professional judgement underpins the way in which an occupational hygienist assesses an exposure problem. Despite the importance placed on professional judgement in the discipline, a method of assessment to characterise accuracy has not been available. In this paper, we assess the professional

judgement of a group of occupational hygienists ('experts') when completing exposure assessments on a range of airborne contaminants across a number of job roles within a surface mining environment. The novel approach of eliciting exposure assumptions focusing on contaminant concentration and attribution of an exposure standard estimate was used. These elicited values were then compared to measured data using a scaled Beta distribution, providing a good approximation of the expert's professional judgement in the context of the study. Our findings suggest that occupational hygienists are inclined to overestimate exposures and that they were more accurate at estimating percentage of exposure standard than the actual concentration values. The practical implication of overestimating may be an 'overprotection' of workgroups, or a misallocation of resources such as risk controls, respiratory protection, health surveillance and awareness programs. We demonstrate that this approach and the encoding methodology contained within can be applied to assess accuracy of exposure judgements which will impact on worker protection and occupational health outcomes.

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Comparison of Quantitative Mineralogy and Sequential Leaching for Characterization of Ni in Workplace Dust Collected at a Stainless Steel Operation

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Introduction: Based on epidemiological records of workers at Ni operations, regulatory guidelines commonly target specific Ni compounds for setting exposure limits. Thus, reliable methods of Ni speciation in airborne dust samples are required for effective monitoring of workplace exposure. Zatka sequential leaching has been routinely performed industry-wide since the 1990's for characterization of Ni in dust samples; however, limitations related to leaching kinetics have been identified, and optimization of the methodology is required to improve accuracy of data.

Material and methods: In this study, Ni characterization of dust collected from a stainless steel operation was performed using Zatka sequential leaching (original and modified protocols) and quantitative mineralogy (QEMSCAN). Mineralogical analysis was also performed on bulk material collected from selected work areas at the plant. The results are compared with the objective of identifying opportunities to optimize the methods for characterizing dust that is unique to stainless steel manufacturing.

Results and conclusions: The quantitative mineralogical analysis determined that the Ni dust is composed of oxidic and metallic Ni, and the results were validated against chemical assays and alternate methods of mineral characterization. In contrast, the original Zatka method erroneously identified soluble Ni as a major Ni contributor, whereas the modified Zatka method identified sulfidic Ni. The mineralogy identified Ni-barren dust and grain sizes and

liberation of individual Ni compounds as potential factors that can affect leaching selectivity.

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Development of rapid and highly accurate method to measure concentration of fibers in atmosphere using artificial intelligence and scanning electron microscopy -Verification using field filters

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Introduction: The demolition of buildings containing asbestos is expected to continue until approximately 2055 in Japan. Measuring the concentration of airborne fibers typically requires 2-3 days. In many cases, demolition works would have already been completed before the measurement results are obtained. Aiming to solve this issue, we developed a measurement method that can count fibers rapidly by scanning electron microscopy equipped with an artificial intelligence image recognition system (AI-SEM).

Material and Methods: We used filters of airborne fibers sampled chrysotile and amosite. A total of 832 images from filters was taken of the samples at a 5 kV accelerating voltage with 1 500X magnification scanning electron microscopy (SEM). Each of three expert analysts counted all images and created a model answer for fibers. We trained the artificial intelligence (AI) using 112 of the 832 images from filters. After the training, the AI counted fibers in 832 images again.

Results: AI-SEM can detect 45.8% of fibers which is similar to a skilled analyst. When observing 300 images with 1500X magnification SEM, the expected analysis time required for the trained AI is 7.5 minutes, whereas the expected time required for observation by an analyst is 150 minutes.

Conclusions: As the first step of the research, AI-SEM has shown the possibility of shortening the measurement time of the airborne fibers. The results of this research, especially about analysis accuracy is not sufficient for the development of AI-SEM; it is necessary to continue to verify and validate it in the future

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Exposure characterisation of wood dust particulate, endotoxins and glucans and their determinants in Mozambiquan wood processing workers

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Background: Comprehensive assessment of wood dust particulate and bioaerosol exposures in African settings is limited. This study characterised exposure to wood dust and its determinants in the Mozambiquan wood processing industry.

Material and Methods: A total of 124 inhalable personal samples, collected from a stratified random sample of 30 workers, were analysed for dust particulate, endotoxins and (1-3)- β -D-glucans. Multivariate regression models were developed to investigate significant exposure determinants.

Results: The geometric mean (GM) inhalable particulate concentrations were 3.29 mg/m³, 98 endotoxin units (EU)/m³ and 123 ng/m³ for glucans. In the models, predictors for higher particulate levels were working with African sandalwood or Mahogany bean (GM ratio, range: 3.19-3.39), sawing (GMR=4.18), painting (GMR=4.01), carpentry (GMR=3.74) or machinery (GMR=2.39) tasks. Panga-panga and African teak wood were predictors of lower particulate levels (GMR range: 0.36-0.39). Determinants of higher endotoxin were African sandalwood (GMR=9.21), closed buildings (GMR=2.10) and sawing (GMR=1.48); while for lower levels were Panga-panga (GMR=0.54), dry wood (GMR=0.06), painting (GMR=0.32) or joinery work (GMR=0.14). Semi-closed buildings (GMR=2.14) were predictors of higher glucans levels. Damp cleaning consistently predicted lower endotoxin, glucans and particulate levels (GMR range: 0.35-0.55).

Conclusion: Working with certain wood species (African sandalwood, Mahogany bean) and poorly designed buildings were associated with higher dust exposures, whereas damp dust cleaning practices were associated with lower exposures.

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Monitoring nano-particle release of metal additive manufacturing (3D printing) to assess working occupational exposures through the printing process phases

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Introduction: The high energy and temperature used for melting metals during additive manufacturing generate high numbers of fine (FP) and nanoparticles (NP), with significant time-dependent variations. To evaluate possible health risk, we investigated the time course of airborne FP and NP released during different phases of two selective laser melting processes as well as their environment boundaries (temperature t, humidity UR, mechanical ventilation MV).

Materials and methods: FP were monitored by the aerosol particle counter LasairIII (Particle Measuring System, 0.3-25 μ m). DiScmini (Testo), was used for measuring number (n) and average diameter (δ) of NP (10-300 nm). t and UR were monitored through data logger 174-H (Testo).

Results: The core of the printing phase entailed a slight but continuous increase of n and δ , and almost constant FP number, whereas the warm-up and cleaning without MV increased the n of

released NP by +26% and +37%, respectively. Turning-on MV during cleaning and warm-up limited the increase of n (respectively -50% and +1% as compared to printing). At the end of printing, with no MV and no operating activities, there was a constant increase of n and decrease of δ (respectively +48% and -22% in 14 hours), suggesting the low deposition rate of generated NP, with a positive relationship between the n and UR.

Conclusions: The phases and operators' tasks as well as the environment boundaries have impact on the NP release and size. Analysing a wider spectrum of conditions and processes is necessary to characterize potential exposures and to suggest effective mitigation measures.

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Time trends in full- shift exposure to benzene in the offshore petroleum industry in Norway (2002-2018)

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Background: Workers on offshore petroleum installations have a potential for benzene exposure during operation and maintenance of the process system. The aim of this study was to investigate the time trend in full-shift benzene exposure among laboratory technicians, mechanics, process operators and "others" during the last two decades.

Materials and methods: The dataset comprised 924 personal measurements (sampling duration 60-940 min) performed on 25 different installations on the Norwegian Continental Shelf. Geometric mean (GM) was estimated for three sampling periods (2002-2006, 2007-2011 and 2012-2018). Time trend was investigated annually, both overall and by job group. Calculations was done by linear mixed effect tobit regression analyses to account for multiple limits of detection. Analyses were performed unadjusted and adjusted for job group, design of process area, season, wind speed, and sampling duration.

Results and conclusion: Adjusted GM benzene exposure in the periods 2002-2006, 2007-2011 and 2012-2018 were 0.003 ppm (95% CI 0.002-0.006 ppm), 0.004 (0.002-0.005) and 0.010 (0.006-0.017), respectively. An overall annual increase of 8% in GM benzene exposure was seen during 2002-2018. A change in measurement strategy over time towards more sampling on days with exposed work tasks could have contributed to the overall increase in exposure level. For the mechanics and process operators no annual changes were observed, while increase (32%) was seen for the group "others". Laboratory technicians had annual decrease (11%) which might partly be explained by implementation of control measures.

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Proactive Approach to Occupational Hygiene in a Pharma Formulation Company

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Introduction: A diverse approach to occupational hygiene & employee engagement was demonstrated by a progressive medium-sized pharmaceutical company with 500 employees located in Ahmedabad, India. Occupational hygienist was appointed though not required by local law.

Methods: Site EHS vision statement on “Creating Zero Harm Culture” developed. Activities focussed on creating awareness for managing environmental stressors, conducting exposure assessment & efficient maintenance of engineering controls. “Occupational Hygiene Theme” celebrated.

Results: Occupational hygiene activities undertaken proactively include:

- Exposure Assessment: Qualitative & quantitative assessment was conducted where 13 operations were analysed from exposure risk perspective.
- Hearing Conservation: Noise control measures & interventions implemented after risk assessment.
- Ergonomics: Ergonomic workshop highlighting manual handling activity risks, laboratory ergo risks & prolonged computer work station risks. Risk assessment conducted by RULA REBA methodology.
- Elimination & substitution of Hazards
- Employee education by Occupational Hygiene (OH) videos prepared internally
- Train the Trainer Concept

Conclusion: Reduction of occupational hazards to permissible level, behavioural change and improved satisfaction achieved by completing more than 15 projects in last 3 years. These are easy to apply, action-oriented, innovative, low-cost and focus on workplace improvement. Implementing these principles helped to reduce site exposure to potential risk and liability.

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More Than silica; exposure of stonemasons to volatile organic compounds

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Introduction: Artificial stone (AS) is widely recognised as a significant source of occupational respirable crystalline silica (RCS) exposure. However, stonemasons may also be exposed to noise, vibration and chemicals that could have additive or synergistic effects in combination with RCS. The aim of this project was to evaluate stonemason exposure to volatile organic compounds (VOCs).

Methods: Similar exposure groups (SEGs) monitored included factory-based wet polishers (n=2), Bridge saw operators (n=2), mitre assembly (n=2), warehouse (n=1), monument (n=1), and field technicians (n=2). Personal monitoring was undertaken from 26-29 November 2018 in accordance with AS/NZS 2986.2 using diffusive badges (SKC 575-001). Analysis was by NSW TestSafe (NATA #3726), method WCA 207. Twenty-nine (N=29) VOC samples were collected, ethics approval H12930.

Results: The VOCs exposures for all SEGs were compliant with current occupational exposure limits (OELs). VOCs detected included styrene, toluene, ethylbenzene, acetone, n-heptane, methylcyclohexane, cyclohexane, 3-methyl hexane, n-pentane, 3-methyl pentane and 2 methyl butane (<1% of OEL), and xylene, ethyl alcohol, and n-hexane (<10% of OEL).

Conclusions: The study found stonemasons may be exposed to ototoxins, as well as aliphatic and aromatic hydrocarbons that could have an additive effect with RCS for autoimmune diseases e.g. systemic lupus erythematosus and systemic sclerosis. Further research is needed on potential health effects associated with co-exposure of stonemasons to RCS and biological, chemical and physical hazards, especially for autoimmune diseases.

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Chemical Risk Assessment in a Paint Industry : The Case of a Paint Company in Cotonou Benin

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Introduction: Throughout the world, the problem of the use of chemicals is a real public health issue. The chemical risk associated with the use of those products is not negligible. The objective of this study is to contribute to a better knowledge of chemical risks at a paint company in Cotonou.

Methodology: This was a cross-sectional descriptive and analytical study that took place from May 15 to June 15, 2020 at a paint company in Cotonou. The study population consisted of thirty-seven (37) workers from the paint company. The chemical risk assessment in our study was carried out using the Oper@ method. The non-probabilistic method with the exhaustive choice technique was used. Data entry was done in Excel software and analysis with SPSS software version 22.0.

Results: All the products evaluated, about a total of seven (07), present a high level of severity. The overall prevalence of exposure was 51.4% (95% CI; [35.1-67.6]). As for the impact of exposure on health, clinically, only the occurrence of eye disorders is significantly associated with exposure to chemicals (p = 0.012) and, at the para-clinical level, only abnormalities in liver function tests are significantly associated with exposure to chemicals (p = 0.029).

Conclusion: Exposure to chemicals is associated with eyes and the liver dysfunction.

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Interaction of Occupational Risk Factors and Health industrial workers in the Republic of Kazakhstan

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Introduction: According to WHO, workers make up half of the world's population and are the main contributors to economic and social development. Their health is determined not only by the risks in the workplace, but also by social and individual factors.

Materials and Methods: The purpose of the study was to determine the role of social and hygienic factors and their risk in the formation of workers' health

Results and Conclusions: The following indicators of professional risk were obtained: Dissatisfaction with work - 43.7% (low wages - 44.2%, poor work organization - 11.1%, inconsistency of work with

qualifications - 10.6%, dissatisfaction with working conditions - 42.5% (partially mechanized labor - 46, 7% and not mechanized - 19.1%), the presence of harmful production factors in the workplace (3 or more factors - 58.3; dustiness - 71.9%, noise - 61.8%, vibration - 60.3% , Smoking-55.6%; drinking alcohol-64.3%, Uncomfortable working position 48%, poor health among workers with more than 10 and 20 years of experience-50%; Thus, the subjective perception of the conditions and nature of work by the questionnaire by employees coincides with an objective assessment of the factors of the working environment and the labor process in a given production, which can affect the participation of workers in improving working conditions, compliance with labor protection and safety requirements at the workplace, increasing responsibility for maintaining their own health. Having both medical and social significance.

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Particulate Matter (PM) Exposure Assessment and its Control Strategies in a Small Coffee Roastery

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Introduction: As coffee consumption increases, the number of coffee roasts is increasing. Measuring the weight of green beans during the roasting process is one of the causes of PM generation during the pouring process from coffee sacks to baskets. The local exhaust ventilation (LEV) system is required to avoid worker exposure to PM. The purpose of this study was to evaluate the effect of LEV in mitigating PM generation during coffee bean weighing. **Material and Methods:** Differences in the concentration levels of PM were investigated to understand the generation of PM (10/2.5) and compare their concentrations according to their sizes over time, based on the presence or absence of an LEV. Sampling was performed in a roastery. An aerosol spectrometer was used to measure the concentration of PM. The background concentrations were measured for about 20 min. before each weighing. Factors affecting the concentration of PM, the presence of LEV, were investigated. **Results:** There was a significant difference in PM concentrations during the weighing of beans in those with an LEV compared with those without an LEV. Without an LEV, higher concentrations were observed. After pouring green coffee beans for weighing, the peak concentrations of PM₁₀ were 767.2 mcg/m³ with LEV, and 13,599.1 mcg/m³ without LEV. Meanwhile, peak exposures of PM_{2.5} were 171.6 mgc/m³ with LEV, and 340.4 mcg/m³ without LEV. **Conclusions:** Roastery workers may be exposed to high concentrations of PM. LEV may be an appropriate control strategy to mitigate PM exposure. Further studies, including personal exposure and risk assessment, should be conducted for roastery workers.

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Microbiological monitoring database. Sharing knowledge on occupational biological risk exposure

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Introduction: We developed a software for a database containing information about environmental microbiological monitoring in different working sectors, with samplings and analysis of air and surface microorganisms and with other tools to measure microbiological contamination.

Material and Methods: Database contains information about workplace data, monitoring data, monitoring results (CFU/m³ of air or /100cm² of surface) for each microbiological parameter; microclimate; other parameters like endotoxins or indoor allergens. A worksheet for statistical quality control of data and automatic conversion of the number of colonies in CFU has been included.

Results and Conclusions: The database is available for internal and external use, after registration, at this link:

<https://www.inail.it/cs/internet/attivita/prevenzione-e-sicurezza/promozione-e-cultura-della-prevenzione/software/applicativo-banca-dati-agenti-biologici-ambienti-lavoro.html>

Two are the possible access profiles:

- viewers: interested in consulting the archive and able to view a summary of the data

- users: technical personnel carrying out environmental investigations that intend to use the procedure to archive their data. Users are also viewers of monitoring performed by others.

The software was developed for:

- management of the detection process of microbiological contamination

- storage of data deriving from surveys

- evaluation of the results and statistical quality control of the microbiological data.

A better shared knowledge on this risk allows to define preventive strategies and measures in order to protect workers from occupational biological exposure

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The Real-time chemical exposure monitoring system in SME by using chemical sensor and communication technology

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Introduction: With the advent of the Industry 4.0 and the spread of uncontact-activities, changes arose in many aspects of manufacturing processes as well. In particular, the increase in the use of new chemicals, changes in employment patterns, and the creation of new jobs have a direct impact on the safety and health of workers. **Material and methods:** In order to prevent industrial accidents, KOSHA is promoting the establishment of safety and health infrastructure for workers, and plans to actively introduce Industry 4.0 technologies such as IoT sensors, communication technology and platform technology. In this presentation, I would like to introduce the real-time chemical exposure monitoring system projects which promoted by KOSHA. The purpose of this system is to prevent chemical poisoning.

Results: In order to monitor the level of exposure to chemicals in small and medium sized enterprises in real time, a system using IoT sensor technology is being developed. It is a method that notifies the exposure level of chemical substances in the workplace detected through sensors in a real time way.

Conclusions: This system can alerts employers and workers when a dangerous situation occurs, and provides safety information and technical advises for improvement of workplace. KOSHA is developing this new concept of safety and health technology and is promoting pilot projects to validate its effectiveness.

11. MINING OCCUPATIONAL SAFETY AND HEALTH

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Mining safety and health in the philippines: occupational and environmental impacts

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This research on small scale gold mining (SSGM) in Benguet, Philippines draws from three different but complementary data sources to analyze work, well-being and health in SSGM. The data sources were- 1. workplace inspection to assess working conditions; 2. health assessment and laboratory examinations among indigenous miners; and 3. environmental monitoring of mercury in water samples across all 13 municipalities of Benguet. The work analysis showed accident risks from use of explosives, poor visibility in tunnels, exposure to dust during tunneling, and chemical exposures to mercury and cyanide without protective equipment and proper ventilation. The workplace inspection of the underground tunnels showed safety infarctions including unsteady trenches, insufficient slopes, possibility of collapse of trenches, and the risk of subsidence. Another data from a sub-population of 34 miners showed major causes for hospitalization were trauma, ulcers, kidney and cardiac diseases. Low back pain was common and associated with heavy lifting ($p=0.001$). Reticulocyte count was associated with total lifetime mining hours ($p=0.033$). The mental status examination showed most deficits in repeat phrase and recent memory. For the environmental monitoring of mercury in 90 surface water and 40 drinking water samples, a considerable percentage exceeded the maximum contaminant level (MCL) of both the Philippine guideline (0.001 mg/L for drinking sources, 0.002 mg/L for surface waters), and EPA (0.002 mg/L), above which levels can cause risk to health. All the three different but complementary data sources show the need for an occupational and en

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Is personal discomfort a main factor in driving employees' wearing of hearing protectors in a mine setting?

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Introduction: Continuous exposure to noise can have both physiological and psychological effects on workers. Where a worker is exposed to excessive noise, hearing protectors should be worn. Company policy and personal comfort were the main factors identified in the adherence to wearing hearing protectors. The objective was to answer if there is an association between personal comfort and wearing of hearing protectors if the company has already set up a health and safety policy.

Material and Methods: The study employed a cross section research survey questionnaire. The target population involved was 107 workers in a heavy manufacturing and mine facility. Binary regression and descriptive analysis were conducted on the data collected.

Results: The majority of the study population agree personal discomfort is a factor using hearing protectors in the workplace, 36.2% agree ears hurt when wearing, 49.1% feel uncomfortable

when wearing especially in warm weather, and 27.6% feel itching when wearing. The adherence to wearing hearing protectors was not affected by years of employment or duration worn throughout the day. There is no significant association between reporting ears hurt while using hearing protectors and age or roles of workers. Workers are aware of sections of the company policy.

Conclusions: Although the company has a strong safety policy, personal discomfort is a factor in wearing hearing protectors within the company. To influence the wearing of hearing protectors a company should give employees the option to select the type of hearing protector and provide more choices.

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Health profile of mining workers of an open-cast iron ore mine in Eastern India: A cross-sectional study on Non-Communicable Diseases

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Introduction: Non-Communicable Diseases (NCDs) are important among adults and leading causes of mortality and morbidity globally. In the 21st century, India is experiencing a rising burden of NCDs consisting of cardiovascular diseases, stroke, diabetes, cancer, MSD, chronic respiratory diseases, accidents and injuries. Being the part of hazardous industry, mining workers are exposed to various factors and few develop disorders gradually. This study focused to know the health status of mining workers, epidemiological profile, prevalence of NCDs, factors associated and prevention.

Material and Methods: A cross-sectional study was conducted through health check-up of 160 mining workers of an open-cast iron ore mine in eastern part of India. Study period: January-March 2020. Chi-Square test was used for statistical analysis.

Results: The study revealed, mean age of employees 45.14 ± 10.09 years. Most of them (46%) were pre-obese or obese. 23%, 20% & 14% workers were hypertensive, with MSD and diabetic respectively. Ischemic Heart Disease (8%) and chronic respiratory diseases (7%) was present among few workers. BMI was significantly associated (at $p < 0.05$) with hypertension ($x^2=4.9021$, $p=0.02682$) and diabetes ($x^2=4.9354$, $p=0.02631$). Smoking showed statistically significant correlation ($x^2=6.5752$, $p=0.010341$, at $p < 0.05$) with hypertension.

Conclusions: The study emphasized need for implementation of population-based screening programs, community-based wellness program and some specific approaches like weight management plan, de-addiction program, smoking cessation program, yoga therapy to prevent NCDs in mining workers.

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Expanded health "accident" resulting from a dam rupture in Brumadinho (BRAZIL): workers' deaths surveillance

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Introduction: This is a quali-quantitative and descriptive study based on the investigation of deaths caused by the rupture of the mining tailings dam in Brumadinho/MG, in 2019, one of the largest socio environmental tragedies worldwide, identified through the Death Certificates (DC).

Methods: The investigation was conducted by the Betim/Mg Workers' Health Reference Centre, in its area of operation. 72 verbal autopsies were made, through household visits, being found that 59 deaths were of workers working for Vale S/A. Bardin's content analysis and the Statistical Packet for Social Sciences (SPSS 23) software were used for the analysis.

Results: According to the data, 66% were male, 75% were between 22 and 48 years old, 100% had a formal contract, 72% were outsourced workers and the Work Accident Communication was issued for 98%. The DCs were altered after the VA in 98% of the cases. Victims' families received instructions regarding social security, negotiations with the companies involved and healthcare.

Conclusions: This work highlights challenges faced by Workers' Health in the SUS (UHS), considering territories that house mining mega-projects, with heightened risks for the workers', community and environmental health.

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Artisanal gold mining, Mercury and Health. Paraguay

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Introduction: Artisanal gold mining is considered one of the extractive processes with greater amount of environmental problems, and human health, it is calculated that for every gram of gold mined, 7 to 30 grams of mercury can be used. The inappropriate use of mercury has neurotoxic effects and systemic in both occupational and environmental exposures.

Objectives: Evaluate the health impacts of mercury use in artisanal miners in Yobai pass in the years 2018-2019.

Methodology: Cross-sectional, observational, descriptive study. 99 miners of Paso Yobai were evaluated. A) Occupational clinical history was applied b) Questionnaire of Neurotoxic Symptoms Q 16 c) Mini Mental test d) study tremographic e) Biological Surveillance Mercury in 24-hour urine. The data were analyzed with SPSS 25.

Results: 78.2% were male, mean age 34.1 ± 12.9 . 62.2% had studies basic. 61.4% handle mercury. The mean years 7.4 ± 5.8 years. 20.2% they had arterial hypertension, abortion 10.1% and congenital malformation in 6.7%. Use of mask in 46.1%, gloves in 40.2%, boots in 17.1%. Trembling fingers 23.2%, nausea and vomiting in 22.8%. Q16 with disorders of memory 42.4%, change of mood and anger 39.4%, paresthesias 29.2% (Chi: 0.012). Mini mental Test 39.8% with slight impairment, 15.3% with moderate deterioration. Mouth ulcers in 27.3%, gingivitis in 13.1%, gingival border in 8.1%. Skin lesions 6%, tremor in 33%. Mean mercury concentration was 2.21 ± 2.30 ug / 24 hours. Those who handle mercury present higher values of mercury (Chi 0.006).

Conclusion: Multilevel interventions are necessary to install health promotion and risk prevention in Paso Yobai.

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Business Continuity amidst COVID-19 Pandemic, Experiences on Mining Sector in Indonesia

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Introduction: The National Economic Recovery and COVID-19 Control Committee prioritize Healthy Indonesia, Working Indonesia, and Growing Indonesia activities. Working Indonesia is a control measure to keep business activities in Indonesia running and prevent a significant decline in productivity. The mining sector has contributed significantly to the Indonesian economy, and special efforts were held to keep it running. **Objectives:** This study aims to document mining occupational safety and health in the Indonesian mining sector to control COVID-19 spreading.

Methods: The study used the literature and documents of Occupational Health and Safety (OHS) related to the mining and COVID-19 pandemic. Data were analyzed narratively to find the terms of law and regulation, occupational health and safety services, covid 19 test, tracing and treatment, and documentation of best practices in mining to prevent spreading COVID 19 on mining in Indonesia. **Results:** The mining sector is one of the essential businesses in Indonesia that is continuously active during the COVID-19 pandemic. Indonesia has a plethora of laws covering mining OHS, COVID-19 prevention and control guidelines in the enterprises, national and company COVID-19 vaccination program, and best practices of COVID-19 prevention program at the workplace.

Conclusion: The study concludes that mining in Indonesia continues to be active during the COVID-19 pandemic. OHS activities shifted to the COVID-19 prevention and control through regulations, guidelines, and best practices to continuously run the mining activities

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Overweight and Obesity in Australian Mining

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Introduction: The mining industry has reported higher than population levels of overweight and obesity, with poor diets and physical inactivity largely attributable. Targeting these factors through coordinated workplace wellness initiatives could help mitigate this issue.

Materials and methods: Participants at an open cut coal mine in NSW, Australia, completed a paper-based baseline survey. Subsequently a 12-week weight loss challenge was implemented, centred around diet and exercise. Different delivery modalities (PowerPoints, face to face talks, body composition scanning, handouts) were utilised, alongside competitive elements (weight loss leader board, prize winners) to drive participation. Follow-up data was collected 18-months after baseline.

Results: Surveys were completed by 389 participants at baseline and 420 at follow up. Post intervention participants reported significantly increased levels of physical activity, number of times they participated in moderate and vigorous exercise, and number of days they

participated in strength or toning activities. There was a reduction (although not statistically significant) in BMI and in bodyweight post intervention. However, weight loss of a 0.74 kg on average per participant is clinically significant, and substantial considering the impact of the COVID-19 global pandemic and global weight gain.

Conclusions: Sedentary behaviours are a key contributor to increasing levels of overweight and obesity. Workplace wellness programs may prove efficacious in reducing sedentary behaviours, reducing overweight and obesity and improving employee general health.

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Examining particulate matter exposures in & around an opencast coal mine in Southern India

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Introduction: Particulate matter (PM) from opencast mining operations has significant environmental & occupational consequences. Exposure to PM₁₀ & PM_{2.5} can pose health risk to both mine workers & community residing around the mine as pollutants disperse in the area. This study aims to evaluate the spatial distribution of PM & determine exposures from an opencast coal mine in Southern India.

Materials and Methods: Secondary data for bi-weekly ground-based observations of PM₁₀ & PM_{2.5} collected between March 2017–April 2018 were obtained for the Manuguru Opencast Coal Project, Bhadrachari-Kothegudem district, Telangana, India. Observations were made from ten locations situated 0.5 – 5 km from the mine & Inverse Distance Weighted interpolation model was applied to determine PM concentrations at specific operation sites (within mine) & residential areas (outside mine) using QGIS 3.10.

Results and Conclusion: Spatial interpolation revealed the highest concentration of pollutants inside the mining area. Interpolated seasonal PM₁₀ concentration inside the mining zone were 151 – 170 µg/m³ (Summer), 112 – 122 µg/m³ (Monsoon), 99 – 100 µg/m³ (post-monsoon & winter) & PM_{2.5} concentrations were 54 – 60 µg/m³ (Summer), 45 – 48 µg/m³ (Monsoon), & 46 – 50 µg/m³ (Post-monsoon & Winter). Summer PM₁₀ concentrations were highest near the mine, suggesting likely contribution by enhanced resuspension of mine dust. Our study highlights the significance of pollutant modeling in mining areas for better occupational & environmental health practices. Further prediction of diesel & dust-related PM exposures through dispersion modeling is underway.

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Exploring the relationship between risk factors to occupational injuries and gender among artisanal gold miners in Kakamega, Kenya

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Introduction: Artisanal and small-scale gold mining (ASGM) is a source of livelihood for thousands of men and women in Africa.

Despite both men and women engaging in this occupation, there exists disparities in how these two genders benefit economically from ASGM. In addition, regardless of ASGM being an important economic activity, both women and men are exposed to risk factors to occupational injuries while engaging in the work. This study therefore explored the relationship between injury risk factors and gender among miners in Rosterman, Kakamega county in Kenya. It also highlights other gender disparities in the engagement of ASGM.

Material and Methods: A descriptive cross-sectional study was carried out on 313 artisanal gold miners in Rosterman, Kakamega County. Both quantitative and qualitative data was collected on risk factors to occupational injuries. ODK was used to collect the data. Chi-square test of association was carried out. SPSS was used to analyse the data.

Results: Men in the study comprised 68.7% , while women comprised 31.3%. From the chi-square test the following injury risk factors had a significant association to gender with P is significant if < 0.05. The significant risk factors included smoking, alcohol consumption, training on frequent mining activity, training on injury prevention, having a personal safety culture, day shift work hours and underground ore excavation.

Conclusion: Occupational injuries are prevalent among both women and men. Gender does have significant association with various occupational injury risk factors. Injury prevention measures in ASGM need to be gender-specific.

12. MUSCULOSKELETAL DISORDERS

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Musculoskeletal pain in the coronavirus disease 2019 pandemic: How is it related to work from home?

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Introduction: During the coronavirus disease 2019 pandemic, work from home (WFH) has a negative impact on a musculoskeletal system when performed in non-ergonomic conditions. Given that many workers experienced WFH for the first time during the pandemic, the aim of the study was to examine new working conditions and related musculoskeletal pain.

Material and Methods: The cross-sectional study included 722 participants (52.5% women, 46.5% men), aged 40.6±8.9 years, who have been working from home between March 2020 and March 2021. They completed a self-administered WFH questionnaire about a job sector, working conditions, exercising, and musculoskeletal pain. The research was approved by the Ethics Committee of Zagreb University School of Medicine.

Results: The majority of participants (38.9%) were employed in the information technology sector. Most (90.6%) were using laptops for work, 60.4% had office desks, 40.9% had computer mice, and only 34.6% had office chairs available at home. Fourteen percent did exercises during work breaks, and 35.6% did it regularly regardless of a job. Sixty percent reported greater lumbar pain, 37.7% greater neck pain, and 19.8% greater hand pain than before the pandemic. Those with greater lumbar pain had office chairs less available than the others with constant pain or without any lumbar pain (P=0.010).

Conclusions: Workers mostly suffer from lumbar pain, and rarely did exercises or had office chairs available at home. WFH brings additional risks for the musculoskeletal system and should be better controlled by increasing the availability of ergonomic equipment and promoting exercising.

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Benefits of Ergonomics in Industrial Material handling

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Introduction: In any industry, it becomes essential for the operator to carry out the physical activity routinely number of times. In such cases adhering to wrong practices even inadvertently can become potential hazard as such wrong practices enhance the chances of the operator falling pray to backache over a period of time. Thus, adhering to suitable Ergonomic based practices help in minimizing the impact of backache on already affected operators and/or prevents the new operator from not getting affected from backache. This paper describes and how application of suitable Ergonomic principles in manual material handling is helpful in minimizing the impact of backache on the already affected operators and can also lead to its prevention among the new operators.

Materials and Methods: Retrospective case history data of backache cases observed during 1990 to 2016. Analysis of medical data recorded prior to the systematic study and that obtained after the implementation of the remedial measures.

Results: It shows a significant reduction in incidences of backache in post study era. Thus, the present study demonstrates the how application of principles of Ergonomics suitably can minimize the impact of Backache in persons carrying out manual operations routinely.

Conclusion: It is concluded that principles of ergonomics are very useful in general and particularly application of ergonomics in an industrial material movement offers great benefits like minimizing the impact of backache on already affected operators and/or prevents the new operator from not getting affected from backache.

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A health impact assessment of a preventive measure to reduce the risk of work-related low back pain, lumbosacral radiculopathy and knee osteoarthritis among construction workers in the Netherlands

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Introduction: Worldwide the construction industry is characterized by high physical work demands and prevalent work-related musculoskeletal disorders (MSDs). The two body regions with the highest one-year prevalence are the low back (51%, 95%CI 41–61) and the knee (37%, 95%CI 22–52). A job were workers are exposed to high physical work demands that are established risk factors for

these complaints are floor layers. To prevent these complaints, a manual moved machine (MMM) was introduced to reduce the exposure to kneeling and bending of the back for floor layers in the Netherlands. The aim of this paper is to estimate the potential health gain of the MMM in preventing low back pain (LBP), lumbosacral radicular syndrome (LRS) and knee osteoarthritis (KOA) compared to the traditional working technique.

Materials and Methods: The potential health gain was assessed using the Population Attributable Fraction (PAF) and the Potential Impact Fraction (PIF). For LBP and LRS, the exposure limit was set at working 30 minutes per day with the back >40° flexed with a corresponding OR=1.7 and 2.4, respectively. For KOA this was kneeling 60 minutes per day with an OR=1.7. The percentage of workers exceeding these thresholds was based on worksite observations among 18 floor layers.

Results: For LBP, 9/10 workers were at risk using the traditional working technique with PAF=38%, and for MMM this was 6/10 with a PIF=13%. For LRS, these data were 9/10 with PAF=55% and 6/10 with PIF=18% and for KOA, 8/10 with PAF=35% and 2/10 with PIF=26%.

Conclusions: A MMM might have a significant impact on the prevention of LBP, LRS and KOA among floor layers.

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Prevalence Of Musculoskeletal Disorders Of Upper Limbs Of The Informal Sector : The Case Of Dyers From Anyama, Ivory Coast

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Introduction: informal sector dyeing activities expose workers to various risks including musculoskeletal disorders (MSD) of the upper limbs

Material and methods: We conducted a descriptive study over 10 months (July 1, 2018 to April 30, 2019), focusing on MSD of the upper limbs presented by the dyers of the informal economy of the town from Anyama. Data were collected using a survey form based on the Nordic Kuorinka questionnaire applied to the upper limbs. The clinical diagnosis of MSD was made according to the european protocol for clinical examination for the identification of musculoskeletal disorders of the upper limb SALTSA.

Results: We recorded 110 dyers mainly female (60%) with an average age of 37.75 +/- 14.24 years. The average professional seniority was 13.35 +/- 11.84 years with extremes 1 and 46 years. We found an 87.27% prevalence of upper limb MSD. These were mainly rotator cuff syndrome (72.8%), neck pain (54.1%) and carpal tunnel syndrome (19.7%). In our study, professional seniority had a statistically significant link with the occurrence of TMS-MS (p = 0.001) in dyers.

Conclusion: MSD of the upper limbs have high prevalence among dyers, thus compromising the sustainability of activities already carried out under precarious conditions. Among the recommendations, we emphasize the value of training dyers on gestures and postures at work.

183**Investigation of work technique training to reduce physical loads on the musculoskeletal system among airport baggage handlers - Results from the quasi-experimental ErgonAir study**

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Introduction: Physical loads at the workplace are a main source of incapacity for work resulting in considerable costs. The study evaluates the effects of an educational training program developed for baggage handlers at Hamburg Airport.

Materials and Methods: This quasi-experimental trial allocated 52 workers to two groups receiving the educational training program or no intervention. The program consisted of 16 sessions in three simulated work scenarios. Transfer into practice was enhanced with visits at the working place. Primary outcome was the cumulative musculoskeletal load for the back, knee and shoulder region of the workers. It was assessed by a motion-capturing system and video recordings. Measurements were performed before and after the intervention. They were analyzed with ANCOVA-models adjusting for baseline load and additional potential confounders.

Results: For the working scenario of loading baggage at the baggage wagon the adjusted difference between intervention and control group for the cumulative musculoskeletal load of the back was -1455 weighted grade-seconds (95%-CI -2517 – -393), 2227 (1644 – 2810) for the load of the knees and 813 (-523 – 2150) for the load of the shoulders. After Bonferroni correction for multiple tested hypothesis, only the results for the knees were statistically significant. There were no significant differences in the other two scenarios.

Conclusions: Behavioral changes were observed in some working scenarios. After the intervention, physical load decreased for the back and increased for the knees.

184**Influence of lower trunk muscle mass on developing low back pain among health care workers: a prospective cohort study**

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Introduction: Low back pain (LBP) is one of the most common medical problems among health care workers. Studies have reported the relationship between trunk muscle mass and lumbar spinal dysfunction, but it remains unclear if lower trunk muscle is an independent risk factor for developing LBP.

Material and Methods: This was a single-center prospective cohort study. Nurses and caregivers without a history of low back pain due to a specific cause were recruited, and their demographics and trunk muscle mass measured by bioelectrical impedance analysis (InBody770, InBody, Seoul, Korea) were obtained at baseline. The trunk mass index (TMI, kg/m²; trunk muscle mass divided by height in meters squared) was calculated and the bottom tertile of TMIs was considered as the lower TMI group. All participants were

followed for 12 months to observe if they develop LBP. This study was approved by the ethics committee of the Showa University School of Medicine in June 2020 (No.3162).

Results: 180 health care workers were enrolled and 153 (35 men and 118 women) were analyzed. In the lower TMI group, 6 out of 49 (12.2%) developed LBP, and 13 out of 104 (12.5%) developed LBP in the normal TMI group (crude odds ratio [OR]= 0.97, 95% confidence interval [CI]: 0.32-2.65, adjusted OR= 2.21, 95%CI: 0.53-9.31).

Conclusion: Lower trunk muscle mass was not a significant risk factor for developing low back pain among health care workers. Trunk muscle mass may decrease as a consequence of recurrent low back pain. 12 months follow-up might not be long enough and continued observation would be needed.

185**Can movement analysis using wearable technology and video be used to assess work task and work site injury risks remotely without the need to visit a work site**

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Background: On-site assessment of physical work tasks by OHS professionals has been the gold standard for Musculoskeletal Disorder (MSD) injury risk assessment for decades. Unfortunately, the COVID-19 pandemic has forced many worksites around the world to limit access to non-essential workers. This has significantly reduced the ability for OHS professionals to access worksites for the purpose of providing safety services, forcing them to consider alternative ways to assess MSD injury risk using innovation and technology.

Method: Two previously validated inertial measurement units (IMU's) and smartphone application were used to measure the worker's movements; one IMU was positioned on the worker's upper back, the other IMU on the worker's dominant upper arm and the smartphone application collected the data and recorded video. The IMU's were shipped to the worksite and the on-site manager was instructed how to download the smartphone App use the sensors to collect data via a video meeting. A cloud-based analytics platform was then used by the OHS professional to analyze the data and video to provide recommendations about injury risk management.

Results: The on-site managers were able to collect high quality data and video of a variety of workers and tasks. This data enabled OHS professionals to assess MSD injury risk through the cloud-based platform without the need to visit the site.

Conclusions: Wearable devices that measure the worker's movements, smartphone technology and cloud-based analysis platforms enable OHS professionals to accurately assess MSD injury risk without the need to visit the work site.

186**Screening work-related musculoskeletal upper limb disorders by using the SALISA Protocol: a work-site study in Belgium**

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Introduction: Musculoskeletal disorders (MSDs) have been considered a primary cause of long-term absenteeism. However, there is still uncertainty about the prevalence of MSDs, and about the contribution of work-related factors in the etiology of

MSDs. SALTSA, developed in 2001, is a European diagnostic criterion document aiming to standardize the reporting of work-related upper limb MSDs (ULMSDs). The aim of this study was to (1) implement SALTSA in daily occupational health practice and, (2) determine the prevalence of ULMSDs in a Belgian company.

Material and Methods: During health examinations, an occupational health physician and occupational health nurses screened employees with ergonomically high-risk activities for the occurrence of ULMSDs using the SALTSA protocol. In order to explore associations between ULMSDs and lifestyle and work related factors, bivariate and logistic regression analyses were performed.

Results: Three hundred and eight (94.0%, 308/328) employees were screened resulting in an ULMSD prevalence of 20.5% (95% CI = [16.0–25.3]). Rotator cuff syndrome was the most common condition. Prevalence varied significantly between men (9.6%, 95% CI = [5.6–14.9]) and women (35.0%, 95% CI = [26.9–43.9]). Being female ($p < .001$) and working in the cabling assembly unit ($p = .002$) were found to be significant predictors of ULMSDs.

Conclusions: By using the SALTSA protocol in occupational health practices, ULMSDs can be screened unequivocally, enabling comparisons between different occupational sectors and countries. Occupational health nurses can play an important role in detecting and screening MSDs among workers.

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Prevalence of Musculoskeletal Disorders and Knowledge of its Causes and Prevention among Airport Baggage Handlers

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Introduction: Airport baggage handlers are commonly tasked to manually handle heavy loads thus predisposing them to risk of developing work-related musculoskeletal disorders (MSD). This study aimed to determine prevalence of MSD and factors associated with risk of developing MSD among airport baggage handlers in Brunei Darussalam.

Material and Methods: A cross sectional study was conducted on baggage handlers at Brunei Darussalam's international airport. Data regarding demographic profile (age, employment duration), work tasks, work area (airport terminal and/or inside aircraft) and MSD (by Nordic MSD questionnaire) were collected using a self-administered questionnaire. Baggage handlers' perception on likelihood of specific work tasks related to MSD, and their perception and knowledge on preventative measures were also sought.

Results: The study received a response rate of 58% (37). 12-month prevalence for MSD was 86.5%. Low back pain (70%), upper back pain (62%) and shoulder pain (43%) were the commonly reported MSD. Container loading in the baggage room, handling baggage inside narrow body aircrafts, and pushing-pulling trailers were considered to be high risk work tasks for baggage handlers.

Conclusions: There was a high prevalence for MSD among baggage handlers. Baggage handlers perceived that provision of manual handling training and implementation of good administrative controls would be helpful in the prevention of MSD.

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Biomechanical overload risk assessment in Industry 4.0

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The ISO standards of the 11228 series have recently been at the center of a lively scientific debate between those who highlighted a series of criticisms and those who claimed that they are still valid standards. Moreover, most of the techniques reported in these standards, drafted by "ISO/TC159/SC3/WG4 - Human physical strength: manual handling and force limits", do not include physiological parameters (muscle activity, metabolic parameters, etc.) for biomechanical risk assessment in non digitalized contexts, in contrast to what has been recently highlighted by the scientific literature in the ergonomics field. The new scenarios offered by digitalization will offer the opportunities to integrate collaborative robotic technologies (HRC) not only in everyday life but also in working environments, the so-called "Industry 4.0". Again, the ISO 11228 series are not applicable given that the use of HRC technologies, which are intended to reduce biomechanical risk, is not considered in any of the recommended risk assessment tools. It implies that most commonly standardized protocols are unable to quantify their impact in real work environments. This grey area is likely to lead to huge troubles in the next future for anyone who has to decide on their use or not, also because of the economic commitment that HRC technologies involve for companies. Given the role played by ISO standards in the assessment of biomechanical risk, it may be appropriate, in the short term, to introduce instrumental-based tools that can now provide more accurate and objective quantification of risk for the prevention of WRMSDs.

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Reducing postural exposure in real manual sorting work by means of real time vibrotactile feedback training

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Introduction: Heavy and repetitive manual handling are considered risk factors for musculoskeletal disorders. To reduce adverse health effects, vibrotactile feedback training may be used as a complementary strategy. The main aim of this study was to evaluate the short- and medium-term effect of concurrent posture-correction vibrotactile feedback training on trunk inclination exposure in real manual sorting work. Secondly, this study aimed to evaluate the usability of the system and the impact on work ability and physical exertion.

Materials and Methods: Fifteen warehouse workers in Belgium completed two 30-minute training sessions and post evaluations performed directly after the feedback training and after about one and three weeks. Trunk inclination angles were recorded using the

ambulatory Smart Workwear System. Information on the usability of the system and effects on perceived physical exertion and work ability were collected by questionnaires.

Results: A significant short-term effect was observed for reduced time in trunk inclination $>30^\circ$, $>45^\circ$ and $>60^\circ$ and reduced peak inclination angles when receiving feedback and immediately after the feedback. No significant reduction was retained after one and three weeks. Wearer comfort was rated high and the feedback did not increase cognitive demands. The training had no significant impact on perceived physical exertion and work ability.

Conclusion: The training program can potentially contribute to reducing trunk inclination exposures in the short term. Future studies should investigate the training design to retain medium- and long-term effects.

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FCP's challenges and learning and development needs in response to managing fitness for work and sickness absence in primary care

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Our National work identifies first contact practitioners (FCPs) learning and development needs and challenges faced in response to the ambition of managing fitness for work and sickness absence certification within primary care, a diverse role that arguably and traditionally has been outside the therapeutic relationship.

Purpose: The UK's Departments of Health and Work and Pensions, within the White Paper Improving Lives: The Future of Work, Health and Disability, outlines the Legislation for extension of Fit Note sickness absence certification for those patients ill for more than 7 days in a row to other suitably qualified non-medical Allied Health Professionals (AHPs) along with a set of competencies to aid in its certification completion. The Statement of Fitness for Work (known as a 'Fit Note') was introduced in the UK in 2010 to allow clinicians to provide their patients with advice on fitness for work and to encourage patients to resume some work as soon as they have recovered sufficiently. Despite this, clinicians seem to not provide fitness advice on most Fit Notes and in 2016 the UK Government reported that the fit note was 'not fully achieving what it set out to do'. The role of certifying sickness absence in the UK has traditionally been conducted by General Practitioners in Primary Care settings, but this role increasingly is being carried out by AHPs who work within Occupational Health and Primary Care settings. More recently, the 2019 AHP Health and Work report was designed by a UK working group.

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Activity analysis and evaluation of musculoskeletal constraints of the left upper limb in tram drivers

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Introduction: Musculoskeletal disorders (MSD) affect tram drivers with important socio-occupational consequences

Material and methods: 120 tram drivers with MSD of the left upper limbs were involved in this study. The approach included analyzing the activity (observations of work situations, video recordings, and exploratory and explanatory interviews), and the biomechanical constraints (using the Ergonom software).

Results: A position of the left shoulder between 20° and 60° with repetition of the movement during 46% of the driving time would be responsible for the development of left scapular tendinitis. A driver's elbow is flexed between 60° and 100° because of the left desk which reduces the field of freedom of the left arm and forces the driver to lean directly against the left epicondyle creating epicondylitis. 40% of the drivers were pictured holding their wrist and left hand in an extension with an angle greater than 30° . A global grip involving the whole palm of the hand was associated with 93% of these positions without deviation of the hand axis. It would be possible to explain the cause of left carpal tunnel syndrome by mentioning manipulator height and VACMA System (automatic standby withhold control). This long duration of conduit limits the possibilities of recovery, disturbs the vigilance, and makes the patient more vulnerable to MSD.

Conclusions: A reorganization of working hours, a redesign of the workstation and the modification of tools and equipment, as well as subsequent interventions on psychosocial factors are necessary for preventing MSD.

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Epidemiological aspects of musculoskeletal disorders related to visual display work among telecom workers in Douala in 2020

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Introduction: Work on a display screen is expanding in African countries; but working regularly on screen can lead to musculoskeletal disorders (MSD), visual fatigue and stress. The objective of this study is to determine the prevalence and risk factor of MSD among on-screen workers in the Douala telecommunications sector.

Material and Methods: This was a descriptive and analytical cross-sectional study conducted in the period from March to May 2020. The target population consisted of the staff of a mobile telephone company in the city of Douala, working on a display screen. Each employee was submitted to the TMS INRS questionnaire adapted to our context by adding a few questions. The data was analyzed with the SPSS software. A logistic regression analysis was performed to avoid possible confusion. All tests were interpreted with a chosen significance threshold of 5%.

Results: A total of 420 workers were included in the study. The average age was 37 ± 7 years. Male workers accounted for 54.5%. The prevalence of MSD was 89.5%, with the main locations being the lower back (68.6%), hands and wrists (67.1%) and neck (61%). After logistic regression, the female sex ($P=0.023$); working more than 4 hours a day in front of the screen ($p=0.001$), image instability discomfort ($p<0.0001$) and work stress ($p<0.0001$) were the main factors associated with MSD.

Conclusion: The prevalence of MSDs in the company was high. The etiology of MSDs is multifactorial. It is necessary to provide workers with screens guaranteeing good image stability, to alternate tasks in order to reduce the time spent on a display screen to reduce the MSDs Prevalence

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A Preliminary Survey on Musculoskeletal Symptoms among Filipino Esports Players

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Introduction: The number of professional esports players is increasing and it is known that intensive use of keyboard and pointing device contribute to musculoskeletal symptoms. This study investigated the characteristics and musculoskeletal symptoms of esports players in the Philippines.

Materials and Methods: An online survey questionnaire link was sent to the respondents and the data was then summarized and analyzed.

Results and Conclusions: A total of 51 respondents participated in the survey. Majority of the respondents were 18 to 21 years (n=33) and 22 to 26 years (n=14). More than half or 55% have played for 0-3 years, 26% played for 4-7 years, and 20% for 8 years and above. The top three devices used are smartphone/cellphone (94%), laptop (55%), and desktop computer (45%). Meanwhile, for the game genre, the top three are Multiplayer Online Battle Arena with 80%, First-Person Shooter Games with 75%, and Fighting Games with 47%. Almost half of the respondents (43%) play daily. Similarly, 45% usually plays 3 to 4 hours per session. For the musculoskeletal discomfort in the past seven days, body parts with the highest rating "quite uncomfortable" are: head, neck, shoulder, wrist, hand and fingers, upper and middle back, lower back, and buttocks. Likewise, respondents replied in the past six months, the highest rating is "quite uncomfortable" for the upper and middle back and lower back areas. This initial investigation has revealed a significant report of musculoskeletal symptoms among the esports players.

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Risk factors for rotator cuff syndrome among French workers: prospective cohort study

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Introduction: To explore the relationships between personal factors and occupational organisational, psychosocial and biomechanical

factors and the incidence of rotator cuff syndrome (RCS) in French workers.

Material and Methods: A total of 3,710 workers of a French region were randomly included by their occupational physician (OP) between 2002 and 2005. Between 2007 and 2010, 1,611 workers were re-examined by their OP. The 1,320 workers free of RCS at baseline were studied. At baseline, all workers completed a self-administered questionnaire about personal factors and work exposure. Using a standardised physical examination, OP diagnosed RCS at baseline and at follow-up. A conceptual model was developed in which direct and indirect relationships between organisational, psychosocial, biomechanical, and personal factors at baseline and the incidence of RCS were assumed. Structural equation modelling was used to test the model.

Results: RCS was directly associated with biomechanical factors and age but not with psychosocial factors. However, skill discretion and psychological demand influenced RCS through biomechanical factors. Exposure to a work pace dependent on an automatic rate and to a work pace dependent on customers' demands were associated with biomechanical and psychosocial factors.

Conclusions: This study identified the complex direct and indirect relationships between occupational factors and RCS. Our data confirmed the conceptual causation model: organisational and psychosocial factors were associated with biomechanical factors, while biomechanical factors were linked to the incidence of RCS.

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A four-jurisdiction qualitative analysis of workers' compensation healthcare policies

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Introduction: Very few projects have compared, at the policy level, the impact of workers' compensation policies on healthcare providers' work and their ripple effect on workers' care. Our project aimed to shed light on the distinct ways in which workers' compensation policies can affect the delivery and trajectories of care for injured workers across four jurisdictions.

Material and methods: We conducted a cross-jurisdiction policy analysis using key informant qualitative interviews. A purposive sampling strategy was used to recruit 42 participants from different 'social locations' across the provinces of Quebec and Ontario in Canada, the state of Victoria in Australia and the state of Washington in United States. Framework Analysis for policy review was used to support the analysis.

Results: First, our results show that workers' compensation boards use clinical guidelines, non-economic inducements, and monetary incentives to drive healthcare providers' behaviours with workers. Secondly, our findings present how WCBs' policies achieve control of the workers' trajectory of care via two key mechanisms: the standardization of care pathways and the power and autonomy vested in healthcare providers.

Conclusion: This study shed light on the different ways in which workers' compensation policies frame healthcare providers' day-to-day practices and how these policies can shape workers' care trajectories. A better understanding and nuanced portrait of

these policies can help support reflections on future policy changes and inform the development of policies in other jurisdictions.

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Prevalence of musculoskeletal disorders (MSDs) among female workers in the clothing industry

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Introduction: The aims of this study were to assess the prevalence of MSDs and to analyze their relationship with socio-demographic and occupational parameters among workers in a clothing company.

Material and methods: This cross-sectional study involved 394 women aged > 20 years with seniority ≥ 2 years. It included an observation of the work cycles, a questionnaire of the National Research and Security Institute of France.

Results: The mean age was 30.2 ± 5.9 years, 48.7% were illiterate, and 81.2% engaged in household activities at home. The average seniority was 7.8 ± 3.4 years and the weekly working time was 47 hours. 8.1% worked in the cutting, 41.6% in the assembly line, 10.1% in the ironing, 4% in the store, 10.1% in the packaging, 15% in the stitching and 3% in the household. The postures were sitting for 67.5% and imposed for 85.7%. 24.6% reported neck pain, 38.6% shoulder, 15% elbow, 21.3% wrist-hand, 25.6% lower back and 14.2% upper back. The site of pain was unique in 82.4%, involved two regions in 15%, three regions in 1.8% and four regions in 0.8%. The prevalence of neck - shoulder pain associations was 8.4%, more common in standing postures and at the packing station. Shoulder-back pain was 3.8%, more common in sitting postures and at the cutting and ironing station. Psychosomatic complaints of stress were reported by 91.9% who felt that the occupational demands exceeded their capacities and personal resources. The work was considered intense for 84% with weak autonomy for 68% and weak social support for 15%.

Conclusion: Reducing operator constraints and preventing of MSDs must be a priority in this sector

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Ergonomic survey to ensure a harmonized man-machine interface at workstations in IndianOil

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Introduction: IndianOil has a large workforce of more than 31,500 employees. A major proportion of this workforce work in office and in front of control panels. Common complaints due to

musculoskeletal disorders were identified and ergonomic study as a part of our occupational health survey was carried out to analyse these hazards and implement suitable mitigation measures.

Materials and Methods: A detailed survey of work-stations was carried out to identify the factors leading to musculoskeletal disorders amongst employees working in front of control panels. The incompatibilities were identified and specific mitigating measures were suggested and implemented. The study also suggested the use of full-field intermediate distance glasses for employees working on computers. The use of these lens reduced the need for head tilting and other unnatural posture changes during computer work while working in front of control panels. Training programs are also conducted to increase awareness of Musculoskeletal Disorders and acknowledgment of the risk exposure of affected employees.

Result: The survey revealed that though most of the work-stations are ergonomically designed, there are certain incompatibilities that exist due to specific man-machine interface. The suggested mitigating measures helped in improving the work-place ergonomics by reducing physical demands, eliminating unnecessary and repetitive movements.

Discussion: A good harmony between man and machine reduces the common complaints due to musculoskeletal disorders, thereby increasing the efficiency, productivity and engagement of employees.

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Prevalence of stress and musculoskeletal disorders (MSDs) in Taxi Drivers

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Introduction: The aim was to assess stress and MSDs in taxi drivers by analyzing their relationship with socio-demographic and occupational parameters.

Materials and methods: This cross-sectional study concerned 1874 men, aged > 23 years with a seniority > 2 years. The questionnaire was inspired by those of the INRS and the Karasek. Drivers were categorized into stressed and non-stressed based on their response to the question: Do you feel that the demands of your job are beyond your capacity and resources? The items relating to MSDs were assessed on a discontinuous Likert scale.

Results: The prevalence of reported stress was 58.3%. The prevalence of harmful habits was 40.1% for smoking, 16.9% for cannabis, 11.3% for alcohol and 6.3% for other psychotropic substances and drugs. These toxic habits were significantly higher among the stressed. 37% were overweight (41% in the stressed vs 31.4% in the non-stressed) and 14.3% obese (18.9% in the stressed vs 7.9% in the non-stressed). The average daily working time was 10.6 h ± 1.7. MSDs were reported by 42.5% (51% in the stressed vs 30.6% in the non-stressed). They sat at the neck (12.9%), back (38.5%), pelvis (17.5%), shoulder (15.3%), elbow (12.9%), wrist or hand (14.3%), hip (15.3%), knee (14.1%), ankle or foot (12.6%).

Conclusion: The cumulative constraints of the job (atypical hours, long daily working hours, isolation, external violence, traffic difficulties, etc.) generate stress and numerous chronic diseases, the most frequent were MSDs. These were linked in particular to prolonged sitting and vibrations produced during driving (old cars and pave in poor condition).

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Use of exoskeleton at work – what the current literature says about it ?

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This study intends to review the literature on exoskeleton application in the work highlighting its benefits and limitations.

Methods: This study is a bibliographic review covering the period from 2009 to 2019. Data were collected on August 28 and 29, 2019, by using the following databases: Virtual Health Library (VHL), National Library of Medicine (PUBMED), PUBMED Central (PUBMED PMC), ScientificDirect, Sciverse Scopus, Cochrane Library and Embase. The descriptors defined were "exoskeleton" and "work" and their variants in English, Portuguese and Spanish, in plural and synonyms. Four hundred and ninety articles were found, from then on exclusion criteria, military purposes, medical rehabilitation and technical studies of equipment development were disregarded.

Results: After the application of the exclusion criteria, sixteen articles were selected and read in their entirety. Taking into account the activities for which exoskeletons were designed, studies show that they can reduce musculoskeletal demand for the following body segments: upper limbs, spine and lower limbs. However, these same studies show that there is increased burden for some body segments not supported by the devices, as well as increased body metabolic demand. In some of these articles it was found that the use of exoskeleton results in enhancement of workers' productivity.

Conclusion: Exoskeletons can be reducers of musculoskeletal overload for certain body segments, depending on the specific activities for which they were developed. However, there is evidence of increased physical demand for segments not supported by the device, in addition

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Compliance with Ergonomic Regulatory Requirements in Brazil: Managing Ergonomic Risks and Adapting Workstations – Results Achieved

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Introduction: This paper aims to present the structure of the ergonomics management system implemented in a large multinational

company in the automotive sector, located in the southeast region of Brazil, emphasizing the ergonomic risk management process and the adaptation of workstations to psychophysiological characteristics of workers.

Material and Methods: For this study, we consider the normative documents concerning ergonomics in Brazil, in addition to the items of the specific certification procedure elaborated by the Brazilian Association of Technical Standards, representative of ISO in Brazil. The results arising from the implementation of this system corroborate the importance of structuring, documenting and managing ergonomic actions, confirming the importance of incorporating ergonomics as a value in organizations.

Results: The results achieved with the effective application of this system throughout the challenging year of 2021, add up to implementation of more than 200 relevant ergonomic improvements (which eliminate or reduce an ergonomic risk factor), the preparation of dozens of preliminary ergonomic assessments that identified numerous ergonomic risk factors to be mitigated. In addition, more than 180 workers received training in ergonomics, at different hierarchical levels and more than 20 ergonomics occurrences were duly investigated and documented.

Conclusion: These numbers are the result of the work of a multidisciplinary team that, adopting the premises of the PDCA tool, seek to achieve maturity in ergonomics and continuously improve the organization's working conditions.

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Complex Regional Pain Syndrome: diagnosis in an upholsterer

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Introduction: Complex regional pain syndrome (CRPS) is a painful, progressive and chronic illness of the extremities usually following a harmful event by peripheral trauma (crushing injuries, lacerations, fractures, sprains or surgery) to soft tissue or nerve complexes. Apart from pain the clinical picture unfolds across several domains: sensory, motor, autonomic and trophic.

Material and Methods: The authors describe the case of a 60-year-old female upholsterer diagnosed with algoneurodystrophy, resulting from a work accident, that presented unfavorable clinical evolution.

Results: After a fracture of the right radius/ulna and the performance of a surgery two weeks later, the worker developed CRPS. Currently she presents a very rigid wrist and complaints of pain during effort. The worker was asked to perform arthroscopy to characterize the damage and attempt arthrolysis, however she refused that option and is currently undergoing physiatric treatments and a neurostimulator for pain control was implemented.

Conclusions: Despite early identification, surgeries, physiatric treatment, pain management and psychotherapy, it wasn't possible to reassign the worker to the company. Consequences: after an occupational accident, disability pension is illegal. Her common work isn't feasible, work conversion isn't practicable, other work, attending to her age, professional skills and very frequent complaints, being dismissal illegal, is impossible. Assurance must assume disability coefficient by physical lesions, psychiatric disorders, dysmorphia, disability for any kind of work, diagnostic, therapeutic and physiatric interventions.

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Obesity and its influence on the biomechanics of manual handling: a systematic review

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Introduction: Obesity is a growing health concern worldwide and low back pain (LBP) is the leading cause of disability globally. LBP is an area of concern in obese populations performing manual handling tasks, due to potentially higher muscle forces and altered lifting dynamics. The aim of this review was to investigate biomechanical differences between obese and non-obese groups performing manual handling activities.

Methods: An electronic search was undertaken of three databases using a series of keywords based on three concepts: obesity; manual handling and biomechanics. Studies were included if they were experimental, involved manual handling, compared an obese with non-obese population, and reported on one or more biomechanical measures. Studies were evaluated for the risk of bias.

Results: Of the 1,037 articles identified, 15 met the inclusion criteria. Body Mass Index (BMI) was most frequently used to differentiate between a control and obese population. There was consistent evidence of increased net moments, compression forces and shear forces at L5/S1 in handlers classified as obese compared to non-obese. Inconsistent or no evidence was found for differences between populations for sagittal trunk flexion and acceleration, knee flexion angle and load separation.

Conclusions: Obesity increases loads on the musculoskeletal structures of the spine when handling loads which likely increases the risk of back injuries. Limited evidence of changes in the kinematics of lifting in obese populations has implications for the delivery and content of training, and preventative measures necessary to reduce risks to obese workers.

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Temporal trend of social security disability benefits due to musculoskeletal disorders from 2008 to 2018 in Brazil

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Introduction: Musculoskeletal disorders (MSD) affect workers from different occupational groups. These problems are the leading cause of long-term sickness absence in Brazil. This study aims to analyse the trends of disability benefits due to musculoskeletal diseases granted in Brazil, from 2008 to 2018.

Methods: An ecological time-series study was carried out using public data from the Brazilian National Social Security Institute. All workers who had at least one contribution to the system in any month during the period of time mentioned above was considered as a person at risk. Cumulative incidences of disability benefits due

to MSD were calculated and Joinpoint regression models were fitted to estimate trends and calculate Average Annual Percentage Change (AAPC) with the corresponding 95% confidence interval.

Results: Mean working population was approximately 64.5 million. 5,041,691 disability benefits were granted due to MSD, with an annual average of 458,336 benefits and an annual average incidence of 71.41 benefits for every 10,000 insured. The trend is stable throughout the analyzed period for MSD benefits unrelated to work (95% CI: -0.6 (-1.7; 0.6). The mean coefficient of benefits per MSD related to work was 11.41 benefits per 10,000 insured. There was a mean annual decrease of 12% (95% CI: -13.4; -10.6) of new benefits granted for work-related MSD.

Conclusion: The trends in the benefits of work disability due to MSD showed stability in cases unrelated to work and a significant decrease in work-related cases.

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No Uniform Recommendations For Return To Daily Life Activities Including Work And Sport After Knee Arthroplasty In The Netherlands

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Introduction: Uniform and multidisciplinary recommendations concerning the return to daily life activities including work and sport after knee arthroplasty (KA) are essential for setting realistic patient expectations. However, scientific evidence for such recommendations is limited, and recommendations are often only based on expert opinions of healthcare professionals.

Materials and Methods: We aimed to summarize the current recommendations regarding return to daily life activities, including work and sport, provided by Dutch hospitals and clinics to patients after KA. Recommendations of 43 Dutch hospitals and clinics that perform KA's were identified, representing the advice that is provided to 70% of the total Dutch KA patients annually. Recommendations were retrieved using their websites (n = 8), brochures (n = 40) and content from mobile phone applications (n = 9). Two researchers independently summarized the recommendations.

Results: Recommendations for 24 activities were identified and summarized. Recommendations varied greatly between hospitals and clinics. For example, the recommendations for return to work were mentioned by 18 (42%) out of the 43 hospitals and clinics and varied from two weeks to four months. For return to heavy work, the range was six to twelve months.

Conclusions: Recommendations for return to daily life activities after KA are often missing and vary considerably between Dutch hospitals and clinics. These findings imply the need for more uniform recommendations for postoperative return to daily life activities including work and sports.

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Is consulting an occupational physician associated with earlier return to work among total knee arthroplasty patients? A prospective cohort study in the Netherlands

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Introduction: After total knee arthroplasty (TKA) only 70% of patients return to work (RTW) and in general timely RTW is associated with successful RTW. This study aimed to examine whether patients who consulted an occupational physician (OP) RTW earlier than patients who did not consult an OP.

Materials and methods: A multi-center prospective cohort study was performed among TKA patients between 18 to 65 years and having a paid job. Patients provided information on whether an OP was consulted or not within three months after TKA and were compared for time to RTW using Kaplan Meier curves (KM).

Results: One hundred and eighty-two (182) patients were included with a median age of 59 years [IQR 54-62]; 95 patients were women (52%). Patient and work-related characteristics did not differ between patients who consulted an OP or not, except that self-employed patients consulted an OP less often than employed patients. TKA patients who consulted an OP did RTW later (median 84 days [IQR 61-115]) than those who did not (median 64 days [IQR 35-118]) (KM $p=0.03$).

Conclusions: Consulting an OP was not associated with an earlier RTW. Additional analyses to adjust for confounding and effect modification are needed to confirm this result.

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Biomechanical analysis and assessment of musculoskeletal disorders (MSDs) risk factors in two crane operators in the port

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Introduction: The objective of this study was the ergonomic analysis of the workstation and the assessment of risk factors for MSDs by valid, simple methods that can be easily mastered by prevention specialists

Materiel and methods: the approach included activity analysis (observations of work situations and video recordings), the Nordic questionnaire, the visual analogue scale (VAS) and the Rapid Upper Limb Assessment (RULA) method. RULA requires observation over several work cycles to select the most frequent and / or most restrictive posture a priori. It is a reference method for scoring joint positions. It takes into account the totality of body posture using scores and tables.

Results: The workstation was static for 4 continuous hours in a cabin 35 meters high and moving along an overhead crane. A cycle of 2 minutes for 10 maneuvers with 2 levers required great concentration. The questionnaire showed localized back pain in both operators. The pain assessment VAS was level 4 and repetitiveness of movement was level 7 indicating high repetitiveness. The MSDs screening guide found a score of 7 indicating a work situation at risk of MSDs of the upper limbs. The RULA method showed an average total score of 5.

Conclusions: An ergonomic intervention requiring the collaboration of ergonomists, occupational physicians, operators and supervisors is urgently needed to modify the situation.

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Prevalence and risks factors of low back pain among Senegalese caregivers in 2018

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Introduction: To determine the prevalence and risk factors associated with the occurrence of low back pain among health-care workers in health centers in Dakar.

Methods : This is a cross-sectional study conducted among the health care staff of three health centers in Dakar: Philippe Maguilène Senghor, Gaspard Camara and Nabil Choukair from April 24 to May 29, 2018. The survey concerned all members of the nursing staff in office for at least one year. The study instrument was a self-administered anonymous questionnaire including anthropometric and socio-demographic data, occupational data and low back pain characteristics. Data entry and analysis were performed Excel version 2010 and Sphinx version 5 software.

Results : Out of a total of 273 agents, we collected 189, a participation rate of 68.2%. The average age was 34.4 years with extremes of 21 and 59 years and the sex ratio 4.5 for women. The average body mass index was 24.7 kg / m². Nurses were the majority with 36% (n = 68), followed by midwives 25% (n = 47), then caregivers 22.2% (n = 42) and physicians 15.3% (n = 42). The prevalence of low back pain was 48.1% among caregivers. The risk factors for low back pain were female ($p = 0.042$),

overweight ($p = 0.000$), history of low back pain ($p = 0.0001$), lumbar trauma ($p = 0.00002$), lack of regular physical activity ($p = 0.023$), manual handling ($p = 0.000$) and dissatisfaction with pay ($p = 0.026$).

Conclusion: Low back pain is a reality in health care structures with a high socioeconomic cost and professional consequences. Its prevention requires awareness and training gestures and postures.

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Chronic nonspecific backpain in workers revealed as specific one by enlarged assessments and thereby enabling successful treatment. Clinical observations

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INTRODUCTION: Chronic nonspecific back pain is thought of being one of the most frequent causes of loss of workplaces and for long unemployment. But, may the diagnosis "chronic nonspecific back pain" be transformed into "specific back pain" by more extensive diagnostic assessments and so patients might be treated specifically with success to save their workplaces?

MATERIAL AND METHODS: Over ten years all our patients (about 1800), who came into the orthopedic rehabilitation with the diagnosis "chronic nonspecific back pain" were checked not only standing as usual, but also in sitting to determine the position of their pelvis. Further, we carefully looked at the form of their total spine noting also minimal derivations. In addition all patients were explored in aspects of manual therapy and if needed they were treated manually.

RESULTS: There was an asymmetric upper line of the pelvis in all patients with chronic nonspecific back pain in sitting position, but this was seldom seen in standing. All patients had a scoliosis of their spine mostly discreet beneath 25 degrees (Cobb). There was further a segmental dysfunction in the midst of their thoracic cage. Pain relief, total or at large degrees, was noted by treating the somatic dysfunctions successfully.

CONCLUSIONS: A large part of chronic nonspecific back pain in workers seemed to be specific and may be treated specifically with success. A special form of the pelvis and the spine and a segmental somatic dysfunction in the midst of the thoracic cage seemed to be involved in the etiopathogenesis of this kind of pain.

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How to use biomechanical job exposure matrices (JEM) on job history for musculoskeletal dis-orders? New mathematical method on the example of severe knee pain

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Introduction: Musculoskeletal disorders related to work might follow with a cumulative effect during working life, such as

degenerative disorders like osteoarthritis and knee pain. Biomechanical job exposure matrices (JEMs) are become more available, and before optimizing models using statistical methods, we aimed to compare if low level of exposure with high duration is equivalent to high level of exposure with low duration in the example on severe knee pain and carrying loads.

Methods: The CONSTANCES cohort is used with clean data from 66553 subjects, active at their inclusion with work trajectory coded. Participants' sex, age at inception, body mass index, known inflammatory disease of the joints, leisure activity and depression, and sever knee pain as outcome. "JEM Constances" was used with 0-4 for intensity/frequency of heavy lifting ("lifting") and duration (years). Using advanced logistic models, odds ratios of the highest quartile for the duration with low intensity/frequency and the highest quartile for the intensity/frequency with low duration were studied. Results: The mean age is 49 years at inception with 46% of women, 21 years of employment. The OR of the highest quartile for the duration and low intensity/frequency is not significant for both exposures, whereas intensity/duration is significant for every duration. A dose response relationship was found for lifting for medium and long duration.

Conclusion: Weighting intensity/frequency over duration seemed important. However, it will be necessary to compare different model with appropriate statistics, as well as other outcome and time to occurrence.

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Lumbar Support Characteristics and Its Impact on Sitting Comfortability

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Introduction: Low back pain is one of the most prevalent health problem around the world, and a number of field studies have shown that active and pneumatic lumbar support systems can also significantly reduce discomfort experienced by users. This study compared the characteristics of lumbar support and its influences on lower back comfortability.

Material and Methods: Five male participants (23.8±1.5 years) and five female participants (22.8±1.3 years) were recruited. Participants performed seated typing activity with two types of chairs (static office chair, office chair with wheels) and three types of lumbar supports (cambered surface, fullback and roll type), visual analogue scale (VAS) and three subjective evaluations (hardness, support, fitting). The participant required to evaluate three parts, namely the upper back, the middle back and the lumbosacral regions. Two way repeated ANOVA was performed to analyze the differences.

Results and Conclusions: The main effect lumbar supports is significant ($p < 0.05$) for VAS and subjective evaluations. However, chair types shows no significant effect on the evaluations. In general, hardness of cambered surface type was rated more comfortable than fullback and roll type at all three body regions. Subsequently, participants rated a better support of cambered surface type for upper back and middle back regions. Our preliminary results suggest fullback type and cambered surface provide better comfortability on office chair with wheels and static office chair during seated work, respectively.

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Validity and reliability of a newly developed Intention to Work while Ill (InToWork) inventory among workers with musculoskeletal disorders

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Introduction: Based on the theory of planned behaviour, intention accounts for about 25% of the formation of behaviour. Thus, intention to work while ill may affect the work attendance of workers with musculoskeletal disorders (MSD) and influence their work productivity. In order to explore this relationship, an inventory to measure this intention was developed. This study aims to determine the psychometric properties of this newly developed Intention to Work while Ill (InToWork) inventory.

Materials and Methods: The initial inventory which was developed through in-depth interviews and empirical literature consisted of 67 items in 9 dimensions. One hundred workers with MSD completed the questionnaire. Psychometric properties were assessed by Exploratory and Confirmatory Factor Analysis (EFA and CFA). Ethical approval was obtained from UKM Research Ethics Committee.

Results: In EFA, 21 items in 8 dimensions (2 consequences to others, 3 consequences to self, 4 support from others, 3 workplace arrangement, 2 recovery at home, 2 pain management, 3 work commitment/satisfaction, 2 superior's perception) were identified. Total variance explained by EFA was 78.8%. The Cronbach's alpha for 8 dimensions ranged from 0.779 to 0.953. In CFA, the final measurement model fit the data well (RMSEA = 0.077, CFI = 0.944, and Chisq/df = 1.585). The convergence and discriminant validity were also achieved. The composite reliability for 8 dimensions ranged from 0.784 to 0.955.

Conclusion: The Intention to Work while Ill inventory is a valid and reliable tool to be used in assessing workers' intention to work while having MSD.

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The Intention To Work While Ill Among Workers With Musculoskeletal Disorders (Msd): The Roles Of Work Volition And Compulsion

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Introduction: Workers with musculoskeletal disorders (MSD) would usually call in sick for a few days until the symptoms resolved. Since MSD are often chronic, the frequent short-term

sickness absence is prevalent among these workers. This is then translated into high poor productivity impact to the organisation and poor morale to the affected workers. Thus, factors influencing workers' ability to go to work while having symptoms is crucial to help workers live with their MSD productively. Based on behaviour theories, intention is a strong predictor for a behaviour. Thus, this study was conducted to explore the factors that influence the intention to work while ill among workers with MSD.

Material and Methods: Using grounded theory, 21 in-depth interviews were conducted via a semi-structured guide. Workers with MSD were recruited via purposive and snowballing sampling until data saturation was attained. This study received approval from the Ethics Committee UKM.

Results: Nine themes of factors influencing the intention to work while ill emerged from the interviews. Among them, 6 themes were found to contribute to work volition (work commitment, work satisfaction, support from colleagues, work reorganisation, ability to manage pain at work and ability to recover at home) while 3 themes introduced feeling of compulsion (consequences to self, consequences to others and perceptions of superior and colleagues towards ill workers in an organization).

Conclusion: Both positive and negative motivators are important in influencing the intention to work while ill among workers with MSD.

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Effect of Motivational Interviewing on Work-Related Musculoskeletal Disorder Prevention Behaviors Among Computer Workers

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Musculoskeletal disorders are the most commonly diagnosed health problem among ailments related to working with computers. This quasi-experimental research aimed to study the effects of motivational interviewing (MI) on prevention behavior against musculoskeletal disorders among computer workers. The study participants were 66 computer workers, purposely selected based on inclusion criteria. They were randomly assigned to a control or an experimental group. The experimental group participated in the MI activity whereas the control group received only an instruction manual.

Data collection tools included a general questionnaire, a work posture assessment from (Rosa-Rapid Office Strain Assessment: ROSA), and muscle strength assessment forms for sitting and reaching, as well as hand gripping. All research instruments were validated by experts and met acceptable psychometric properties. Data were analyzed using descriptive statistics and two group comparison t-tests. The results found that, after the experiment, the experimental group had statistically significant mean scores for ROSA and muscle strength assessment which were better than prior to the experiment, as well as compared with the control group. The better mean score for ROSA indicates that the experimental group had adopted a good working posture and appropriate workstation modification. Moreover, the experimental group engaged in regular physical activity to improve muscle strength. Results from this study support the further use of the MI program to enhance work-related musculoskeletal disorder prevention behavior among computer workers.

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The Welder's ChairDr Soumya Prabhat Jati*Hero Motocorp Ltd, Medical, Haridwar, India*

Introduction: The primary cause of absence of welders at fabrication sites of industries where boiler components are manufactured are WMSDs. The postural problems faced by welders are neck pain due to over-head welding and below eyelevel welding; back ache due to awkward postures as per welding requirements and welding that requires bending of back; knee pain due to long term standing, squatting and awkward below the waist welding requirements. In addition to the above postural problems the welders also have to face soaring temperature of Indian summers. The weight of the helmet, apron and materials in hand prove to be an additional burden.

Objective: To design a chair as part of ergonomic intervention to minimise the prevalence of WMSDs amongst welders.

Materials and Methods: The welder gets to welding at eye level from 0.25 metre above ground till 2 metres aboveground. The chair has been designed accordingly with a metal beam on a flat circular iron base. The metal hollow beam has equally spaced square and circular holes alternate adjacent placed. The chair is attached to an iron beam (rectangle shaped) which is inserted into square holes on the attached to the flat iron base. The circular holes are used to insert 1 inch semicircular metal pipes which are used to keep the feet. There is a detachable rod which has adjustable height that can be attached to a facet below the chair for stability in the top three positions.

Result and Conclusion: The chair can be used by welders to do long term welding at fabrication sites while sitting in a comfortable position. The chair is also useful for doing overhead welding

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Prevalence of musculoskeletal disorders (MSDs) among fishermen in the artisanal sectorTarik Ghailan¹, Nadia Manar¹, Salwa Laraoui², Hicham El Bouri², Frédéric Deschamps³, Chakib El Houssine Laraoui Hossini²

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Introduction: MSDs are the most common occupational diseases in many sectors. The aim of this study was to screen and assess the prevalence of MSDs among fishermen in the artisanal sector, to specify their location and to analyze their psychosocial, demographic and organizational risk factors

Material and methods: This cross-sectional study took place in two ports in northern Morocco in 2021, and involved a representative sample of 903 fishermen. They were > 20 years old with > 1-year full-time seniority. The approach included the analysis of the activity (observations of work situations, video recordings) and the use of the Nordic questionnaire (pain or discomfort limiting work during the last 12 months).

Results: The prevalence of MSDs with work-limiting pain for any part of the body was 62%. The most affected part of the body were the

lower back (25.2%) and wrists/hands (25.1%). The main locations affected by MSDs and causing discomfort at work were the lower back (25.2%) and wrists/hands (25.1%). Sailors were more prone to MSDs (72.2%) than mechanics and pilots. Variables statistically associated with MSDs were age over 50 years, professional seniority, overweight and long working hours daily. The most significant risk factors were handling, vibrations and repetitive gestures.

Conclusions: The prevention of MSDs requires prior detection of risky work situations, early medical diagnosis and ergonomic intervention. Some work positions increase the strain on the lower back and hands/wrists. Training in gestures and postures, the substitution of old boats, and the mechanization of the loading and unloading of catches.

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Low Back Pain as a Challenge for Occupational HealthToni Vanni¹, Jorma Rantanen¹, Kari Reijula¹, Fabrizio Russo², Sergio Iavicoli³

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Introduction: The lifetime prevalence of low back pain (LBP) is 80-90% and 15-20% annually. LBP is a major cause of sickness absenteeism and disability, and a daily challenge for occupational health. We analysed the support from research for occupational health practices in prevention of LBP at work.

Material and Methods: From PubMed, SCOPUS, Cochrane Library and manually 1300 articles were searched, grouped using the PRISMA and 160 analysed independently by two experts using COVIDENCE. Of them 66 were included and assessed with Joanna Briggs plus AMSTAR2 criteria. For prevention and management of LBP at work, an eight-step logic model was designed and articles were located into best fitting steps. Each step was assessed for consistency and evidence. An evaluation of studies in view of prevention and management of LBP and return to work was made.

Results: Only high-quality articles were included. Most of the reviews were limited to one step only. A comprehensive approach was rare (7.5 % in good practice guidelines, GPGs). Systematic reviews were often inconsistent in conclusions. Most reports were descriptive instead of problem-solving. Most recommendations called for more research only.

Conclusions: LBP is still an unsolved problem for occupational health practice and does not get optimal support from research due to narrow scope of articles and inefficiency in problem solving. Heterogeneous concepts, inconsistent criteria and methods often prevent concise conclusions. A standardized approach covering the whole scope from problem identification to practical solutions (GPGs) with higher quality and relevance is recommended

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Subjectivity in the assessment of risk from manual handling of low loads at high frequencyMassimo Cecchini*University of Tuscia, Department of agriculture and forest sciences, Viterbo, Italy*

Introduction: Musculoskeletal disorders have been increasing in recent years, so the assessment and control of the risk factors that determine them are of great importance. Disorders affecting the upper limbs are mainly due to activities involving repeated movements. ISO 11228-3:2009 is applied both in the risk assessment and in the planning phase of these activities. This study analyzes one of the assessment methods proposed by the standard to identify any critical issues due to the subjectivity of the evaluator in estimating specific risk factors.

Material and Methods: A sample of 29 expert subjects, 18 consultants + 11 labor inspectors, were asked to independently fill in an OCRA checklist and calculate the "real workstation scores", for left and right limbs, relating to a task (vegetable grafting) also through a video (<https://youtu.be/x4v-14jHjfg>). Each subject reported his assessed values: recovery multiplier; frequency score; force score; complementary points; posture scores for shoulder, elbow, wrist, hand, stereotype, final score; duration multiplier; station real score.

Results: The data analysis shows that the method is substantially affected by the subjectivity of the evaluator. A high variance is observed in the posture score (sd=3,0) and in the frequency assessment (sd=1,8 for right limb). Values assessed by "inspectors" are more focused than those of "consultants". Differences in OCRA c.l. of ± 3 are to be considered normal but can radically change the final judgment of the risk assessment.

Conclusions: There is a need to adopt systems that make the results more objective, especially for frequency and postures.

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Postural, Physical and Musculoskeletal Impacts of Children using Personal Electronic Devices
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Introduction: The increase of computer technology over the past decade led to an increase in children using personal electronic devices (PEDs) for school and personal use. There is a lack of research investigating children using PEDs and the effects this usage has on their muscles and posture. The aim of this study was to explore biomechanical/physiological changes in children using PEDs and the link to self-reported back/neck pain.

Material and Methods: Participants, 7-17yrs old, were recruited from physiotherapy clinics and social media, with no muscle pain or neck/back pain. The lab-based study used EMG measuring muscle activations, the Myoton Pro measuring muscular tone of the trapezius, sternocleidomastoid and latissimus dorsi muscles, and a 3D postural analysis machine measured the curves and posture in a spine. The tests were done with the participants using and not using a tablet sitting and standing.

Results: Preliminary results suggest that participants with neck pain may have increased spinal curvature in both the PED positions and normal standing. Participants with back pain recorded the biggest difference in the lower back curve when sitting in the two positions but there was no difference in standing between the groups. Other preliminary results suggest muscular activity changes when using a PED both in sitting and standing.

Conclusion: Preliminary analyses suggests children's posture and muscle activity changes when using PEDs which may lead to back and neck pain. This suggests the need to understand how ergonomic factors can impact on physiological differences.

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Adaptation of the work station for health care workers with musculoskeletal disorders at the Ibn Rochd University Hospital Center in Casablanca (CHUIR): About 86 cases

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Introduction: Musculoskeletal disorders (MSDs) are a common multifactorial pathological entity in hospitals. They suggest a double problem: suitability for the work position during the acute phase, involving temporary or permanent post adjustment, and the professional reintegration of these caregivers after healing or consolidation.

Materials and methods: Our study is a descriptive cross-sectional survey at CHUIR, covering the medical records of 86 MSD-positive workers who spontaneously requested a workplace fit-up between February 2018 and September 2021. Our objective is to study the prevalence groups of these MSD cases, as well as their professional development.

Results: The average age was 40 years, with a clear female predominance (75.6%) and a high prevalence among nurses (56.9%). The average length of service was 14 years. The most concerned services were medical (23,2%), surgical (22%), emergency (18,6%) and resuscitation unit (15,1%). Night work was found in 50% of cases. MSDs were dominated by lumbosciatalgia (33.7%), cervical-brachial neuralgia (19.7%), and shoulder tendinopathy (5.8%). Concomitant axial and peripheral injuries accounted for 11.6% of cases. Previous work-related injuries accounted for 16.9%, systemic osteoarticular disease for 13.2% and arthritic spine for 30% of cases. The workstation layout recommendations were followed in 25% of cases. Professional reclassification was required for five staff members.

Conclusion: Measures to prevent MSDs must be geared primarily to the activities and the categories of most affected caregivers, obviously based on a real approach to occupational risk assessment.

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Upper limb musculoskeletal disorders' risk assessment: tools for evaluators

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Introduction: Upper limb musculoskeletal disorders risk assessment need trained evaluators especially in those activities that are not performed in assembly lines such as craftsmanship or agriculture. Major problems are: identification of biomechanical movements made by workers, identification of postures, tool handling; strength evaluation; frequency of actions.

Materials and Methods: As INAIL (Italian National Institute for Insurance against Accidents at Work) evaluators since 2016 we started to perform monthly meetings to analyzed occupational cases. The working group improves intra- and inter-observer reproducibility in the application of the OCRA checklist. We record videos about specific repetitive working tasks and evaluate them using the OCRA checklist. Risk assessment performed by every participant is compared and the results are analyzed to obtain an agreed intrinsic risk index.

Results and Conclusions: Our internal network allows to improve quality standards in the application of the assessing methods, comparing the differences intra- and inter-observer and minimizing the under- or overestimation of the risk. Our periodic meetings 1) train members for the application of evaluation methods; 2) update members on upper limb musculoskeletal disorders' risk assessment literature and method assessment review; 3) build a database of all the work activities analyzed, made available to external users in which are also described possible protection and prevention actions 4) develop an online application for identification of ULMSDs risk factors.

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Musculoskeletal disorders of the neck among female office workers

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Aim: To assess the prevalence and determinants of MSDs of the neck among female office workers working in health care sector. **Methods:** A cross-sectional multicentric study was conducted among medical secretaries working in three public hospitals. It included a self-administered questionnaire related to individual and professional characteristics with a French abbreviated version of the Karasek's Job Content Questionnaire and a French validated version of Nordic Questionnaire.

Results: The study population was entirely female with a mean age of 43.75 ± 8.9 years. The average job tenure was equal to 15.65 ± 9.18 years. According to Nordic questionnaire, 60 of participants presented MSDs of the neck (83.3%). Among participants, 54 subjects (75%) were in a situation of Job strain. No significant association between MSDs of the neck and socio-demographic characteristics was found. However, MS aged more than 45 years were found to suffer more from MSDs of the neck without reaching the significance level ($p=0.07$). Similarly, domestic activities were

more frequently associated with MSDs of the neck without reaching the significance level ($p=0.051$). MSDs of the neck were significantly associated with time spent in front of the computer's screen ($p=0.005$). In the multivariate analysis, time spent in front of the screen was found to be a risk factor for MSDs of the neck. In fact, MS who spend more time on the computer screen were 2.8 times more likely to develop MSD of the neck.

Conclusion: MSDs of the neck can lead to serious consequences for society, imposing multidisciplinary preventive strategy and management.

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Assessment of musculoskeletal disorders of the upper limbs in health workers

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Aims: To assess the impact of working conditions on the risk of musculoskeletal disorders of the upper limbs (MSDs-UL) among health workers.

Materials and methods: Analytical cross-sectional survey carried out during 2019, at the Department of Occupational Medicine and Occupational Pathologies at CHU Taher Mahdia, Tunisia. The study population is represented by all the nursing staff working in the hospital structure. The data collection was based on a pre-established survey covering the description of the socio-demographic data, professional constraints particularly psycho-organizational and biomechanical, using the ORSOSA questionnaire in its French version. In this study, we adopted the Nordic questionnaire in its short version to determine of MSDs-UL in the study population.

Results: Seventy nurses participated in this study. The average age was 36 ± 8.2 years with a female predominance (69.6%). The average professional seniority was 10.2 ± 8.3 years with seniority in the current position of 7.5 ± 7.2 years. Within the study population, 44.3% reported having musculoskeletal disorders of the upper limbs, affecting the shoulders in 41.4% of cases, the elbows in 18.6% of cases and the wrists in 27.1% of cases. The psycho-organizational constraints most claimed by nurses were: frequent interruptions during work (92.4%), lack of sharing of work values (69.7%) and lack of support from the health manager (52.3%). The physical load of a typical working day was assessed as being intense in 60.3% of cases. After advanced statistical analysis, psycho-organizational and biomechanical constraints did not influence the occurrence

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Work-related musculoskeletal disorders - Official data study in the Republic of Ecuador

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Introduction: Knowledge of occupational diseases remains a key challenge for the Sustainable Development Goals (SDGs). Particularly, there are gaps in work-related musculoskeletal disorders (MSDs) in the Republic of Ecuador.

Objective: To describe the epidemiological profile of MSDs according to socio-occupational characteristics between 2016-2020. **Methods:** Exploratory study of 2863 cases diagnosed by MSDs (86% of all occupational diseases) registered in the national social security compensation system (IESS). Cumulative frequencies were calculated for socio-occupational variables according to sex and significant differences ($p < 0.05$).

Results: The most frequent pathologies according to the International Classification of Diseases (ICD) code were M51 (873; 26,2%), G56 (591; 17,8%), M 51.1 (459; 13,8%) and M75.1 (427; 12,85). Significant differences according to variables of interest were found between women and men.

Conclusions: The underreporting of occupational diseases affects official statistical information systems and limits the generation of real knowledge to establish public policies on occupational health in the country.

13. NANOMATERIAL WORKERS' HEALTH 224

Use of Comet Assay and Micronucleus test as noninvasive biomarkers in workers occupationally exposed to TiO₂

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Introduction: Numerous in vitro studies showed that TiO₂ can induce oxidative and genotoxic responses, however the role of TiO₂ on humans is controversial. The IARC classified it as suspected carcinogen (2B). The aim of the study was to investigate genotoxic and oxidative damage in workers employed in pigment production using non-invasive approach.

Materials and Methods: Health status, life habits and occupational history of 30 workers and 10 external control subjects were recorded with a questionnaire. Airborne inhalable and respirable fraction of TiO₂ were quantified with personal and area monitoring. Urinary Titanium was used to determine the subjects exposure. Genotoxic and oxidative damage (Comet Assay±FPG and Micronucleus test) were assessed on salivary leukocytes and epithelial buccal cells.

Results: Despite the low concentration of respirable dust, TiO₂ was detected in filters for airborne dust collection in the paint producing area. TiO₂ exposed subjects revealed in salivary leukocytes DNA damage ($p < 0.05$) and oxidative stress ($p < 0.001$) higher than controls, while no significant difference between groups of micronuclei counts were observed. In all population investigated the DNA damage and oxidative stress resulted significantly related to urinary Titanium and smoking habits ($p < 0.05$), while task seniority was significantly related to oxidative stress ($p < 0.01$).

Conclusion: The Comet assay in salivary leukocytes proved a useful tool to evaluate early DNA and oxidative damage in workers occupationally exposed to TiO₂ even at low exposure. These preliminary results need further investigation in a broader scale study.

14. NEUROTOXICOLOGY AND PSYCHOPHYSIOLOGY 225

Serum Aluminum Level and Cognitive Functions among Exposed Egyptian Workers

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Introduction: Occupational Aluminum (Al) exposure has neurodegenerative effects associated with changes in amyloid precursor protein (APP) initiating amyloidogenesis. This study aimed at early detection of cognitive functions among aluminum exposed workers through studying the relation between serum aluminum, serum APP and the Mini-Mental State Examination (MMSE). **Subjects and Methods:** A cross sectional analytic study was carried out on 65 apparently healthy literate male workers in the Arab Aluminum Company in Ismailia Governorate with at least 2 years duration of employment. All participants were subjected to a structured interview questionnaire, serum Aluminum assessment using graphite furnace atomic absorption spectrophotometry, serum APP assessment using APP Human Elisa Assay and neuropsychological testing using MMSE.

Results: the mean levels were 1.156 1.49 mg/l for serum Aluminum, 2574.23 935.64 pg/ml for serum APP and 27.92 1.78 for the MMSE score. Most studied workers had elevated serum Al levels (83.1%) while APP levels and MMSE scores were normal. A significant moderate negative correlation was found between serum Aluminum levels and MMSE scores and weak insignificant negative correlation between serum APP levels, and both serum Aluminum level and MMSE scores. The best predictors of MMSE by multiple linear regression analysis were duration of employment and serum Aluminum levels.

Conclusion: Elevated serum Aluminum while both serum APP and MMSE are normal were found. Serum Aluminum and MMSE scoring are negatively correlated. APP does not have impact in impairment of cognitive functions with Al exposure.

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Performance pressure and mental health in office finance workers

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Introduction: Problems of mental health, including suicide among office finance workers, have been repeatedly reported, but no actual investigation has been conducted. Therefore, this report analyzed the correlation between the indicators of performance pressure characteristic in office finance and mental health.

Materials and Methods: The survey was conducted online, and a total of 1,181 people participated. Short questionnaires were used to ask whether there is performance pressure and suicidal thoughts/plans/attempts, depression(PHQ) and anxiety(GAD). For statistical analysis, frequency analysis and chi-square test and simple logistic regression analysis was performed.

Results: Of the total 1181 patients, 797 people (83.54%) answered that they felt pressure to have to perform at work, and 252 people (26.42%) answered that they sometimes want to achieve results even when they engage in illegal activities. When the correlation between performance pressure and mental health was analyzed through univariate log regression analysis, suicidal thoughts, depression, and anxiety were higher in those who felt pressure to perform at work than those who did not. Those who felt that they wanted to achieve results even though they were doing illegal activities had higher suicidal thoughts, plans, and attempts to commit suicide, and also had higher levels of depression and anxiety.

Conclusions: It was confirmed that a factor called “performance pressure”, which is considered a characteristic of work in the office finance industry, exists as a great stress for workers and appears in mental health.

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Acrylamide reduced neurite outgrowth by suppressing p44/42 expression levels in PC12 cells

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Introduction: Acrylamide is widely used in industries as a coagulant aid in drinking water treatment, and soil conditioning. In human case reports, acrylamide exhibited neurotoxicity, such as ataxia, memory impairment, and illusion. The aim of this study is to evaluate the neurotoxicity of acrylamide using PC12 cells.

Material and Methods: PC12 cells were exposed to acrylamide at gradually increasing concentrations (0.1–10 mM) for a maximum of 72 h. The cell viability assay and cytotoxicity assay were determined, using the cell counting kit and cytotoxicity LDH assay kit, respectively. The morphology was evaluated at 24 or 72 h after being treated with nerve growth factor (NGF) and acrylamide. The expression of mitogen-activated protein kinase (MAPK) signaling proteins was obtained by western blotting.

Results: The cell viability ratio significantly decreased when the concentration was more than 2.5 mM after 24 h compared with the control, whereas the cytotoxicity ratio significantly increased. The morphological evaluation, which is including the length, pass, and joint, significantly decreased at 1 mM after 72 h of acrylamide exposure and treatment with NGF. The expression of MAPK family, including p44/42, considerably changed when the concentration was more than 0.1 mM after 24 h exposure.

Conclusion: This study shows the reduction in neurite outgrowth with NGF by decreasing the expression of phosphorylated p44/42 at acrylamide concentrations that do not exhibit cytotoxicity. The results may support that of previous studies, in which noradrenergic axons were decreased in the experimental animals.

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Investigation of a method for measuring hair cortisol

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Background and Objectives: Cortisol in blood and saliva is sometimes used as an index to evaluate stress, but it is difficult to evaluate chronic stress. On the other hand, cortisol in hair is expected to be a method to evaluate chronic stress because the time of accumulation can be roughly estimated by the distance from the hair root. However, there is no standardized method for extracting cortisol from hair, and various methods are used. The purpose of this study was to propose an appropriate method by examining the measurement conditions.

Method: Extraction conditions of hair cortisol were collected from previous reports. Since the method and degree of grinding and extraction time were considered to be the most important steps, these conditions were varied using the same sample, and the extracted cortisol measurements were compared. In addition, once the hair was extracted, it was extracted again and the respective recoveries from the first and second measurements were compared. Cortisol was measured by ELISA.

Results and Discussion: The longer the grinding time of the hair and the extraction time of cortisol, the significantly higher the cortisol value was. The cortisol value was significantly higher with longer hair grinding time and cortisol extraction time, especially for the cortisol extraction time condition. In most cases, the cortisol level was lower in the second extraction than in the first extraction. Based on the results of this study, we would like to optimize the method for extracting cortisol from hair.

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Psycho-organic Syndrome (POS): Contribution of neuropsychological testing

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Introduction: It is currently well established that damage to the CNS secondary to occupational exposure to Organic Solvents (OS) may be manifested as neuropsychiatric disorders whose early diagnosis is based on neuropsychological testing.

Objective: To describe the neuropsychiatric disorders related to the occupational exposure to OS.

Methods: A retrospective descriptive study of the patient files with a POS confirmed by neuropsychological testing.

Results: These were 33 predominantly male patients, with a mean age of 41±9.74 years and an average professional length of 15.24±7.64 years. The sectors most responsible for this pathology were the printing sector (24.2%), automotive industry sector (15.2%) and the manufacture of glue (15.2%). The main complaints were headache (72.7%), asthenia (21.9%), mood disorder (81.8%), memory disorder (72.7%), and concentration disorder (36.4%). These symptoms appeared 13.85±7.52 years after onset

of exposure. The neuropsychological testing has shown an impairment of memory (78.1%), attentional processes (54.5%), executive functions (42.4%) and temporo-spatial disorientation in 9.4% of cases. An irreversible POS was diagnosed in 21 patients, 8 of whom were declared as an occupational disease. A workstation adjustment was proposed in 36.4% of the patients, a transfer in 45.5% of the patients and early retirement in 18.2% of the patients

Conclusion: Workers chronically exposed to OS even to low concentrations require vigilance. The adoption of suitable preventive measures remains the only guarantee in order to avoid the passage to an irreversible stage.

15. OCCUPATIONAL AND ENVIRONMENTAL DERMATOSES 230

Cement Irritant Contact Dermatitis in a Construction Helper. An Occupational Medicine Case Report

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Background: Irritant contact dermatitis is a nonspecific response of the skin to direct chemical damage that releases mediators of inflammation predominantly from epidermal cells while allergic contact dermatitis is a delayed (type 4) hypersensitivity reaction to exogenous contact antigens. Irritants can be classified as cumulatively toxic (e.g., hand soap causing irritant dermatitis in a hospital employee), subtoxic, degenerative, or toxic (e.g., hydrofluoric acid exposure at a chemical plant).

Case Presentation: A man, 23 years old, who works as a construction helper, comes to the skin clinic with complaints since about 1 year ago that he has itching, dryness and cracks on his right and left hands after contact with cement while working. The job of a construction helper is to help builders in work, prepare tools, mix cement to sand, and deliver the mortar to the masons who work and fix the tools that have been used (Monday to Saturday). Materials used are cement, sand, hoe, shovel, cement spoon, bucket, sandpaper, bricks with a work period of 2 years.

Conclusion: In this case, the right and left manus regions erythema, scale, fissure and lichenification are visible, can be look at picture 1 more lichenification predominant, deep burn like to irritant than sensitizer of allergen. Therefore many of worker feel same complaint with patient and enough time up by months to years beside on the reference upside. The Occupational Medicine Specialist Treatment for Irritant Contact Dermatitis related to work based on Fit to Work and Impairment Compensation from Occupational Disease Diagnose and Treatment Guidelines by IOMA.

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Occupational Skin Disease resulting from black rubber in firefighters' masks

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Introduction: N- isopropyl-N'-phenylenediamine (IPPD) is an antioxidant used in black rubber to prevent deterioration. Occupational allergic contact dermatitis (ACD) from IPPD has been reported in workers contacting tyres and rubber rings on microscopes.

We report a case series of five firefighters with occupational ACD caused by IPPD found in the rubber component of a protective face mask. All patients developed an itchy, erythematous rash localized to the area of skin in contact with the mask. Symptoms would recur with subsequent mask use. All patients achieved resolution of the rash with mask avoidance as well as topical treatments which included moisturizers and steroids.

Results: All patients underwent patch testing and all reacted to black rubber mix, IPPD and the facemask supplied by the manufacturer. They were diagnosed with ACD to IPPD in the black rubber component of the face masks.

Ingredient information of the rubber mask components were obtained from the manufacturer confirming the presence of IPPD. An alternative face mask without IPPD was provided for patch testing. All patients did not react on patch testing to the mask components, nor to a "use test" of the mask.

Conclusions: We report a series of ACD caused by IPPD in the black rubber of a protective face mask used by firefighters. Despite this being an uncommon presentation of ACD to black rubber, clinicians should be aware of this possible diagnosis. We also stress the importance of obtaining ingredient information from manufacturers to inform patch testing as well as to guide further patient management.

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What do COVID-19-associated hygiene measures mean for the skin health of healthcare workers? Results of a controlled, prospective intervention study

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Introduction: More than 100,000 occupational COVID-19 infections in healthcare workers (HCW) were reported in Germany from 12/2020 to 6/2021. Hygiene measures were consequently tightened further. We investigated the impact of current hygiene measures on the incidence of hand eczema (HE) and the effect of prevention measures during the above-mentioned period.

Materials and Methods: 302 nurses from two hospitals were recruited for a controlled intervention study. The intervention group (IG, n=135) underwent a two-part intervention (online health education course and provision of a skin cleansing and skin care product ad libitum). The control group (CG, n=167) received no intervention. The skin condition of the hands was assessed by a dermatologist at baseline (T0) and after 6 months (T2) using the Osnabrueck Hand Eczema Severity Index (OHSI).

Results: The drop-out rate was 16.9% at T2. New HE developed in none of the 115 participants of the IG but in 12 (8.8%) of the 136 participants of the CG. With the same baseline score (1.5 points in both groups at T0), the OHSI showed statistically significantly better values in the IG than in the CG at T2 (0.6 points vs. 2.1 points, p<.001).

Conclusions: The intervention did not only contribute to maintenance but even to improvement of the skin condition. A decrease in hygiene measures is not to be expected in the foreseeable future. The use of the intervention concept in the context of the prevention of occupational HE among HCW seems reasonable. Skin protection and skin care recommendations of the online health education course can also be adapted for other high-risk occupations.

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Examination of skin symptoms in painters in the shipyards

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Introduction: Occupational skin disease is the most common occupational disease, and various forms of disease can occur. Similar symptoms were concurrently developed in a shipyard. Then occasional physical investigation was conducted to find the cause of the occurrence of these skin symptoms.

Material and Methods: The investigation was conducted on 299 painters in the shipyard. The 1st examination was conducted through the interview of occupational health physicians. Based on this result, 35 people suspected of having newly developed skin diseases were selected. In the 2nd examination, dermatologist examined and conducted patch test. The patch test was conducted on 25 types of standard antigens and 8 types of paint samples that may cause symptoms were used.

Results: As a result of the investigation, 71 found cases of contact dermatitis, 7 hives, and 10 others. As a result of the patch test, 7 out of 10 people tested positive. 3 people tested positive for the paint, and 2 people tested positive for standard antigens. 2 out of 7 people tested positive for both paint and standard antigens. 3 people showed allergic systemic reactions instead of skin reactions in the patch test.

Conclusions: About a third of the subjects were found to have skin diseases, and various skin diseases were observed including contact dermatitis. Few people tested positive for paint samples even though clinically suspected of occupational contact dermatitis was selected. It is necessary to develop more accurate diagnostic tools to identify the cause of skin symptoms.

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Italian health care workers and Adverse skin reactions to personal protective equipment during Covid-19 pandemic

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Introduction: During the pandemic, the use of personal protective equipment (PPE) has become essential for Healthcare Workers (HCWs) to fight safely against the virus. However, the extensive and prolonged use of PPE may cause various adverse skin reactions due to the use of alcohol hand cleanser and protracted use of masks and goggles. The aim of this study is to evaluate the skin problems caused by PPE in HCWs and the possible consequences on their work.

Materials and methods: An online ad hoc questionnaire, composed by 35 questions about sociodemographic characteristics, work related issues and exposure/habits about PPE, was administered to a sample of Italian HCWs. Univariate and multivariate analyses were performed in order to explore possible associations between variables.

Results: We tested 3 types of PPE: Gloves, Hair Bonnets and Masks for different time of utilization (<1, 1-3, 3-6, >6 hours). The sample included 1184 participants: 292 workers reported a dermatological pathology nested in four different pathological groups: 45 (15%) had Psoriasis, 54 (19%) Eczema, 38 (13%) Acne, 48 (16%), seborrheic dermatitis and 107 (36%) other. 25 workers had a loss of occupational days due to dermatological illness; 56 occupational physician surveillance visits were asked for; in 30 cases were recognized limitations in working duties.

Conclusions: Protecting HCWs requires the use of PPE, but occupational dermatitis is an emerging problem in the midst of the COVID-19 pandemic. National data for affected healthcare professionals could contribute to a better understanding of the problem and prevention initiatives in the workplace

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Allergic and irritant-induced occupational contact dermatitis differential work-specific prevalences

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Introduction: Occupational allergic contact dermatitis (OACD) diagnosis is patch-test (PT) dependent so that, if negative, left occupational irritant contact dermatitis (OICD) as an exclusion diagnosis.

Methods: Retrospective analysis (2010-2020) of 2948 CD (PT:32 allergens-EurAcadDerm-GPEDC). In addition, 4 upper-limb (ULCD) subgroups: construction (CT), hairdressing (HD), cleaning (CL), and healthcare workers (HCW) have been compared to a control group (CG) of nonspecific exposure.

Results: Of the 2948 PT nonselected patients (F/M: 2177/771), 1461 (49.6%, F/M:385/79) were PTve+. In 739 active workers (PTve+ 52.5%) out of 1586 ULCD nonselected patients, HCW (114; PTve+: 64%), CT (19; PTve+: 73.7%), HD (62; PTve+: 75.8%), CL (62; PTve+: 59.7%) and "other" (289; PTve+: 45.3%) vs CG (193; PTve+: 44.6%) we observed significant correlations ($\chi^2_{295}CI$) in CT (dichromate:86, p<0.001; thiurams:36, p=0.002; caines:25.5, p<0.001), HD (PPDA:16.6, p<0.001; N-isopropyl-N-PDA:1.1, p=0.002; disp orange:1.1; p=0.001; OH-ethylmetacrylate:18.3, p>0.001), CL (thiurams:13.2, p=0.013) and HCW (thiurams:14.5, p=0.002;

formaldehyde: 6.2, $p=0.015$). By exclusion, OICD in ULCD was a probable diagnosis in 244/546 (44.7%) active workers vs 107/193 (55.4%) controls.

Conclusion: The anticipated correlation between OACD and specific work contact allergens in ULCD-affected workers doesn't preclude the need to consider OICD as a relevant occupational skin disease demanding equally assertive preventive measures.

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Study Of Contact Dermatitis In Workers Of A Cashew Nut Processing Plant In Bouake (Cote D'ivoire) In 2020

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Introduction : Cashew nut processing exposes workers to many risks, including contact dermatitis.

Material and method : During 6 months (March 1 to September 30, 2020), we conducted a prospective cross-sectional study with a descriptive aim of contact dermatitis observed in workers handling cashew nuts.

Results : During our study period, sixty-two cases of contact dermatitis were recorded out of 1523 consultations, i.e. a prevalence of 4%. These cases were generally observed in female workers (60%), with an average age of 27 years. Almost all of them were workers (89%). The main activity carried out by the workers suffering from contact dermatitis was the manual shelling of cashew shells (71%). More than 2/3 of the patients (70.9%) had been at their workstation for less than one month. Clinically, all patients reported pruritus and tingling pain. Erythema was also noted in 61.3% of the workers. These lesions were located on the limbs (82.2%), particularly on the forearms (38.7%). The incriminating agent was the cashew nut shell liquid. It was responsible for eczema that occurred within 24 hours after contact. The duration of evolution of the lesions was a minimum of 4 days and a maximum of 30 days. This condition was responsible for 181 lost work days and none of these cases was reported as an occupational disease.

Conclusion : Allergic contact dermatitis is probably an occupational disease that should be included in the list of IPM in Côte d'Ivoire. The possible localization to the whole body raises the problem of protection of workers.

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Dermal exposure and surface contamination associated with the use of a cobalt-chrome alloy during metal additive manufacturing

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Introduction: Amidst the rapidly emerging Additive Manufacturing (AM) industry, not enough attention has been given to dermal

exposure. To date only one AM study investigated dermal exposure to metals (nickel-chrome alloy). Our study aimed to: (i) characterise a cobalt-chrome (CoCr) AM feedstock powder in terms of particle size, shape, and elemental composition using the Morphology G3, X-ray fluorescence and inductively coupled plasma-optical emission spectrometry (ICP-OES) analyses, and (ii) assess dermal exposure and workplace surface contamination when the CoCr feedstock powder was used during AM.

Materials and methods: This study was approved by the North-West University Health Research Ethics Committee (NWU-00152-21-S1). A removal wipe sampling method was used. All AM operators participated (two in total), and metals were wiped from the index finger, palm, wrist, back of hand and neck, before and after each AM processing phase (for six process cycles). Workplace surfaces were wiped before and after each shift to quantify surface contamination. Wipe samples were analysed using ICP-mass spectrometry (ICP-MS).

Results: Co, Cr, molybdenum, iron, aluminium and nickel were present in the CoCr feedstock powder. These metals were also detected on dermal and workplace surface wipe samples. Preliminary results indicate exposure on all the anatomical areas, with the highest exposure on the index finger, and the highest exposure during the post-processing phases of AM.

Conclusion: Skin exposure to metals occur during metal AM and control measures need to be implemented in AM facilities to eliminate/reduce metal dermal exposure.

16. OCCUPATIONAL HEALTH AND COVID-19

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Disinfection of Respiratory Protective Equipment in OHSE - H2S Practical Trainings

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INTRODUCTION:: The COVID-19 Pandemic has caused greatest impact to the business framework across the globe. Each company depends on their strategy, they developed their pandemic business continuity management. Like other industry, the OHSE Education and Training organizations have faced similar challenges especially to conduct trainings like Hydrogen Sulphide (H2S) rescue kits includes escape set, working set respiratory protective equipment. The different disinfectant chemicals have been identified and experimented on various feasibility factors like level of disinfection, procedures to be followed for disinfection, availability and the cost factor. In this process the material damage due to disinfectant chemicals over the equipment have been identified and the appropriate alternate chemicals by applying the Chemical Risk assessment & Substitution Hierarchy of control have been identified.

MATERIALS AND METHODS: The chlorine based and the ortho-Phthalaldehyde based COVID19 disinfection chemical compounds have been used for the different respirator protective equipment and escape sets. The disinfection chemicals have been applied over the RPEs for the following materials like Neoprene, Chloroprene, natural rubber, Polycarbonate, Flame retardant polyester and the impacts have been observed.

RESULTS AND DISCUSSIONS: The dilution factors, disinfection efficiency, Chemicals used can be identified from the manufacturer, federal and chemical agencies. This experiment result will help to

identify the suitable COVID-19 disinfection chemicals for the different RPEs used in H₂S/SO₂ escape sets used in the Hydrocarbon industry.

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Changes in air quality inside vehicles and in working conditions of professional drivers during COVID-19 pandemic, in Paris area

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Introduction: During COVID-19 crisis, we evaluated the impact of the first lockdown restriction measures (March –May 2020) in Paris area on (1) the variation of in-vehicle ultrafine particle (UFP) and black carbon (BC) concentrations between pre- and post-lockdown period and (2) the professional drivers working conditions and practices.

Material and Methods: The study was conducted in 33 taxi drivers. UFP and BC were measured inside their vehicles with DISCmini® and microAeth®, respectively, on two typical working days pre- and post-lockdown. The job-related characteristics were self-reported.

Results: Our results showed that post-lockdown, the number of clients significantly decreased as well as the taxi drivers journey duration. Taxi drivers significantly opened more their windows and reduced the use of air recirculation. UFP decreased significantly by 32% and BC by 31% post-lockdown, with a weaker positive correlation compared to pre-lockdown. The reduction of in-vehicle UFP was explained mainly by the reduction of traffic flow and ventilation settings, though the latter probably varied according to the traffic condition. No predictor explained the variation of in-vehicle BC concentration between pre- and post-lockdown, suggesting different sources of UFP and BC. The road traffic was not anymore the dominant source of BC post-lockdown.

Conclusion: We emphasize the role of traffic emissions on in-vehicle air pollution and that preventive measures such ventilation settings will help to better manage air quality inside vehicle in order to minimize exposure of professional drivers, as well as passengers, to air pollutants.

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A blueprint for well-designed, high-performing cloth masks that can outperform a 3-layered surgical mask

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Introduction: During COVID-19, due to the worldwide shortages of medical masks, homemade cloth masks became a mainstay of the pandemic. The CDC and WHO recommend the use of homemade

cloth masks. However, there is insufficient evidence on the performance: respiratory droplet blocking ability, water-resistant capacity, breathability, and washability of commonly used fabrics to design high-performing cloth masks that can outperform medical masks.

Material and Methods: We conducted a series of experiments on aerosol blocking (using healthy volunteers sneeze, image-based flow measurement technique), water-resistant, breathability, and washability to evaluate all dimensions of protection of 17 different commonly available fabrics and their layered combinations.

Results: The research provides a blueprint for the optimal design of a high-performing cloth mask that can outperform a 3-layered surgical mask. A minimum of 3 layers is recommended to provide the performance of surgical masks. A combination of cotton/linen for the inner layer, blends for the middle-layer, and polyester/nylon for the outer-layer. The average thread count (threads contained in one square inch) should be greater than 200, and the porosity (percent of pores in a fabric) should be less than 2 %. Increasing the number of layers increases the droplet blocking efficiency by approximately 20 times per additional fabric layer. Machine washing at 60 °C did not affect the performance of cloth masks.

Conclusions: These results and visualizations can assist people in preparing effective homemade cloth masks during the ongoing COVID-19 pandemic and future epidemics.

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Using Health-Related Behaviour Change Program For Control Of Covid-19 At Workplaces: How It Works

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Introduction: The COVID-19 pandemic which is caused by severe acute respiratory syndrome – coronavirus 2 (SARS-CoV-2), has ravaged the world enormously, creating a huge pandemonium among public health, and occupational health and safety authorities. The virus is an enveloped RNA virus, transmitted directly or indirectly via airborne route or contact with contaminated fomites. Studies have shown that transmission occurs rapidly among humans because of poor health – related behaviour frequently exhibited. Although, necessary information on COVID-19 is accessible on all media platforms, the consistent poor response to safety guidelines by individuals at home, public settings and workplaces has aided the prolonged duration of the pandemic. In addition, it has been reported that individuals can be reorientated to behave appropriately via specialized and structured programs. Hence, I hereby propose the use of health – related behaviour change (HRBC) program for control of COVID-19 at workplaces.

Materials and Methods: The HRBC program for control of COVID-19 at workplaces requires strict adherence to the following measures: development, implementation, and enforcement of workplace policy for COVID-19; workshops; penalty and reward system; workers engagement via whistleblowing; use of educative videos in eating areas; COVID-19 safety tips in daily toolbox talks; and quarterly performance review.

Results: Quarterly review should show increased healthy behaviours and decline in infection rate among employees.
Conclusion: HRBC program is the future of workplace measure for control of COVID-19 and other infectious diseases.

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Health Impact and Psychosocial Perceptions of SARS-CoV-2 exposure among French hospital workers: A Cross-Sectional Survey

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Introduction: In 2020, the COVID-19 pandemic had an important effect on healthcare systems, including their healthcare workers (HCW). Studies on HCW well-being and mental health have regularly reported problems associated with their occupational activities during epidemics. The aim of this study is to describe the mental health impact and psychosocial perception of hospital workers one year after the first peak of the COVID-19 outbreak in France.

Methods: The validated SATIN questionnaire was used to collect data on health and psychosocial factors. It was sent and self-administered online in July 2021. In a multinomial regression model we included covariates: HCW status, age, gender, frontline worker, SARS-CoV-2 status.

Results: Data from a total of 830 participants were included (64% were HCW). We found that worries about infection for oneself is a risk factor for negative perception of global health (OR 1,5 95% CI [1,029-2,199]), work demand (OR 1,8 [1,2-2,5]), work environment (OR 1,8 [1,3-2,5]), organizational context (OR 1,9 [1,1-3,3]), for psychosomatic symptoms (OR 2,1 CI [1,1-3,9]) and stress (OR 1,8 [2,1-1,3]).

Conclusion: We have shown that uncertainty about SARS-CoV-2 infection has an high mental health impact in hospital' workers. Actions on information, training, organizational context and appropriate protective equipment are useful and needed.

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Work Engagement, Job Demands and Burnout among Croatian Health Care Workers during the Coronavirus Disease 2019 Pandemic

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Introduction: As the world is fighting COVID-19 pandemic, health care workers (HCWs) keep struggling with increased stress at work and consequential mental health disorders. The aim of our study was to assess workplace characteristics and the development of burnout in HCWs during COVID-19 pandemic.

Materials and Methods: This study was designed, developed and ethically approved by the South East European (SEE) Network on Workers' Health in cooperation with SEE Health Network. During the autumn of 2020, an online anonymous survey was conducted among HCWs in Croatia. A total sample of 300 HCWs answered the

Maslach Burnout Inventory, Utrecht Work Engagement Scale and Job Demands and Resources Questionnaires.

Results: Hospital nurses made up the majority (68.0%) of participants. The highest level of job demands (3.92±0.63) was at physical level: excessive workload at a hospital or unit, time pressure, and lack of staff and supplies. No significant correlations were found between physical job demands and age, gender, work tenure and working hours. The highest significant positive correlation was found between organisational job demands and emotional exhaustion (r=0.455, P<0.001). Emotional job demands moderately and positively correlated with depersonalization (r=0.373, P<0.001).

Conclusions: HCWs' workplaces have significantly changed during the COVID-19 pandemic and become substantially hazardous for mental health. Preventive measures need to be implemented urgently and should be primarily focused on excessive workload reduction with additional emotional support to reduce burnout rates and preserve HCW's work ability.

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Respiratory And Non-Respiratory Symptoms In Health Care Professionals Infected With Sars-Cov-2 – Reported Cases In The First Wave Of Covid-19 In A Portuguese Occupational Health Service

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INTRODUCTION: Healthcare professionals are among the main risk groups for COVID-19 and can also be a source of transmission to patients to whom they provide care. The identification of symptoms is important in the clinical presumption of COVID-19. However, the infection may be asymptomatic or paucysymptomatic.

MATERIAL AND METHODS: Cross-sectional study, with retrospective analysis of the clinical records of health professionals who went by self-initiative to the Occupational Health Service of a University Hospital Center, between March and August 2020, for presenting symptoms, risk contact with a confirmed case of COVID-19, or by both and, who in this context, performed the RT PCR SARS-CoV-2 test.

RESULTS: 613 professionals were evaluated. Of the 420 symptomatic professionals, in 27 COVID-19 was confirmed, while only 3 of the 193 asymptomatic professionals being positive (95% CI, p = 0,009). In turn, of the 371 who had respiratory symptoms, 19 were positive for COVID-19, versus 11 among the 242 who had no respiratory symptoms, not being difference statistically significant (95% CI; p = 0,75). Nasal congestion and rhinorrhea were the respiratory symptoms with the highest proportion of positive cases (11,43% and 8,97%, respectively).

CONCLUSIONS: Although COVID-19 is typically associated with respiratory symptoms, not all these symptoms were predictive of disease. It becomes crucial to value mild symptoms among healthcare professionals, even in the absence of risk contact.

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Teleworking, Work Engagement and Intention to Quit During the COVID-19 Pandemic: A Study Examining the Effects of Individual and Organizational Characteristics

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Introduction: This study aimed to determine if work engagement played a mediating role in the relationship between teleworking and intention to quit during the COVID-19 pandemic. It also aimed to evaluate if individual (i.e., emotional intelligence, self-esteem, locus of control) and organizational (i.e., decision authority, skills utilization, workload, recognition) characteristics played a moderating role. **Material and Methods:** Path analyses were conducted with MPlus software on a sample of 254 workers from 18 organizations. **Results and Conclusions:** Teleworking was directly associated with lower work engagement and indirectly associated with intention to quit. Individual and organizational characteristics did not play a moderating role between teleworking and work engagement after a Bonferroni correction was applied. That said, one dimension of emotional intelligence (i.e. use of emotion) was directly associated with higher work engagement and indirectly associated lower intention to quit. Moreover, skills utilization and recognition were directly associated with higher work engagement and indirectly associated with lower intention to quit. This study indicates that even if teleworking has many advantages (e.g., allows more flexibility to help employees to reconcile their personal and professional lives), it also has the disadvantage to potentially reduce work engagement. Even though this study found that individual and organizational characteristics did not attenuate or accentuate the effect of teleworking on work engagement, it provides insights into increasing work engagement and decreasing intention to quit.

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Development and validation of a multi-lingual online questionnaire for surveying the COVID-19 prevention and control measures used in global workplaces

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Introduction: There is an ongoing need for targeted disease prevention and control efforts in high-risk occupational settings. This study aimed to develop, pilot, and validate an instrument for surveying occupational COVID-19 infection prevention and control (IPC) measures available to the global workforce.

Material and Methods: A 44-item QualtricsXM survey was developed, translated, and validated for face, content, and cross-cultural validity according to literature review, expert consultation, and pre-testing. The survey was piloted with 890 workers from diverse industries and countries. Exploratory factor analysis (EFA) was conducted, and internal consistency reliability verified with Cronbach's alpha. Hypothesis testing and Pearson correlation coefficients verified construct validity (i.e., known-groups technique, discriminant validity), and criterion validity.

Results: EFA revealed nine key IPC domains relating to: environmental adjustments, testing and surveillance, education, costs incurred, restricted movements, physical distancing, masking, isolation strategies, and areas for improvement. Each domain showed sufficient internal consistency reliability (Cronbach's alpha ≥ 0.60). Hypothesis testing confirmed construct validity ($p < 0.001$), criterion validity ($p \leq 0.03$), and discriminant validity ($r = -0.45$).

Conclusions: The occupational IPC measures survey showed strong validity and reliability. It can be used by decision makers in the distribution of IPC resources, and to guide occupational health and safety (OSH) recommendations for preventing COVID-19 and future infectious disease outbreaks.

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Remote work during the COVID-19 pandemic: How do digital technology use affects mental fatigue, psychological distress and well-being?

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Introduction: In the wake of the COVID-19 pandemic, many organizations had made a major shift towards remote work, causing an increased use of digital technology. While remote working has several benefits, one of its downsides is to create information and communication technology (ICT) demands (e.g., feeling obligated to stay connected). While previous studies have revealed the harmful effects of ICT, very few have investigated the impact of ICT demands on three specific related psychosocial factors. In such a context, this study aims to shed light on the relationship between ICT demands, mental fatigue, psychological distress and well-being. 2.

Material and Method. The study was conducted during the first wave of COVID-19 in 2020 in Canada. The data was collected from 320 workers who provided online consent and completed the survey on a voluntary basis. Ethical approval from the research ethics committee of Laval University was obtained. Hayes Process add-on for SPSS was used to test parallel mediation analyses. The study used validated measures to assess ICT demands, mental fatigue, psychological distress, and well-being. 3.

Results and Conclusions. The results reveal that mental fatigue and psychological distress significantly mediate the negative relationship between ICT demands and well-being. In a context where many organizations are now considering adopting telecommuting on a permanent or hybrid basis, these findings suggest that special attention must be paid to sufficiently supported workers in their remote work to mitigate the adverse effects on psychological health.

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PPP model for COVID 19 mitigation for construction sector in Pune , India

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Introduction: COVID 19 pandemic has affected all sectors including constructions and workforce is severely affected due to loss of wages and cost of treatment and testing of COVID 19. In Pune one of the construction industry partnered with testing centre and isolation facilities of local self Govt in Pune.

Material Methods: 56 families(213 members) were staying at construction sites during lock down and interval testing of COVID 19 i.e. Rapid antigen test or RTPCR was costly for the workers and even treatment at private centres was costly so the author suggested to take help of local municipal corporation and COVID 19 centres. The support was also extended for COVID 19 vaccination at workplace Cost saving. **Results:** 198 were tested for RAT and 6 were found positive, all were asymptomatic and then were sent to isolation at COVID 19 centres to prevent the further spread in the labour camp. Repeat testing was conducted at monthly interval and for consecutive six months avg 89% percent of the population tested regularly and positivity was rate was

less than 2% where in general population it was 5 to 10 %. NO death was reported from the site for COVID 19. Covid appropriate behaviour by the workers was also found 90 percent during random surveys done as it was always emphasized during testing. COVID 19 vaccination of all workers at workplace was also done in this PPP model.

Conclusion: Public private partnership during COVID 19 plays important role during COVID 19 times for the workers and cost for testing ,admission and vaccination was nil. Work continuation and cost saving is also important.

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Worker adaptation behaviours and mental health impacts in Irish workplaces arising from COVID-19 – observations of OSH professionals

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Introduction: Workers quickly adapted during the COVID-19 pandemic to comply with updated work arrangements, control measures and policies. Understanding adaptation difficulties/fatigue and mental health issues among workers is crucial for OSH professionals to plan for future emergencies.

Materials and Methods: As part of a larger COVID-19 workplace study, 16 two-hour focus groups (4-6 participants each) were conducted with OSH professionals (n=60) in Ireland, covering four predetermined themes (organisational preparedness; organisational impacts; worker adaptation behaviour; and the future of OSH post-pandemic). Thematic analysis was conducted using Nvivo.

Results: OSH professionals observed many workers rapidly adapted and became involved in organisational COVID-19 outbreak prevention and long-term adaptation, in contrast to some workers that exhibited mental health problems as they struggled to adapt. Adaptation fatigue was observed when staff were sent home to work due to a range of factors: 1) isolation at home 2) no boundary between work and life; and 3) inability to disconnect from negative media coverage. The situation can be alleviated by 1) increasing informal communication to cope with isolation; 2) Employee Assistance Programmes; and 3) additional consultation regarding their COVID-19 concerns.

Conclusion: Most Irish workplaces focused more on employees' physical safety rather than their mental wellbeing. The experiences shared by OSH professionals in this study illustrate their agility and ability to apply their risk management and control skills to any unanticipated public/occupational health crisis that arises.

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Demographic Characteristics Of Workers Vaccinated During Workplace Covid-19 Vaccination Program In Croatia

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INTRODUCTION: Vaccine hesitancy is one of the main causes of poor vaccine coverage during ongoing COVID-19 pandemic, which imposes significant occupational and public health threat. Vaccine

acceptance is highly influenced by perception of vaccine efficacy and safety where gender and age-based differences seem to play a role. In order to assess possible gender and age-related differences in responsiveness to occupational COVID-19 vaccination, present study was conducted.

MATERIALS AND METHODS: Data of vaccines administered by Mobile Occupational Vaccination Team during April 14, 2021 – July 12, 2021, were examined in order to describe demographic characteristics of fully vaccinated workers in major Croatian companies. RESULTS and CONCLUSIONS: During 3-month period 12360 workers were fully vaccinated among which 55.5% men (4.9% at age 15-24y, 69.2% at age 25-49y and 28.9% at age 50-65y) and 44.5% women (3.9% at age 15-24y, 68.2% at age 25-49y and 27.9% at age 50-65y). When compared with current Croatian labor force participation rates for men (53.6%) and women (46.4%) in regards to age stratification, we found larger proportion of men receiving full immunization with the vast majority of them being between 24 and 65 years old. Acknowledging and understanding gender and age-based differences in perception of vaccine safety and efficacy may be beneficial in constructing effective vaccination campaigns targeted towards vulnerable occupational groups potentially resulting in greater vaccine acceptance and optimal workplace vaccine coverage.

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Which jobs are lucky against the “biologic” and “economic” risks caused by the covid-19 pandemic?

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Introduction: Coronavirus disease 2019 (Covid19) is more common in some occupations and also many workers have been influenced in term of socioeconomic conditions in this period. The aim of this study is to investigate the occupational distribution of the patients diagnosed with Covid19, in two dimensions that work-related covid19 transmission (WRCT) and pandemic-related economic worsening (PREW).

Method: The study population of this cross-sectional study was 271 workers, out of 1505 who were diagnosed with Covid19 at Hospital between 19.03.2020-04.09.2021. A structured questionnaire were applied by telephone interview. The outcomes of the study were WRCT and PREW. International Standard Classification of Occupations and Erikson-Goldthorpe social class chart was used for occupational and socioeconomic classifications. Descriptive statistics is presented. Chi square test is used in comparison of proportions.

Results: Of 233 workers who accepted to participate in the study, 51.5% were male (n=120). The mean age was 37.7(±9.2). WRCT was found 3.6 times higher in healthcare workers (CI%95 1.9-6.9). PREW was observed in 53 workers (%27.7). Twenty workers had quit from their jobs (8.5%). PREW was higher in private sector (OR=6.69 CI %95 3.1-14.5). PREW was found significantly high in self-employed and small business owners compared to other social classes (p=0.001).

Conclusions: Healthcare workers are exposed higher biological risk factors while small business owners might be vulnerable against economical risk factor. The white collar workers who could work from home were the luckiest, the virus risk has been reduced while ensuring business continuity.

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Is SARS-CoV-2 prior infection related with more adverse effects to mRNA vaccine in healthcare workers?

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INTRODUCTION: Coronavirus disease (Covid-19) has claimed more than 4 million deaths worldwide by 13th August, 2021. In December 2020, Covid-19 vaccination campaign started. Nowadays, around 4.6 billion doses have been administered. The aim of this study is to detect if people with SARS-CoV-2 prior infection suffer more adverse effects to messenger ribonucleic acid (mRNA) vaccine, compared to people without this background.

MATERIAL AND METHODS: All health workers from Fundación Jiménez Díaz University Hospital (Madrid, Spain), who reported local and general adverse effects after SARS-CoV-2 mRNA vaccine administration, were recruited between January and February, 2021. Age, sex, number of doses, professional category and department were studied as independent variables. The dependent variable selected was positive polymerase chain reaction (PCR) test and/or positive immunoglobulin G (IgG) against SARS-CoV-2.

RESULTS: 200 out of a total of 4,665 healthcare workers, who received mRNA vaccine at the hospital in that period of time, reported adverse effects. Regarding local symptoms, a lower risk of presenting them was observed after the administration of the second dose (OR 0.19, 95% CI 0.10–0.37, $p < 0.001$). Attending to general symptoms, the results indicate older workers (OR 0.93, 95% CI 0.86–0.99, $p = 0.045$) had fewer symptoms.

CONCLUSIONS: An association between SARS-CoV-2 prior infection and more adverse effects to mRNA vaccine was not found in our study of hospital healthcare workers. Furthermore, variable “age” needs to be further investigated, since younger people seem to have more adverse effects to the vaccine.

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Social determinants of health and health inequalities in context of COVID-19 pandemic

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Introduction: The COVID-19 pandemic has disproportionately affected disadvantaged populations, exposing existing inequalities in the society and widening health inequalities. Health inequalities are those preventable differences in health status between groups that arise from the unequal opportunities and unequal distribution of resources related to health, which determine the risk of people getting ill, ability to prevent illness or opportunities to access medical care.

Material and Methods: Literature search was done through relevant science databases. Available studies regarding health inequalities in context of COVID-19 pandemic were examined and presented in this review.

Results and Conclusions: The higher risks of COVID-19 infection and mortality has been noticed for specific groups that are disproportionately affected by pandemic due to inequalities in the social determinants of health, such as living and working conditions, access to healthy food, opportunities for maintaining hygiene and access to healthcare. To understand why lower socioeconomic groups and minorities are more susceptible to infection, broader context of the pandemic has to be observed. Although the existence of virus is a key factor, differences in infection, prevalence, severity and mortality rates seem to be a result of a synergistic effect of the virus itself, social determinants of health and inequalities in pre-existing chronic diseases. The important task for the future is to create more equal and healthier living and working conditions, improving the health of the most vulnerable groups and reducing inequalities in the population.

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Food supplements in nurses' diet during COVID-19 pandemic

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Introduction: The study aims at investigating the impact of COVID-19 pandemic on the frequency of nurses' food supplementation.

Material and Methods: The study was carried out in the winter of 2020–2021 in the City of Zagreb and comprised a total of 148 nurses affiliated with the PHCC “Centar”. Data were collected via a questionnaire adapted to the purpose. The research was approved by the Ethics Committee of PHCC. Differences between the group which changed its food supplementation during the COVID-19 pandemic and the group that did not were tested using the χ^2 test. **Results:** The results reveal the consumption of some food supplements to be habitual to nurses. COVID-19 pandemic urged over a third of them to start taking food supplements, or to increase the amount and frequency of their use (38.5%). As for vitamins, during the pandemic nurses increased D vitamin intake ($P < 0.001$). Significant differences in the consumption of minerals & proteins seen between the group that changed its food supplementation habits and the one that did not, arose primarily due to the changes in magnesium ($P = 0.020$) and zinc intake ($P = 0.030$). On top of that, a significant rise in beta glucan ($P = 0.015$), and homeopathic preparations' ($P = 0.010$) intake was documented.

Conclusions: COVID-19 pandemic significantly impacts food supplementation in nurses. Based on the dietary recommendations, during the pandemic the focus should be shifted to healthy diet principles. In case of an increased risk of COVID-19 disease or nutrient deficiency, food supplements should be introduced, too.

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"Mat-O-Covid": a SARS-CoV-2 (COVID-19) Job Exposure Matrix

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While exposure assessment is complex for the occupational risk researcher, the objective of our work is to develop and validate a job-exposure matrix (JEM) for SARS-CoV-2 exposure called "Mat-O-Covid" project ("COVID-Mate" in French).

A group of French experts, the JEM was developed for all workers using the 2003 Occupation and Socioprofessional Categories (with a transcoding gateway to the 2008 International Standard Classification of Occupations) and a focus on the health and care sector. The average of the experts' coding was used as estimates for both estimates, exposure "subjects" (colleagues and/or public) and "patients" for the focus on the health and care sector, as well as the probability of prevention for each. Intraclass correlations were considered good to excellent except for health prevention. Compared to the United States O*Net JEM, the evaluation was considered as fair.

In conclusion, a "Mat-O-Covid" JEM providing a probability of occupational exposure to SARS-CoV-2 will have implications for research and public health, taking into account that its limitations are known, and its validation is still in progress.

NB: Mat-O-Covid is available at <https://www.sciencedirect.com/science/article/pii/S1775878521001296#upi0005>

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The impact of death of COVID-19 patients on mental health of healthcare workers: a latent profile analysis of post-traumatic stress symptoms

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Introduction. The COVID-19 pandemic crisis significantly impacted workplaces across the world. Healthcare workers (HCWs) had to promptly manage unpredictable daily severe critical patients, caring for severely traumatized patients, and frequent witnessing of

death of patients. More recently, many studies highlighted how the large number of deaths and the way patients were dying significantly impacted mental health of HCWs, exposing them to the risk of developing post-traumatic stress (PTS) symptoms. The main purpose of this study was to explore subtypes of HCWs on the levels of PTS symptoms, considering those workers who cared for patients who died of COVID-19.

Materials and Methods. An online survey was conducted using LimeSurvey. We applied latent profile analysis (LPA) to identify profiles of PTS symptoms in a sample of Italian HCWs (n=543). LPA including one to six latent profiles were estimated by using MPlus 7 robust maximum-likelihood estimator (MLR).

Results. LPA showed a three-latent-profile solution: high-PTS symptoms (high levels of intrusion, avoidance, and hyperarousal; n=35), moderate-PTS (moderate levels of intrusion, avoidance, and hyperarousal; n=397), and low-PTS (low levels of intrusion, avoidance, and hyperarousal; n=111).

Conclusions. To our knowledge, no studies have yet examined whether distinct subgroups of PTS symptoms can be identified among HCWs exposed to the death of COVID19 patients. Using person-centered methods for the identification of latent patterns of PTS symptoms may potentially have conceptual, diagnostic, and treatment implications.

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Analysis on the evolution of the personal protective equipment proposed in catalan hospitals during the first wave of the covid-19 pandemic

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INTRODUCTION: This project arose to suggest in-depth research on key topics to give our health system better tools to face future outbreaks. And in order to determine the flaws in the response given to the COVID-19 pandemic and what led to them, all to prevent them from happening in future outbreaks.

MATERIAL AND METHODS: WHO's tuberculosis laboratory biosafety manual and the tuberculosis patient insulation procedure from the Bellvitge hospital as examples of protocols before the pandemic and V2, V2.3 and V3 of Pla EPI as examples implemented during the outbreak have been used. Pla EPI was created to help distribute PPE (Personal Protective Equipment) among healthcare personnel based on their tasks and taking into consideration the lack of it due to the collapse in the supply chain faced during the first wave. By summarizing the documents of interest using data tables. A comparative between the PPE proposed in the different published versions of "Pla EPI" has been made.

RESULTS AND CONCLUSIONS: This comparison has led to the conclusion that new protocols offer a more bilateral healthcare worker/patient protection instead of only focusing on protecting the worker from patients' pathogens. In relation to pla EPI, considering the now demonstrated importance of aerosols in transmission of COVID-19, we conclude that PPE available at the

moment isn't enough to protect against this type of diseases and that more research should be done towards better PPE. We should stop relying on a few countries to provide the whole healthcare system with PPE, after all, that was the main cause of PPE shortage during the first wave.

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Specific Occupational Health Interventions and the new normal at our Workplace (Hero MotoCorp Ltd- World's largest 2-wheeler manufacturer) to control SARS-CoV2 pandemic

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Introduction: As we are surfing repeatedly over SARS-CoV2 pandemic waves in an unprecedented new normal phase in our lives, our belief in hope, optimism & resilience conjoined with our precautionary, preventive & control measures have enabled us to confront it, stay alive & even return to work. Objective of study was to evaluate & justify the interventions at our workplace aimed at control of the pandemic, resumption of operations, ensure business continuity & wellbeing of all employees.

Materials and Methods: A restart manual was designed with 10 control domains, over a month (April 2020) after analyzing the high risk points in the workplace, with approval of higher management & implementation started top-down. Later revisions were made as per demand of the situation. Defined metrics and assessment tools were used to evaluate effectiveness like total cumulative COVID cases in each wave, total primary contacts, comparison data with cases in adjoining district and nationwide in the same timeline.

Results and Conclusion: At our workplace at Dharuhera, the total number of COVID cases dropped from 176 to 103 from 1st to 2nd wave respectively & total primary contacts dropped by 50%; also unlike the surge in cases in the adjoining district & national figures which were much higher in 2nd wave (97894 new cases in single day on 10.9.2020 in 1st wave & 414188 on 6.5.2021 in 2nd wave). Thus to conclude, all the 10 intervention domains were very effective & justified since we could achieve a control on the pandemic.

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QRISK3® stratification during the Coronavirus pandemic and the evolution of a health promotion opportunity in NHS hospital employees

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Introduction: Healthcare workers (HCWs) from black and minority ethnic origin (BAME) worldwide paid a higher price in terms of mortality and morbidity during the pandemic. An association between cardiovascular (CVD) risk and COVID-19 complications was suspected as a cause for this disparity. A large NHS Trust developed its own COVID-19 risk stratification incorporating CVD risk of staff assessed by QRISK3® algorithm alongside other risk factors such as asthma/COPD, low immunity and cancer, long before UK wide guidance was published. High and increased-risk staff were offered additional COVID-19 protection.

Material and Methods: All staff aged ≥45 years (8047 among total 18025 employees) were eligible to participate. Clinical information

alongside blood pressure, BMI, renal and lipid profile and HbA1c was entered into the QRISK3 calculator. Staff with "increased" (Score >10; 10% risk of a CVD event over 10 years) and "high" (>20) CVD risk were restricted at work.

Results: A total of 1075 employees participated (75% white, 25% BAME). 5% and 7% were identified as increased and high-risk requiring restriction. Advice was provided to participants who were obese (36%); overweight (36%); hypertensive (25%); diabetic/ pre-diabetic (11%) and with unexpected results (BP≥140 systolic 17%, CKD 2%, HbA1c >48 1%). Hypertension was commoner among whites and Diabetes among BAME staff.

Conclusions: The trust's initiative of risk stratification by using QRISK3® may have provided an additional protection to staff with high CVD risk from COVID-19 complications. Its potentiality as a wellbeing tool for health promotion needs to be explored.

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Association between workplace bullying and mental health in the COVID-19 pandemic

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Introduction: The pandemic of the new coronavirus disease (COVID-19) has created a challenging environment for workers. This study aimed to clarify the prevalence of workplace bullying during the pandemic and its relationship with socioeconomic status (SES) or mental health.

Methods: We conducted an online cross-sectional survey of 28,000 general residents from August to September 2020. One item of the Brief Job Stress Questionnaire was used to determine whether the respondents had experienced bullying at work, and those who answered "Yes" were defined as the exposure group. Severe psychological distress (SPD) was measured by K6 (≥13) and suicidal ideation was measured by one item. Gender, age, education, marital status, household income, employment status, industry, office size, job characteristics, and hours worked per week in the past month were measured as individual and occupational characteristics, including SES.

Results: The prevalence of workplace bullying (14.9%) was high among males, those without a spouse, those with the lowest annual household income, and corporate executives/regular employees. The risk of SPD was 3.7 times higher and the risk of suicidal ideation was 2.5 times higher in the group exposed to workplace bullying than the non-exposed group (logistic regression analysis, after adjusting all of the individual and occupational characteristics).

Conclusions: The prevalence of workplace bullying was higher than previously reported (6.1%). Although workers with low SES are more likely to experience bullying in general, even workers with high SES also experienced bullying during the pandemic.

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The impact of COVID-19 pandemic on scientific knowledge: the future perspective of virtual Conferences

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Introduction: The measures taken to combat the pandemic, such as travel restrictions, closed borders and gathering bans, led to cancellations of many conferences, meetings and workshops, forcing the scientific community to identify new ways of disseminating scientific knowledge. This resulted in the transition from traditional face-to-face meetings, where practitioners and academics meet to exchange knowledge, network and develop collaborations, to the development of new events in digital formats. This study aimed at investigating the impact of the spreading of virtual conferences on the field of research.

Materials and Methods: We made a SWOT analysis to evaluate strengths, weaknesses, opportunities and threats of this new way of organizing scientific conferences, as compared to face-to-face conferences in terms of effectiveness of result dissemination, networking opportunities, and policy development.

Results: Among the biggest opportunities of virtual conferences, revealed by the SWOT analysis, there are larger accessibility, equity (in terms of sex, ethnicity, geographical setting, physical ability, health, and career stage) reduced expenses, environmental sustainability and a better work-life balance. On the contrary, reduction in network building and in research capacity/cooperation, lower interest of local stakeholders and “digital exclusion” represent the most important threats.

Conclusions: Organizing a virtual conference does not mean concentrating only on the offline or the online side of the event, but rather to integrate the two sides in order to offer the participants the opportunity to choose how to part

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Occupational skin dermatoses as a result of Covid-19 prevention practices

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Introduction: Occupational skin diseases (OSD) account for a significant proportion of occupational disease. High risk occupations for OSD include workers in the healthcare, food service, metal-working, hairdressing and construction industries. The prevention of the COVID-19 virus has increased the use of personal protective equipment (PPE), handwashing and cleaning practices globally.

Methods: We will cover the first hand experiences gained during the pandemic, by reviewing the presentations of OSD at a dermatology clinic as result of COVID-19 practices.

Results: During the pandemic, the use of PPE created occlusive and humid environments particularly exacerbating underlying skin conditions. This phenomenon was not exclusive to high risk OSD occupations. Atopic individuals at risk of OSD had an increased susceptibility to irritant contact dermatitis (ICD) as a consequence of using hand sanitizers and additional hand washing. Furthermore more exacting cleaning practices provided exposures to additional irritants and allergens, such as laundry rinses containing benzalkonium chloride (BAK) and fragrances in personal care products. Patch testing proved useful in

diagnosing and treating patients, which allowed workers to return to work.

Conclusions: Personal protective practices adopted during the pandemic adversely affected workers, especially those with underlying skin conditions. This included the use of PPE, increased hand washing and sanitizing practices as well as increased cleaning practices. Treatment of underlying skin disorders as well as education on skin protection has been pertinent during this time.

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A longitudinal study of frontline health care workers during the pandemic

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Introduction: Occupational stressors have continuously varied throughout the COVID-19 pandemic. Only a prospective study can fully describe the phenomenon.

Material and Methods: A one-year longitudinal study was performed in correspondence with the first three pandemic waves from April 2020 to June 2021 in the intensivists of a COVID-19 hub hospital. Changes in work activity due to the pandemic were measured together with the perception of organizational justice, occupational stress, sleep quality, anxiety, depression, burnout, job satisfaction, happiness, and intention to quit. The participation rate was over 60% in each of the three surveys. The Catholic University Ethics Committee had approved the study (ID 3292).

Results: The various pandemic waves have placed different stressors and generated corresponding reactions in the workers. After the 3rd wave, 59.2% reported at least one unprotected exposure to COVID-19 patients and 19.2% had contracted the infection. Confidence in safety measures was low and occupational stressors (excessive workload, isolation, compassion fatigue, lack of time for meditation and physical activity) were present. Consequently, distress (73%), sleep problems (28%), anxiety (25%), and depression rate (64%) remained unacceptably high.

Conclusions: Clearly, the situation illustrated in our study calls for preventive and supportive action. Preventive interventions are difficult to implement but cannot be postponed. Participatory involvement in safety procedures, increased intangible rewards, increased attention to meditation and sleep are recommended.

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One year of SARS-CoV-2 Pandemic: a characterization of infected healthcare workers in a peripheral hospital of Lisbon, Portugal

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Introduction: After more than one year of coronavirus disease 2019 (COVID-19) pandemic, there are still scarce studies on healthcare workers and particular risk factors for infection, with most published papers focusing on the psychological impact of the

pandemic. Our group analyzed infection rates by professional category, hospital service, as well as initial symptom onset and description in our hospital center.

Material and Methods: We conducted a descriptive study of our hospital center's healthcare workers that were infected with COVID-19 from the 13th of March of 2020 until the 31st of March of 2021. The information was mostly based on the occupational health service's database and confirmed by consulting TRACE-COVID, a platform that gathered information on every COVID-19 patient, nationwide.

Results: From March 2020 to March 2021, about 13.7% of our hospital's staff was diagnosed with COVID-19, with the most affected being nurses and nurses' aides, and healthcare professionals working in the emergency department, as well as infirmaries of internal medicine and general surgery.

Conclusions: In our center, known high risk scenarios in the workplace were not particularly met with high incidence rate of infection, probably because of a particular compliance in the use of personal protective equipment. Although the SARS-Cov-2 pandemic remains a challenging event for hospital centers worldwide, occupational health services should use this opportunity to better study infection rates in their work environment and optimize prevention measures to further protect our professional's health and safety.

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Recovery from pandemic: insights from those affected

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Introduction: In 2021 the WHO observes over 20 disease events worldwide with endemic or pandemic potential. The SARS-CoV-2 pandemic highlighted the vulnerability of the globally connected workplace. As part of pandemic planning, preparing for a return to normal operations is required. With the support of the German scientific societies for occupational medicine and safety engineering, companies in Germany were surveyed on the current status of recovery planning.

Methods: From March 2020 to August 2021 German companies completed an online checklist on operational and occupational health issues concerning the return to normal operations. This descriptive evaluation focused on occupational health aspects.

Results: A total of 2606 people participated (answering at least one question). There were: 1117 data on occupational group (36% managers, 62% EHS staff); 992 data on pandemic planning (yes/partially/no: 48%/24%/28%); 911 data on recovery planning (yes/preparation/no/don't know: 27%/46%/20%/7%); 986 data on relevance of recovery planning (important/not important/no statement possible: 92%/6%/2%); 352 data on involvement of occupational health professionals (yes/no/does not apply: 68%/17%/15%); 352 data on infection screening (yes/no/does not apply: 61%/15%/24%); 348 data on hygiene training (yes/no/does not apply: 78%/13%/9%). **Conclusions:** The relevance of structured pandemic/recovery planning is confirmed. Occupational health aspects such as occupational health care or hygiene training are important components.

The course of the pandemic shows that continuous review and adaptation of recovery planning are necessary.

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Psychological work demand, pleasure and suffering of Brazilian health workers from urgency and emergency services in the Covid-19 pandemic

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Introduction: COVID-19 pandemic intensified objective and subjective factors influencing health and working conditions of health professionals. This study had the aim to investigate psychological work demand, pleasure and suffering of workers working in urgency and emergency services in the face of the COVID-19 pandemic.

Material and Methods: descriptive, quantitative study, from April to June 2020, with 80 health workers working in urgency and emergency units, using Job Stress Scale (JSS) and Scale of Suffering and Pleasure at Work (EIPST). Descriptive statistical analysis, with investigation of association between variables (Chi-square test). Study approved by the Brazilian National Research Commission.

Results: Workers in the care of cases of COVID-19 were from an average age of 37.3 years, most from Brazil Southeast (78.75%), nurses (60%), working in public service (78.75 %) and in weekly shifts longer than 60 hours (40%). There was 21,6% of occurrence of high level of psychological work demand, 48.75% of critical/severe level of pleasure, and 37.5% of critical/severe level of suffering. No statistically significant associations were found between the phenomena and independent variables ($p > 0,05$).

Conclusion: there is high psychological demand and low control at work, in addition to impairment of pleasure and the occurrence of suffering related to work activities among health care workers. Subjective conditions are essential for health promotion actions for these individuals. The non-association between the level of pleasure and suffering presupposes that the stressors are probably similar between the groups studied.

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COVID-19 as Occupation Disease in Russian Federation

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Implementation of the WHO Global Plan of Action for Workers' Health is the main focus of efforts to strengthen the management function of national health systems in the Russian Federation. The number of cases of occupational diseases (OP) in Russia for the period 2011-2020 decreased from 7836 to 3409, which amounted to 0.78 per 10,000 employees, a decrease of almost 2.5 times (compared to 1.92 per 10,000 employees in 2011). In 2020, the level

of chronic OD was higher compared to the acute course of OD, and the proportion of acute OD was 21.7% (729 cases). The number of deaths from acute OD in 2020 was 606 cases (versus 9 cases in 2019), mainly due to deaths related to COVID-19 among medical personnel. In connection with the situation related to the pandemic of a new coronavirus infection, for the first time in 10 years in the structure of occupational diseases associated with an unfavorable effect on an employee of a biological factor were in second place. The report analyzes the results of postmortem examination of 290 cases of acute OD in medical workers conducted at the IRIOH clinic.

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Impact on Occupational Health by Teleworking during the Coronavirus disease (Covid 19) Pandemic

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Introduction: To counteract the spread of COVID, many companies opted for teleworking and thus reduce the number of people exposed. Knowing and regulating its implications is necessary for the health of the working population.

Material and Method: a prospective descriptive study was conducted from May to August 2021, through an online questionnaire, which was answered regardless of the line of work, by 202 workers in several companies in Guatemala, who were doing at least one day of teleworking. The questionnaire with 21 questions evaluated work, personal and family aspects, implications for physical and mental health; as well as economic

Results: hours of workers were extended in 80%. 27% up to 3 to 4 hours outside the usual, even 83% reported work activity during weekends, 88% having message / call activities outside the regular hours. Around 40% did not have a suitable table and chair for teleworking, which led to 96% reporting at least some physical symptoms, such as neck pain, eye fatigue and back pain.

Conclusions: half of the respondents indicated that they were prepared to telecommute, but the same number reported personal life problems with noise, lighting, and temperature, which led to eating and sleeping disorders, and physical conditions. Workers had increases electricity and internet expenses, making 50% of the participants an investment of \$50. Although, 81% indicated they agree that teleworking be implemented, 96% consider that it should be regulated.

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Changes in fears and worries related to COVID-19 during the pandemic among current employees in Japan: a 5-month longitudinal study

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Introduction: This study investigates and describes the time course of fears and worries about COVID-19 among currently employed population during this outbreak.

Methods: This study was a longitudinal study using the dataset from the Employee Cohort Study in Japan (E-COCO-J). The study

comprised 4120 individuals from February 2019. A baseline survey in March 2020, a 2-month follow-up survey in May 2020, and a 5-month follow-up survey in August 2020 were conducted. Questions surveyed respondents' global fear and worry and six items related to COVID-19. A mixed model for repeated measures of an analysis of variance was used.

Results: A total of 1,421 respondents completed the baseline survey. At 2- and 5-month follow-ups, 1,032 and 1,181 respondents completed surveys, respectively. Of those, 64 and 33 individuals who were temporarily laid off or on leave were recorded as missing values. Global fear and worry about COVID-19 significantly increased from March to August 2020. Fears of personal or family infection, limiting one's activities and national and local government policies also significantly increased with time. In contrast, fears of lack of knowledge and difficulty of obtaining hygiene products significantly decreased.

Conclusions: Global fear and worry about COVID-19 were increased even though people have stayed together longer with this infectious disease. To conduct efficient risk communication during a pandemic, knowing the concerns of the populace, providing correct information and a sufficient supply of products, and setting clear guidelines are essential.

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The implementation of environmental risk controls at worksites experiencing COVID-19 outbreaks - UK COVID-19 National Core Studies Consortium

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Introduction: SARS-CoV-2 is a highly transmissible virus that caused the COVID-19 pandemic, with workplaces frequently being implicated in transmission of the virus. The COVID-OUT study is established to investigate SARS-CoV-2 transmission routes and risk factors, and their role in COVID-19 outbreaks associated with workplaces. The study is part of the PROTECT COVID-19 National Core Study (NCS) on Transmission and the Environment in the UK. **Materials and Methods:** A series of field investigations of outbreaks has been carried out which include detailed assessments of the physical work environment and the COVID risk controls. The findings of these can be combined with epidemiological and laboratory data to generate hypotheses of the causes of an outbreak and can also be used to support modelling to characterize the relative contribution of transmission routes.

Results and Conclusions: Preliminary findings indicate:

- i) Many workplaces experiencing outbreaks believe that transmission within their workforce predominantly occurs outside the workplace.
- ii) Social distancing frequently breaks down in manufacturing environments
- iii) The role of ventilation in preventing virus transmission was poorly understood and many employers had very little information on the adequacy of ventilation in their premises.
- iv) Carbon dioxide measurement can be an effective method of assessing ventilation, but expertise is required to use this effectively.
- v) In non-healthcare workplace settings, viral RNA contamination on surfaces is typically low or absent.

- vi) Most workplaces had implemented enhanced cleaning regimes as a result of the pandemic.

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A mixed methods study of risk factors and lived experiences of health care workers tested for the novel coronavirus in Canada

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Introduction: Health care workers (HCWs) worldwide have borne a disproportionate burden of infection from SARS-CoV-2-19, but this varies markedly by jurisdiction: HCWs in the Vancouver Coastal Health (VCH) region of British Columbia, Canada have infection rates paralleling those of the background population. We assessed the association of risk factors among HCWs in this region, and examined how HCWs frame their experience.

Methods: We conducted a matched case control study with an integrated qualitative component using questionnaire data from HCWs who sought testing at a VCH site between March 2020 and March 2021.

Results: Quantitative data from 1340 HCWs were included. Free text responses for qualitative analysis were received from 316 HCWs. Community exposure to a known COVID-19 patient was associated with COVID-19 infection (adjusted odds ratio (aOR) 2.45; 95% CI 1.67-3.59). Compared to medical staff, care aides and licensed practical nurses had a considerably higher infection risk (aOR 2.92; 95% CI 1.49-5.70). Direct care for COVID-19 patients, however, was not associated with infection (aOR 1.05; 95% CI 0.76–1.45). Framing of HCWs' experiences broadly reflected the phase of the pandemic during which they were tested. Communication challenges and being in situations perceived as unsafe in and out of work were cited as sources of dissatisfaction.

Conclusions: Community exposures were more important determinants of infection than workplace exposures in our study area. Availability of protective equipment, and clear communication are important for enhancing a sense of safety among HCWs during this unprecedented pandemic.

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Online occupational health consultations in the COVID-19 pandemic: experience, user satisfaction, and difficulties from a nationwide cross-sectional online survey of workers in Japan

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Objectives: COVID-19 has increased the use of online consultation in occupational health. To clarify the experience, satisfaction, and difficulties of the online consultations, we surveyed a sample of workers about their experiences with online consultations during COVID-19 pandemic.

Methods: An online survey was conducted in March 2021 among employees of the nationwide online panel survey in Japan (E-COCO-J). Respondents were asked to report whether they had online or face-to-face consultations with occupational health professionals in the past year, their level of satisfaction with these, and their difficulties and problems related to the online consultations when they had.

Results: Among 1,102 respondents, 4.5% experienced online consultations and 5.0% experienced face-to-face consultations with occupational health professionals in the past year. The proportions of respondents who reported satisfaction with online consultations was high for general health consultation, for the follow-up consultations of health-checkups and health guidance, and for other purposes. The proportions of satisfaction with online consultations of occupational physician for those who worked long hours and consultations for employees who took leave or returned to work were low. The difficulties of online consultations were the discrepancy with the workers' intentions, the quality of communication, and concerns about confidentiality.

Conclusion: Online occupational health consultations worked well in the COVID-19 pandemic. The difficulties may exist for some types of consultations and in client's preference, connection quality, and security.

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Exposure assessment to atmospheric pollutants in different working conditions: WFO (Working from Office) versus WFH (Working from Home)

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Introduction: In the COVID-19 context, the opportunity to work from home (WFH) became of great importance: several studies investigated the WFH phenomenon but, to the best of our knowledge, no studies have yet been performed considering the differences between WFH and WFO (working from office) conditions, in terms of exposure assessment to different air pollutants. The principal aim of this study is therefore to evaluate the personal exposure to selected airborne pollutants during these working conditions.

Material and Methods: A long-term campaign involves the measurement of different PM (particulate matter) fractions, using portable direct-reading instrumentation. The measurements will be carried out in two different seasons for two consecutive weeks. The data relating to the exposure concentrations will be acquired at the same time by a subject in WFH conditions for 24 hours per day, and by a second subject in WFO conditions for 8 working hours. In a short-term campaign, at least 50 subjects are expected to be enrolled, who will carry out two consecutive monitoring days (respectively in WFO and WFH conditions).

Results and Conclusions: Preliminary results (for both campaigns) indicate that, on average, the levels of exposure to the different PM fractions are higher during the WFH mode. The WFH/WFO ratios calculated on the different PM fractions are on average equal to 2.4 and 1.9 respectively for the short-term and long-term campaign. Differences in terms of median exposure concentrations measured during the two working conditions are statistically significant ($p < 0.001$ for all PM fractions, in both campaigns).

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Morbidity patterns and Hospitalization of COVID19 Infected Reliance workforce and family members post Covid19 vaccination

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Introduction: COVID 19 Pandemic has engulfed the whole world for more than last one and half year. Apart from COVID Screening, testing, Isolation and Management of COVID Cases, it is imperative to have strong preventive measures to control the spread of COVID infection and curb the COVID pandemic. As part of our daily practices, we at Reliance have implemented the standard prevention method of SMS (Sanitization, Mask and Social Distancing) and to further augment the preventive measures Vaccination drive was commenced for Reliance Workforce and Family members. Covid19 vaccination has been found to decrease the hospitalization, severity of the disease among vaccinees.

Methodology: Using Intervention study design two groups were identified, one was Vaccinated COVID19 infected patients and other was non-vaccinated covid19 infected patients as control. A comparison was done to assess and analyze the severity of the disease, Hospitalization rate and duration required for recovery.

Result: There was 9% increase in Home Isolation (84% in Vaccinated Group as compared to 75 % in Non-Vaccinated Group) and the hospitalization rate was decreased by 6% (8% in Vaccinated Group as compared to 14% in Non-Vaccinated Group). The duration of recovery was reduced (61% recovered in first 2 weeks among vaccinated group as compared to 31% in non-vaccinated group). The moderate to severe cases were seen to decrease by 0.5% in vaccinated group.

Conclusion: Vaccines are effective tools to reduce the COVID 19 disease burden, it helps to develop herd immunity and decrease the morbidity post-infection. However, we must continue practicing the SMS strategy.

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The Characteristic of the COVID-19 outbreak in The Royal Thai Army personal during 1st April to 8th May 2021 and Preventive Policy suggestion

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Introduction: In April 2021, coronavirus infection disease 2019 (COVID-19) had attacked Thailand, resulting in a new wave and prolonged large outbreak. The goal of the study was to describe the specific characteristic of COVID-19 epidemics in the Army. Another goal was to recommend the control strategies of the disease for Thai army units.

Material and Methods: The COVID-19 investigated questionnaires were used to collect the characteristics of patients by public health officers, including identifying a common risk factor in each outbreak. Descriptive statistic methods were performed to describe the disease distribution and to determine a factor-related cluster of diseases.

Results: Sixty-five cases of COVID-19 were reported from 1st April to 8th May 2021. Eighty-one percent of the patient was an active-duty officer. The average incubation period and antigen detection time were 6.5 ± 3.5 and 3.5 ± 2.66 days, respectively. Visiting the high-epidemic area and staying together with patients of COVID-19 were principal risk factors to get the disease.

Conclusions: Bubble and Seal (BB&S) measures should be implemented for a cohort of people because BB&S can promote physical distancing and limit the spread of the disease in an army camp.

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Risk of COVID-19 among different groups of healthcare workers: a 150-day follow-up study

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Introduction: To date, issues related to the protection of medical workers from COVID-19 infection, including immunological protection, are of particular interest. The aim of the study was to assess the risk of a new coronavirus infection depending on the initial immune status and occupational group during a 150-day follow-up. Materials and Methods: The study of immune response to the SARS-CoV-2 virus was carried out in the frame of the large-scale program ruled by the state body responsible for the epidemiological surveillance. From the regional sample, medical workers (301 people) without a previous history of the new coronavirus infection at the time of biosampling (June 2020) were selected. The comparison group included 52 workers and was formed from engineering and technical personnel not employed in medical institutions. Within 150 days from the blood sampling, cases of the new coronavirus infection were monitored based on the patient's inclusion in the Federal Register of COVID-19 patients. To estimate the adjusted hazard ratios, Cox proportional hazards models was applied.

Results and Conclusions: In 150-day follow-up it was revealed that the probability of remaining healthy by the end of the follow-up was the lowest among doctors from medical and preventive

institutions (MPI) that did not serve as temporary hospitals: HR 2,33 [95% CI 0,95; 5,70], which may be due to both insufficient anti-epidemic measures and the peculiarities of the immune response and approaches for its evaluation. The risk of COVID-19 in seronegative individuals was higher, but without statistical significance.

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Mortality among Brazilian doctors in Covid-19 pandemic

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The Covid-19 pandemic can be considered the biggest global health problem and also the biggest health challenge of the present times; its repercussions and impacts directly affect the health professionals involved in dealing with it. Doctors are among the health professional categories involved in coping with it and with a high risk of infection and a higher probability of more severe clinical presentations and mortality. The objective of this study was to compare the mortality due to Covid-19 among physicians in Brazil and the general population during the pandemic. A descriptive study was carried out using secondary data related to the number of deaths from Covid-19 in the general population and among doctors in Brazil, from March 2020 to July 2021. The profile of deaths of physicians showed a higher mortality among men, between 60 and 79 years of age. The temporal analysis of the number of physicians who died from Covid-19 in Brazil in the period analyzed shows a higher number of deaths at the beginning of the pandemic, with a peak in May 2020 (N=107) and a fall after vaccination beginning. Regarding the Covid-19 crude deaths rate, it was found that physicians had a lower risk of dying than the general population, even with greater exposure to the virus. Only in the North and Northeast regions these rates were higher than the general population. The findings of the study indicate the need for interventions in the levels of protection offered to professionals, as well as confirming the negative impacts of the unequal distribution of these professionals, pointed out by medical demography studies carried out in Brazil.

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Acceptability of anti-covid -19 vaccination by health care workers (HCWs)

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Introduction: Vaccination remains one of the most effective ways to control the pandemic of covid-19. HCWs have been given priority for vaccination. The aims of this survey were to assess the barriers and motivations of HCWs to accept this vaccination.

Matériel and methods: this cross-sectional study, carried out in 2021, involved 669 hospital staffs in Khemesset, Morocco. A self-administered questionnaire comprised socio-demographic and occupational data and items relating to knowledge about Covid-19, the barriers and motivations for vaccination.

Results: 83.4% were participated. 67% were in favor of vaccination, 21.9% against and 11.1% undecided. Nurses had the highest acceptance rate (68%), followed by physicians (67%) and non-nursing staff (60%). The main reason for accepting the vaccination was personal and family protection. The refusal was the lack of information and the fear of side effects. The main predictors of vaccination acceptance were age > 50 years, male sex, job tenure > 20 years, urban exercise, presence of comorbidities, level of knowledge about covid > 3/6, the perception of the severity of covid > 6/10, the confrontation with severe cases and continuing education. The most cited vaccination incentives were better information on the efficacy and safety of vaccines.

Conclusions: The results will help to target barriers of immunization among HCWs, allowing for tailoring and personalization of promotional interventions to achieve better immunization coverage. Acceptability of vaccination in HCWs is crucial because their attitudes are an important determinant for recommending the vaccine to their patients.

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Homecare personal support worker experiences working during the COVID-19 pandemic: A qualitative study

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Introduction: Personal support workers (PSWs) are considered the backbone of homecare however their working conditions remain precarious and unregulated suggesting increased vulnerability in the face of a pandemic. The purpose of this study is to better understand the experiences of PSWs working in homecare during the COVID-19 pandemic.

Methods: This qualitative descriptive study used a social constructivist approach to understand the experiences of Toronto-based PSWs working at a local homecare agency during the COVID-19 pandemic. Semi-structured virtual interviews were conducted. All transcribed interviews were coded and analyzed using the DE-PICT framework.

Results: 19 interviews were completed. PSWs shared a strong belief in duty to work during a health crisis and responsibility to support their vulnerable clients despite feeling vulnerable themselves to transmission and infection; the weight of pandemic anxiety was felt daily and intensely for most. PSWs described existing system challenges exacerbated by the pandemic that tested the limits of their motivations to work, emotional wellbeing and perception of organizational support.

Conclusions: The COVID-19 pandemic contributed to increased occupational stress among PSWs. Longstanding system-level issues coupled with increased emotional labour has positioned this workforce at-risk for burnout indicating that health human resource issues may persist if unaddressed. Homecare organizations can implement strategies that promote and protect the mental wellbeing of PSWs while aggressively lobbying for system changes such as higher wages and better labour protections.

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Working From Home: Personality Traits As Predictors Of Psychological Symptoms – A Rapid Review

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INTRODUCTION: Working from home offers several advantages over working from offices. It is known that some employees prefer and perform better in WFH settings than others, and those who cannot adapt well to WFH may suffer psychological issues. The differential response to WFH could be because of personality traits. Understanding how WFH affects employees' health and developing evidence-based policies can be crucial for businesses. Therefore, it would be worth exploring the current body of evidence about the potential association between the mental health impact of WFH and personality traits.

METHOD: PubMed, ProQuest, and Google Scholar were searched using the concept terms of working from home, psychological impact, and personality traits.

RESULTS: Out of 25 relevant articles, only three peer-reviewed articles addressed the subject matter, and there was no case-control study.

CONCLUSION: Despite frequent reporting on WFH in the popular media, there is no robust and longitudinal research to explore the association between personality traits and WFH-related mental health symptoms. A limited number of studies and non-peer-reviewed reports corroborate that personalities like extroversion, agreeableness, and conscientiousness are more likely to adapt well to WFH. However, the association is not always a linear one due to compensatory attributes in various personality traits. The author recommends further research on the topic for better insight and realistic expectations about WFH for both employers and employees. It will also help employers make evidence-based decisions in relevant policies to protect employees' health.

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Qualitative and Quantitative Fitting Characteristics of Respirators among the Iranian Users during the COVID-19 Pandemic

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In order to provide the optimal respiratory protection for the users; particularly, the frontline healthcare workers (HCWs)

while performing the aerosol-generating procedures (AGPs), it is required to conduct fit testing during the COVID-19 pandemic. A total of 90 HCWs (35 males and 55 females) were participated in the study voluntarily. All participants were randomly allocated into six available filtering face-piece respirators (FFRs) with two kinds of styles (cup-shaped and flat-fold). Then, they underwent quantitative fit testing (QNFT) using the TSI PortaCount® respirator fit tester and qualitative fit testing (QLFT) procedures using the Moldex® Bitrex® fit test kit. The outcomes were the qualitative fit factors (QLFFs=100) and quantitative fit factors (QNFFs≥100). The overall passing rates of the QLFT and QNFT procedures were 35.17% and 29.33%. One imported and domestic respirators had highest proportions of the QLFF (48% and 45%) and QNFF (43% and 38%) and QNFF values of all. Furthermore, the mean FFs for the mentioned respirators were 120 and 103, respectively. Moreover, no significant difference was found between the whether females and males or between imported and domestic respirators by the passing rates ($p>0.05$). Overall, the passing rates obtained from both QNFT and QLFT procedures were low. One reason could be due to all studied respirators only came in one size or style. An optimal fit test panel should also be developed for the Iranian people to determine the appropriate face sizes and shapes in order to select the well-fitting respirator. Besides, the manufacturers are required make the respirators w

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Determinants of nurse's and personal support worker's adherence to facial protective equipment in a community setting during the COVID-19 pandemic: A pilot study

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Introduction: Facial protective equipment (FPE) is a critical barrier to COVID-19 transmission, but compliance with FPE recommendations has historically been low, even amongst health care workers. This study analyzes factors influencing home care worker FPE compliance during the COVID-19 pandemic.

Materials and Methods: Nurses and PSWs employed by VHA Home HealthCare (N=199) completed an online survey adapted from a Facial Protection Questionnaire used in previous studies from January 27 – February 10, 2021. Descriptive statistics, tests of significance, and logistic regression were conducted for each variable separated by FPE compliance.

Results: This study found higher rates of FPE compliance (71%) than previously reported. Regression results suggest that participants who were not always FPE compliant (29%) were significantly more likely to have lower perceived FPE efficacy, lower knowledge of recommended FPE use, lower perception of risk at work, and higher personal barriers for face shields. Fogging of glasses or face shields from wearing a mask (74%) or face shield (71%) increased job difficulty for many participants.

Conclusions: Policies and initiatives addressing perceived FPE efficacy, knowledge of recommended FPE use, perception of at-work risk, and personal barriers to FPE would be expected to significantly

affect FPE compliance in the home care sector. Additionally, interventions that reduce visibility issues while wearing FPE would decrease personal barriers to FPE use.

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New emergent risks from Home Working in Pandemic Time – Editing of guideline

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Introduction: The Covid-19 pandemic has deeply altered social and working environments in several ways influencing the mental health of citizens and workers. It is evident that this outbreak produced changes in the workplaces and in the way to perform work activities: “Home Working”. Workers had to face with a new challenging working scenario; it has been demonstrated that work environment, work organization, and work-related behaviors are factors capable of influencing psychological well-being of workers. There is an increased risk from sedentary work as psychological distress, musculoskeletal disorders. Studies found several occupational factors as being able to influence workers’ mental health outcomes in the COVID-19 pandemic scenario linked to the increasingly widespread of Home Working as a way to cope the Sars-Cov-2 spread off.

Material and methods: In spite of epidemiologic evidences there aren’t any specific guidelines and regulations to prevent and regulate new emergent risks from “Home Working”. Scientific articles have been consulted to evaluate “Home working” emergent risks and European legislations have been compared (in Italy the law n.81/2017). Right now there are very few scientific evidences and research and regulations about this topic. After the risks assessment it was created an evaluation form/guideline for the supervisory activities and as a track for companies.

Result: We are in a preliminary phase of study.

Conclusion: It is necessary to spread the culture of prevention also for the “Home Working” risks with the hope that companies could apply “home Working” in consideration of the workers health and safety

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Ensuring energy supply continuity to India during COVID-19 Pandemic

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Introduction: IndianOil is the energy major of India and hence business continuity was essential during the COVID-19 pandemic. A high-level empowered group was constituted for closely monitoring the pandemic.

Materials and methods: Daily virtual meetings of the empowered group were held to discuss the current situation and suitable actions. A COVID dashboard was created for monitoring COVID cases, 41 advisories were issued to ensure safety of the workforce. Tele-consultation app was developed for 24x7 consultations from 250 IndianOil Doctors, training programs were conducted for medical and para-medical staff to empower them with latest medical management of COVID-19 patients. COVID testing facilities were

augmented to identify and isolate the infected cases. Administrative actions like staggered office timings, allowing work from home to identified employees, vaccination coverage to 0.5 million IndianOil beneficiaries. 110 COVID Care centres were established across India with augmentation of existing Refinery Hospital facilities. Insurance coverage was extended to all contract workers. Employee assistance programs were conducted to mitigate the emotional and mental impact of COVID-19.

Result: A proactive, caring & dynamic strategy to mitigate COVID-19 helped in keeping IndianOil workforce safe, minimising the devastating effect of COVID-19 pandemic and maintaining the business continuity to ensure the energy demand of the country. **Discussion:** Core values of IndianOil “Care, Innovation, Passion & Trust”, our agile, resilient & proactive approach towards the COVID-19 pandemic kept our workforce healthy & safe.

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The Impact of the Covid-19 Pandemic on the Working Population in Belgium

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Introduction: Restrictive measures put in place by the Belgian National Security Council against Covid-19, impacted the well-being of workers.

Material and Methods: During periodical medical exams, carried out by a large Occupational Health Service in Belgium, employees are asked to report their Subjective Units of Distress (SUD) score (1 to 10; score ≥ 7 = red flag). Descriptive analysis and logistic regression are performed on scores and the relation with socio-demographic factors.

Results: Data of 2308 employees were available (81.5% female, mean age: 43.2, Health sector 85.6%, Government 7.6%, Services 7.6%, Education 4.0%). Red flags were found for traumatogenic stress in 3.3% of the employees (1.2% in men, 3.8% in women— mean age: 46.7), for problematic mood in 0.9% (0.2% in men, 1.1 in women— mean age: 46.1) and for exhaustion in 4.6% (1.2% in men, 5.3% in women— mean age 45.2). The regression model showed a higher risk for red flags in women and older employees. Significant p-values were found for women (OR=3.12) and age (OR=1.03) on the traumatogenic stress level, and for women (OR=4.70) on the exhaustogenic stress level. No differences were found between sectors. More data will be available by the end of 2021.

Conclusion: The COVID-19 pandemic has a direct impact on physical health, but the indirect effects of the restrictive measures on health should not be underestimated. Preliminary results of our study confirm the findings of the COVID-19-Gezondheidsenquête of Sciensano in Belgium: women and older employees are more at risk for problematic stress levels.

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A methodological framework to guide the Covid-19 prevention strategies in Italian workplaces

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Introduction: COVID-19 pandemic affected health and safety of workers worldwide showing several types of working conditions at risk of infection. A methodology to assess the risk of SARS-CoV-2 infection in the workplace, has been developed in Italy and adopted by the Government authorities to guide the National prevention strategies.

Material and Methods: A model that includes the analysis of proximity between employees and potential exposure while they work, has been integrated with social aggregation, a specific factor connected to the job due to the involvement of third parties in work processes. The comparative analysis between risk levels and insurance claims for occupational injuries by sector, supported the model validation. The estimated risk class and the incidence of compensation claims were used also as quantitative indicators to prioritize the vaccination campaign in workplaces.

Results: According to the NACE classification, the activity sectors have been classified into four levels of risk (high, medium-high, medium-low, low). By June 2021, the economic sectors at high or medium-high risk of COVID-19 infection (i.e. 'Human health and social work activities' and 'Public administration') included 75% of applications with occupational origin.

Conclusions: This methodological approach guided the modular reopening of work activities for a safe reactivation of businesses. The prioritization of the workplace vaccination strategy taking into account the risk by different productive sectors, may contribute to the fastest achievement of the whole population immunity as progressive "exit strategy" from Covid-19 pandemic.

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Psychological stress of teachers during the SARS-CoV-2 pandemic - Results of a nationwide survey in Germany

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Introduction: The SARS-CoV-2 pandemic fundamentally changed school life as well as the professional life of teachers (TE). For example, organizational processes changed (e.g., increase in workload), pedagogical challenges emerged (e.g., distance learning) and hygiene plans had to be implemented and realized. The leading question was: did psychological stress in TE increase during the pandemic? If so, what sociodemographic and work-related variables were associated with this stress?

Material and Methods: TE throughout Germany were surveyed online in March 2021. Data on psychological stress and strains were assessed using established (e.g., PHQ-4) and specially developed (e.g., corona-associated anxiety) instruments. After data cleaning, 31,090 participants were included in the analysis. Descriptive and inferential statistics were used to analyze the relationship between psychological stress (e.g., depressiveness) and sociodemographic (e.g., gender) and work-related variables (e.g., work schedule).

Results: A significant increase in likely stress induced psychological symptoms was found compared to pre SARS-CoV-2 pandemic samples. Analyses are currently in progress. Results will be presented at the ICOH conference in 2022.

Conclusions: The observed increase in psychological stress of TE during the SARS-CoV-2 pandemic represents a call for interventions especially for highly stressed subgroups of TE. These stress reactions in TE have to be interpreted against the background of a likewise increased mental stress in the general population and their relative changes have to be identified in order to provide demand-oriented help.

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Covid-19 presentation among symptomatic healthcare workers in Ireland: a case control study

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Introduction: It is recognized that healthcare workers are at high risk of contracting Covid-19. The aims of the study were to describe the presenting symptoms of healthcare workers who developed Covid-19 in Ireland, & to estimate the odds of specific symptoms being associated with a positive Covid-19 polymerase chain reaction result.

Methods: A retrospective chart review of symptomatic healthcare workers who self-presented for Covid-19 testing in Cork from March-May 2020 was conducted. A sex-matched case-control study was carried out to compare presenting features among those who tested positive compared to those who tested negative. Univariate & multivariable-adjusted conditional logistic regression models were run using Stata 15.0 to identify the symptoms associated with positive Covid-19 swab results.

Results: 306 healthcare workers were included in the study; 102 cases & 204 controls. Common presenting features among cases were fever/chills (55%), cough (44%) & headache (35%). The symptoms which were significantly associated with a positive Covid-19 swab result were loss of taste/smell (adjusted odds ratio [aOR] 12.15, 95% confidence interval [CI] 1.36–108.79), myalgia (aOR 2.36, 95% 1.27–4.38), fatigue (aOR 2.31, 95% CI 1.12–4.74), headache (aOR 2.11, 95% CI 1.19–3.74) & fever/chills (aOR 1.88, 95% CI 1.12–3.15).

Conclusions: Fever, fatigue, myalgia, loss of taste/smell & headache were associated with increased odds of a Covid-19 diagnosis among symptomatic self-referred healthcare workers compared with those had negative swab results. Testing criteria should reflect the broad range of possible symptoms of Covid-19.

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Health care workers during the COVID-19 pandemic: prevalence of adverse skin reactions from using protective equipment

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Introduction: To prevent nosocomial transmission of SARS-CoV-2-Virus, an increased use of personal protective equipment (PPE) by healthcare workers (HCW) has become necessary. The aim of this study is to investigate the prevalence of adverse skin reactions in care staff associated with wearing of PPE in Germany during the COVID-19 pandemic.

Material and Methods: The study follows a mixed methods approach. In November 2020, a moderated focus group with healthcare experts was performed and qualitatively analyzed. In a second step, 15,959 members of the German Nurses Association (DBfK) were invited to participate in an online survey for care staff over the period from May to June 2021.

Results: 1,691 caregivers took part in the survey, included in the analysis were those who were actively working ($n = 1,559$). The sample consisted predominantly of women. Mean age was 45 years (± 12), and mainly nurses (84%) took part. More than half worked full-time (56%), mainly in hospitals (68%). Pre-existing skin diseases were reported by 17%. The prevalence of new adverse skin reactions was 60%. Of those, 94% involved the facial area. Wearing times of ≥ 4 hours per shift were stated by 89% of respondents for FFP masks and 64% for surgical facemasks. Participants with wearing times ≥ 4 hours of FFP masks were significantly more likely to develop facial skin reactions than participants with less wearing time (OR 1.6, CI 1.1; 2.1).

Conclusion: The prevalence of new skin reactions from PPE, especially from FFP masks, highlight the specific need for preventive measures for HCW during pandemic periods.

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Physician Reported Work-Related COVID-19 cases in Norway 2020 – 2021

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Aims: This study provides a profile of work-related Covid-19 cases reported by physicians to the Norwegian Labour Inspection Authority (NLIA)

Methods: Reported cases of work-related SARS-COV-2 viral infection by a physician to the NLIAs Registry for Work-Related Diseases (RAS) between February 2020 and June 2021 were included. Descriptive statistics for age, gender, industrial sector, and occupation were calculated. Further, the incidence rates (cases per 100 000 workers) were computed for age, gender and occupation.

Results: Physicians reported a total of 182 work-related Covid-19 cases during the study period. Sixty-four percent of the cases were females ($n = 117$) and 36% ($n = 65$) were males. Eighty-six per cent of the cases were reported from the healthcare sector ($n = 157$). The remaining cases ($n = 25$) were distributed among other sectors. Doctors and nurses yielded higher incidence rates compared to other occupations in health care as well as non-healthcare occupations. Thirty physicians accounted for the 182 cases reported during the study period.

Conclusions: This study indicates that women in the age group 25-39 and employed in the healthcare sector had the highest reported incidence and numbers of work-related COVID-19 cases. Physician underreporting of work-related Covid-19 cases seems to be

prevalent for all occupations. The underreporting of cases is possibly greater for at-risk non-healthcare occupations such as waiters, bartenders, food couriers and taxi drivers compared to occupations in the healthcare sector.

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Workplace Exposure to SARS-CoV-2 among Key Workers and Related Social Inequalities: Evidence from France during the First Lockdown

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Introduction: This study aims to assess potential occupational exposure to SARS-CoV-2 among key workers in France during the first lockdown and describe their socio-demographic profile to identify social inequalities in the occupation of these jobs.

Material and Methods: Based on the 2019 edition of the population-based Working Conditions survey, we quantified potential work-related exposure to SARS-CoV-2 as: "exposure to infectious agents," "face-to-face contact with the public," and "working with colleagues". We then used the French list of essential jobs to identify the main groups of key worker occupations. Log-binomial regression models were performed to identify associated occupational and socio-demographic factors.

Results: Compared to other workers, key workers in all groups had greater exposure to infectious agents and more physical contact with others, however, working with colleagues differed among key worker groups. In general, women, employees and manual workers, people working on temporary contracts, those with low levels of education and income, and non-European immigrants were more likely to be key workers. Being female, born outside of metropolitan France, and working as a non-executives professional interacted in increasing the probability of occupying a key job.

Conclusions: Key workers are more likely to have low social status and precarious employment and to be exposed to SARS-CoV-2 through their work. This study contributes to a growing body of research providing evidence of accumulated disadvantages among key workers with regard to social background, geographical origin and exposure to SARS-CoV-2.

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Interview With A Sample Of Occupational Health Physicians About Their Role During The Covid-19 Pandemic

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Introduction. The COVID-19 pandemic legislation integrated the legislation already present in the workplace. The presence of the Occupational Health Physician (OHP) was essential in the company. The OHP, according to the D. Lgs. No 81/2008, is a physician with professional qualifications and requirements, who collaborates in the risk assessment and carries out health surveillance, to protect the health and safety of workers. During the pandemic his work has

been incessant and has led to professional enrichment. Reflecting on his actions is essential to create innovative paths.

Material and method. A semi-structured interview to a sample of OHP operating in the Lazio region was administered through videoconference system. All have received and have consented the information on the processing of data, as established by the privacy legislation. The interview, lasting about 1 hour according to the focused conversation method. The data were analyzed using statistical text analysis software.

Results and Conclusion. The interviews revealed a growth in both inter-professional (colleagues) and intra-professional (safety officers, employer, workers) relationship. In terms of increasing skills and knowledge, the need to update and keep employers updated was a positive element. On the psychological level, job satisfaction, the perception of one's role, awareness of new job requests and the resources activated was detected. In terms of utility and sense of accomplishment, the pandemic has clearly brought out the importance of prevention aspects, beyond current legislation and established routines. This study is still in progress.

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Study of the circumstances of contamination by SARS-CoV-2 of resident physicians at the Ibn Rochd University Hospital Center (IR-UHC) in Casablanca

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Introduction: The COVID-19 pandemic has triggered a major global health crisis and has brought healthcare professionals at high risk of occupational exposure to the forefront. Evaluating the circumstances of contamination can lead to improving prevention measures.

Materials and methods: Our study focuses on resident physicians in training at the IR-UHC, through a self-administered survey posted on Google-Forms from August 1st to August 21, 2021. Our objective is to assess the circumstances of occupational and extra-occupational contamination by SARS-CoV-2, the contamination is retained on the basis of biological or CT criteria; contact tracing involves the two weeks preceding the onset of symptoms.

Results: 165 residents responded. The diagnosis was made mainly by RT-PCR in 90.9%. Extra-professional contamination through contact with those around them concerns 27.3%. Among the circumstances of occupational contamination, we find history and physical examination performed in a distance less than 1 meter (81.8%), endo-buccal examination (27.3%) and nasopharyngeal swab (20%). 80% participate in professional physical meetings with several persons in a room. 69.1% say they have their meals in a break room where the barrier protection measures aren't respected, namely the disrespect of distance (81.8%) with sometimes or never wearing a mask during breaks.

Conclusion: This survey underlines the importance of respecting barrier protection measures in the workplace but also outside of work. Strengthening these measures in the healthcare environment is necessary to protect healthcare professionals.

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Study of the vulnerability and risk of exposure to SARS-CoV-2 of interns and residents in the Ibn Rochd University Hospital Center (IR-UHC) in Casablanca

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Introduction: Healthcare workers are very exposed to SARS-CoV-2, that's causing a vulnerability issue for some of them. The presence of certain risk factors in these workers requires an assessment of the risk of exposure.

Patients and methods: Our study is a cross-sectional descriptive survey by self-questionnaire posted on Google Forms from June 1st to July 31, 2021, intended for residents and interns at IR-UHC. Our objective is to assess the vulnerability and degree of exposure to SARS-CoV-2 through an appropriate risk level matrix.

Results: 280 physicians responded, 36% were vulnerable, mainly asthma (39%), or on corticosteroid therapy (37%). 95% were at high risk of exposure. The level of risk was classified as critical among two-thirds of physicians, of which 67.7% were working shifts in Covid-19 units, 19% were working in a radiology department, 10% in an intensive care unit and 2% in a biology department; less than a third of the doctors presented an unacceptable level of risk of which 72.2% were on Covid-19 shifts, 7% were working in a radiology department and 2% in a biology department. The lack of availability of PPE was found in 64% of doctors. 65.4% of the doctors questioned were infected with Covid 19, of which 70.2% had moderate infection and 6.1% severe one.

Conclusion: The high-risk level of exposure to SARS-CoV-2 among physicians requires the strengthening of preventive measures, and especially the involvement of occupational physicians in the decision of medical aptitude for the post of vulnerable staff.

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Assessment of fatigue and its effect on work ability of Postal Workers of India Post during Wave I and II of COVID 19 - A comparative study

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Introduction: During complete lockdown due to COVID-19, India Post continues their assigned jobs physically and tries to maintain social, economical and environmental sustainability. India Post serves Indian citizen by delivering essential goods like personal protective equipments, medicines etc. to doorsteps, they also provide banking services to every corner in India. The objective of the present study is to analyze the differences in mental and physical fatigue level among postal workers and the effects of the fatigue level on work ability of Indian postal workers during the first and second waves of COVID 19.

Material and Methods: This is an observational comparative study using both online and offline medium. Seventy five Indian postal workers aged between 30–50 years from different post offices were assessed by using Chalder Fatigue Scale questionnaire and Work Ability Index. Same group of subjects were assessed in both I and II waves.

Results: Mean fatigue score of postal workers was significantly higher and mean work ability index score was lower during wave I of COVID19. Study revealed a significant correlation of fatigue score with work ability of subjects ($p \leq 0.001$).

Conclusion: Higher fatigue level and lower work ability index during wave I may be due to huge numbers of uncertainties regarding the disease and also due to lack in supply of personal protective equipments. Whereas, during wave II many of the workers get vaccines and occupational health related guidance as a result fatigue levels declined.

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Evaluation of profile and work capacity of the post Covid-19 patients at the outpatient clinic for occupational health-related diseases at an University hospital in Brazil: preliminary results

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Introduction: Infection by the SARS-CoV-2 virus that causes COVID-19 may lead to symptoms that persist after the disease is cured.

Objective: to assess the epidemiological profile of the workers and their work capacity after convalescence from the symptomatic disease.

Methods: Descriptive, cross-sectional study of 28 workers who had COVID-19 and were treated at the ADT (Outpatient Clinic for Occupational Diseases) of HCPA between April and June 2021. A clinical evaluation was performed and a questionnaire was applied about factors associated with infection by SARS-CoV-2 and the sequelae of the disease.

Results: 63% of the workers were female and 81.5% were self-declared white. 61.5% of the cases had a formal job and 83.3% were away from work for more than 15 days. As to hospitalizations, 44% were in beds of the intensive care unit and 32% on the medical ward. The source of contagion was associated with the work environment in 20% of the cases and 73.9% of the patients had at least one chronic disease. At the time of diagnosis, the most prevalent symptoms were fever (54.2%), coughing (45.3%), dyspnea (45.8%), myalgia (33.3%) and headache (25%). At the first outpatient visit the most common persisting symptoms were: fatigue/tiredness (54.2%), myalgia (33%), anxiety (16.7%) and hair loss (20.8%). **Conclusion:** Incapacity for work was present in all cases studied. The complexity of care of patients who continue to have symptoms after convalescing from COVID-19 requires an interdisciplinary evaluation, which was achieved by creating an outpatient clinic involving more than 10 medical specialties to evaluate these cases.

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The ICOH Survey on COVID-19: global view on policy responses at country level

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Introduction: The COVID-19 pandemic has created an extraordinary challenge to public health and the world of work. Based on its role in the occupational safety and health (OSH) field, the International Commission on Occupational Health (ICOH) developed a survey aimed to collect information on public health policies, prevention measures, and other policies put in place by the governments of the countries in the world to contain the pandemic.

Materials and Methods: A cross-sectional study was conducted through an online questionnaire asking information on COVID-19 data, public health policies and prevention measures, support measures for economy, work, and education, Personal Protective Equipment, Intensive Care Units, contact tracing, return to work, ICOH against COVID-19. The questionnaire was administered to more than 110 ICOH National Secretaries and other senior OSH experts. Collected data refer to the period ranging from the beginning of the pandemic in each country to 30 June 2020.

Results: We received 73 valid questionnaires from 73 countries (response rate: 64.6%). Most of the respondents (71.2%) reported that the state of emergency was declared in their country, and 86.1% reported lockdown measures. Most of the respondents (66.7%) affirmed that the use of face masks was compulsory in their country. As for containment measures, 97.2% indicated that mass gatherings (meetings) were limited. Regarding workplace closing, the most affected sector was entertainment (90.1%).

Conclusions: The results of this survey are useful to gain a global view on COVID-19 policy responses at country level.

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Employees' worry about workplace measures against COVID-19 and the onset of major depressive episode: A 13-month prospective study of full-time employees

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Background: This 13-month prospective study aimed to investigate the impact of employees' worry about workplace measures against

COVID-19 on the onset of major depressive episode (MDE) during repeated COVID-19 outbreaks in Japan.

Methods: Data were collected by using online questionnaires from full-time employees at baseline (May 2020) and the 7th survey (June 2021). The onset of MDE during the follow-up was retrospectively measured at the 7th survey, with a self-report scale developed based on the Mini-International Neuropsychiatric Interview (M.I.N.I.): according to the DSM-IV/DSM-5 criteria. Participants were asked to report the number of workplace measures against COVID-19 in their companies/organizations and their worry about these measures. Multiple logistic regression was conducted of MDE on the number of workplace measures and worry about these, adjusting for demographic and work-related covariates and psychological distress at baseline.

Results: Among 968 respondents employed in May 2020, 827 completed the 7th survey in June 2021 (80%). We excluded 75 respondents who reported they had MDE in May 2020 or earlier. Worry about workplace measures was significantly associated with the onset of MDE after adjusting for the covariates (OR, 2.18; 95%CI, 1.12-4.25, $p=0.022$). No significant association was found between the number of the workplace measures and the onset of MDE.

Conclusions: Worrying about insufficient workplace measures taken by company/organization may be a risk factor for the onset of MDE among full-time employees during the COVID-19 epidemic.

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COVID-19 vaccination intention, confidence and hesitancy among working population in Slovenia: A Cross-Sectional Survey

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INTRODUCTION: Sufficiently high vaccination coverage is required to effectively curb the spread of COVID-19. Since the vaccination rate among the Slovenian working population is low (approximately 40% on June 2021), the aim was to determine the interest and motivators for vaccination, reasons that discourage workers from vaccination, the sources of information people trust most and to discover how to convince undecided workers. These results can help to adjust vaccination promotion strategies.

MATERIAL AND METHODS: In a cross-sectional study, we analyzed 910 surveys completed in July 2020 by employees with SPSS, using methods of descriptive statistics and chi-squared test.

RESULTS: 58% of the respondents had already been vaccinated at least once. A further 13.2% wanted to get vaccinated, while 17.5% were still hesitant and 11.3% refused to be vaccinated. The hesitant group is most often deterred by distrust of COVID-19 vaccines, including the inability to choose a vaccine and fear of side effects. Contrarily, they were most motivated by concern for their own and their loved ones' health. They would most likely be convinced by having more trustworthy data and with a free choice of a vaccine. The most trustworthy sources of information are from medical experts and doctors.

CONCLUSIONS: According to the motivators and factors that could convince hesitant employees, is that the vaccination promotion strategy should emphasize research that reinforces health benefits of vaccination, reducing the fear of side effects and increase the confidence, of the wider public, in vaccines. At present, a free choice of vaccine is possible.

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Covid management strategies for Reliance Retail store-based employees

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Introduction: COVID 19 Pandemic has impacted all businesses across world. Customer facing businesses were impacted the most amongst them. Reliance has more than 8000 Retail stores spread across India with more than 2 lac employees. Involving business in Grocery stores, Apparel stores, Electronic stores, Home delivery by Jio-Mart stores, etc.

Interventions: To ensure safety of employee of Retail stores Reliance has implemented standard prevention methods of Sanitization, Mask & Social distancing (SMS) and few other steps of wearing face shield, thermal screening, symptom checker tool were introduced to strengthen screening of suspect cases. Stringent testing protocols and Strict adherence to contact tracing was implemented. For positive patients Home isolation assistance, Hotel isolation facilities and Covid care centers managed by Reliance. Home care cell to monitor home isolation patients using Telemedicine. Assessment of patients by Inhouse Reliance medical team and timely hospitalization assistance. Thrust on vaccination drive were few more interventions.

Methodology: Using qualitative techniques, consisting of observations using Pre-tested piloted checklist, Key informant interviews and reviews of Records as well as protocols.

Findings: All the strategies were found to be implemented in standardized manner helping the business activities to sustain and serve the customers with uninterrupted supplies of the essentials.

Conclusion: Standardized processes using innovative approaches help in efficient and effective implementation of Covid 19 management strategies towards reducing the mortality and morbidity.

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Immunization coverage is essential for teaching and learning on campus during the COVID-19 pandemic

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INTRODUCTION: Over the past three semesters, universities in many countries have had to organize learning and teaching off campus to protect health and safety of students and staff. In Germany, the political goal of returning well over 50% of all courses to face-to-face teaching can only be achieved if as many students as possible are fully vaccinated. We provide an analysis of students' attitudes and experiences towards pandemic-related health and safety measures and with existing immunization programs. The results will inform the development and adjustment of future immunization services.

MATERIAL AND METHODS: We developed a mixed-methods approach including an online survey and an accompanying document analysis of relevant health and safety material providing

additional background for the interpretation of the results. The survey included questions on attitudes towards pandemic-related health and safety measures, vaccination status, and experiences with the accessibility of vaccination services.

RESULTS AND CONCLUSION: The student survey (n = 4036; response rate = 15%) was conducted at the University of Tübingen between July and August 2021. Of all students, 74% had already been fully vaccinated, indicating a high level of acceptance regarding the COVID-19 vaccination among students. Students considered both behavioral and structural preventive measures as important. After three semesters of online classes, this is likely to play a significant role in preventing coronavirus infections when campus life resumes in October 2021. We are currently recruiting new participants to compare results between universities.

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Work-from-home physical ergonomics and trajectories of perceived work capacity among higher education employees due to the COVID-19 pandemic

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Introduction: The aim of this study was to investigate the developmental pathways of work capacity among higher education employees during the enforced remote work caused by COVID-19, and how physical ergonomics at home, and organizational factors predicts different pathways.

Material and methods: A longitudinal web-survey was conducted with four measurement points (April 2020, to February 2021). Employees who responded to all surveys were included (n = 678). Of the respondents 71 % were women, 45 % teachers or research staff, 44% supporting staff and 11 % hired students. Perceived work capacity was measured similarly in all four times. Work stress, musculoskeletal pain, functionality of the home for work, and satisfaction with activities and support of the employer were measured at baseline. Latent class growth curve analysis was used to identify individuals into distinct trajectories. Multinomial logistic regression was used to determine the associations between individual, ergonomic, and organizational factors (predictors) at baseline and profile membership (outcome).

Results and discussion: The work capacity for 75% of the employees was stable during remote working, 17 % had a favorable trend (very good-stable or increasing) of the work capacity and 8% had non-favorable (poor-stable or decreasing). Non-favorable work capacity was associated with poor physical workstation at home, dissatisfaction with the support from the organization, high work stress and musculoskeletal pain.

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Practical application of Standard Operating Procedures (SOP) Guidelines for COVID-19 autopsies: an Italian experience

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Introduction: SARS-CoV-2, responsible for severe human infection with high mortality rate, has been classified as HG3 pathogen. Despite the need to perform autopsy to clarify the pathogenesis of COVID, such procedures are at high risk of contagion due to the direct contact with aerosols and body fluids. To ensure the safety of the personnel against contagion, it is mandatory to follow the SOP for the management of autopsy environment and infected body. Several studies have shown that SARS-CoV-2 persists on inanimate surfaces for a long time and is also ubiquitously detected in many human tissues, even after long time after death.

Material and Methods: Many international scientific societies have drowned up various guidelines on biosafety and exposure precautions, but none of these is uniquely adopted. So, in the daily practice our greatest difficulty was to identify SOP adherent to the guidelines but applicable to our reality. In our experience, COVID autopsies were performed accordingly to the following SOP:

- COVID mortuary refrigerators
- BSL3 autopsy facility
- Autopsy saw with aspiration system
- PPE: surgical scrub, rubber medical shoes, coverall, shoe leg-gings, FFP3 mask, waterproof gown or apron, eyes protection, two pairs of medical gloves and one of cut-resistant gloves
- Sanitization of surgical tools in autoclave
- Sanitization of the environments with VHP
- Periodic nasopharyngeal swabs from personnel

Results and Conclusions: Our work aims to share our experience and to demonstrate that adopting these measures is effective in reducing risk of infection. In fact, the periodic COVID swabs were negative in 100% of cases.

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COVID-19 Vaccination of Healthcare Workers: Experience of Singapore's Largest Healthcare Cluster

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Introduction: Singapore Health Services (SingHealth), Singapore's largest public healthcare cluster, rolled out a voluntary COVID-19 vaccination programme for the staff population in January 2021. The abstract highlights the strategies undertaken to encourage uptake of the COVID-19 vaccine, in order to achieve a high vaccination rate of its healthcare workforce.

Material and Methods: Beyond the conventional approach centred around logistics, cold-chain and access optimisation, the SingHealth's COVID-19 vaccination programme adapted the principles of the World Health Organization (WHO) Tailoring Immunisation Programme (TIP). The SingHealth's COVID-19 vaccination programme drew on health behavioural change theories that emphasised on social and behavioural insights behind vaccination hesitancy and acceptance, which were essential to shape interventions to achieve a high vaccination-take up.

Results: Vaccination behaviours identified were categorised into three key determinants of Capability, Opportunity and Motivation. Interventions and vaccination efforts were shaped around the three key determinants over a 7-month period from January 2021 to July

2021. 38,244 (93.8%) of 40,767 staff and service partners were fully vaccinated with the two-dose regime of the Pfizer-BioNTech COVID-19 vaccine and 39,206 (96.2%) received at least one dose. Conclusions: Vaccination behaviour continues to be a complex issue that must be addressed given the ever-changing COVID-19 pandemic situation. The SingHealth experience demonstrated how behavioural science can be applied in the planning and rollout of a successful mass vaccination programme.

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Study of sickness absenteeism among nursing staff at the Ibn Rochd University Hospital of CASABLANCA(CHUIR) during the COVID-19 pandemic

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Introduction: Sickness absenteeism among caregivers is of particular importance during this COVID-19 pandemic period, as health care workers are front-line personnel ; however, this implies that they are highly exposed to SARS-CoV-2 as well as to psychosocial risks

Materials and Methods: Our study is a retrospective descriptive survey of all absences due to illness declared to the occupational health service by the nursing staff of the CHUIR, over a period from 31 August to 1 November 2020. Our objective is to determine the reasons for absence as well as the characteristics of these cases of work stoppage

Results: Our study included 120 cases of absences. The Female sex represented 76.6% of the cases. The average age was 33.61 years; the age range was 23 to 60 years. Average professional tenure was 8.07 years ; the seniority range was 3 months to 40 years. Absent staff were nurses in 62.5% of cases. The average length of absence was 16.92 days. The most affected services were medical services in 44 .16%, followed by hematology-oncology services in 20% and intensive care departments in 15%. Psychiatric and psycho-social affections represented 30% of cases, including 18% for depression, 10% for burnout and 2% for chronic psychosis ; COVID-19 accounted for 20% of cases and pathological pregnancies 16.66%

Conclusion: The identification of the reasons for sickness absenteeism among caregivers is essential during this COVID-19 pandemic, in order to orientate preventive measures towards this front-line personnel and allow a more efficient impact of the occupational physician in his action of prevention of professional risks

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The mental wellbeing of Belgian workers during the first wave of the COVID-19 pandemic

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Introduction: Measures, such as teleworking and social distancing, strongly affected employees' work and private life during the COVID-19 pandemic. Employees were confronted with reduced social contacts and a challenged work-life balance. We aimed to explore evolutions in psychological experiences, job-resources and mental well-being of employees during the first wave.

Material and methods: In a prospective cohort study conducted in a heterogeneous sample, psychological experiences (e.g. job insecurity), job-resources (e.g. managerial support), and well-being indicators (e.g. anxiety and depressive feelings) were addressed. Four online surveys, with a time lag of four weeks, were performed during the first lockdown (T1-T2: March-April 2020) and the first relaxations of the measures (T3-T4: May-June 2020).

Results: 1111 out of 9300 employees (12%) completed all questionnaires. Job insecurity remained stable over time (+/-4.5%). Feelings of loneliness decreased, with a large decline at T4 (T1: 9.1%, T2: 8.8%, T3:8.9%, T4: 4.6%). The job-resources 'managerial support' (T1: 71%, T2: 68%, T3:64%, T4: 61%) and 'information and communication' (T1: 64%, T2: 58%, T3:55%, T4: 52%) decreased. Anxiety and depressive feelings decreased (T1: 45%, T2: 40%, T3:41%, T4: 32%), while job satisfaction (T1: 66%, T2: 68%, T3:70%, T4: 72%) increased.

Conclusions: Results showed a slight improvement in mental well-being after relaxation of the measures, while job-resources decreased. Investments in job-resources by employers are of utmost importance as they are known to contribute to employees' well-being.

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COVID-19 and the Workplace

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Introduction: In the Philippines, COVID-19 has changed the new normal productivity into resilience and focus on wellness of the workers. This paper presents sharing best practice guidelines on COVID-19 prevention and control in an office setting. The objectives of this paper are: (1) increase awareness on COVID-19 among workers; (2) increase accessibility to health and safety services amidst the pandemic; and (3) decrease the incidence of cases through COVID-19 prevention and control.

Materials and Methods: The establishment makes every effort to comply with the guidelines issued by both national and local government agencies. To achieve the objectives, the methods include regular zoom webinars for the employees, telehealth consultation services, organization of an incident management team, COVID-19 vaccination campaign, and, quarterly and incident-related antigen testing.

Results: Close surveillance of cases, contact tracing, isolation/quarantine, area disinfection result in prevention of further transmission. The campaign for COVID-19 vaccination resulted in 75% vaccinated employees in all business units. Close coordination between the occupational health personnel and the business unit management resulted in quick implementation of actions leading to prevention and control.

Conclusions: Compliance with national and local guidelines is key to successful implementation of COVID-19 prevention and control.

Key result areas include increased awareness, increased accessibility to health and safety services, and decreased incidence.

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Who is most vulnerable to psychological distress following working from home? A national survey in U.S. employees during the COVID-19 Pandemic

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Introduction: The COVID-19 pandemic has precipitated broad and extensive changes in the way people live and work, especially regarding working from home rather than commuting to a public workplace. While the general subject of working from home has recently drawn increased attention as a research focus, few studies have assessed which demographic subgroups may be more vulnerable to the potential mental health effects of working from home.

Material and Methods: Data were from the Health, Ethnicity, and Pandemic Study (HEAP), a national survey conducted in the U.S. during the COVID-19 pandemic in October 2020. The effects of working from home on psychological distress in 1,577 workers were examined via logistic regression, and stratified analyses were conducted to identify vulnerable subgroups. This analytic research project was reviewed and approved for exemption by the University of California, Los Angeles Institutional Review Board.

Results: After adjustment for covariates, compared to workers who were not working from home, those who were working from home had higher odds of psychological distress (OR and 95% CI = 2.74 [1.49, 5.04]). Two subgroups, i.e., younger workers (<45 years) and women were identified to be associated with elevated psychological distress (ORs and 95% CIs were 3.23 [1.82, 5.76] and 3.70 [1.64, 8.34], respectively).

Conclusions: Working from home is associated with psychological distress, and these associations are stronger in younger workers and in women. These results have implications for workers' mental health in the overall transition towards working from home in the COVID-19 pandemic era.

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Business Continuity and Covid 19 Pandemic: A Case Study of resilient framework of multidimensional interventions undertaken at large petrochemical sector in South East Asia Region

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Introduction: Covid19 pandemic and related multidimensional novel challenges including lockdowns, local diseases spreads, managing supply chain of medicines, oxygen cylinders, consumables like PPEs as well as managing treatment for affected people in scarce resource settings had compelled the leading organizations to think resiliently and innovatively to take proactive measures to protect their people, plants along with profit in terms of business

continuity. The author hereby sharing their people centered business continuity plan and their impact as a case study.

Materials and Methodology: A detailed business continuity plan including identifying all the risks proactively, implementing risk mitigating guidelines, defining roles and responsibilities from organizational top leadership to down the line field level executive and their family members, vendors and visitors, surveillance of ongoing interventions, taking decisions in highly ambiguous work scenarios were highlighted. The global, country, state, and district level Covid19 pandemic's disease trend and epidemiological indicators were constantly monitored and compared with organization specific trends and indicators.

Results: The epidemiological indicators like total cases per ten thousand population for our site were low that is 45.28 as compared to national (India) level, state level and district level cases per 10k populations were India-238.24, Gujarat-121.41 and Bharuch-69.87 respectively.

Conclusion: The proactive planning and implementation of multi-dimensional interventions resulted in containing Covid19 disease and kept our business running.

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Oil and Gas Employees' Experiences on the Workplace Adjustment in the Time of COVID-19 : Experience from Indonesia

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Introduction: The pandemic has significantly changed the way people work in all industries. However, the oil and gas employees are uniquely impacted due to their specific nature of work. This study aims to describe the workplace adjustment in the oil and gas companies and how the workers perceived these adjustments.

Material and Methods: Cross-sectional data were collected via an online survey from oil and gas employees from November 9th to 23rd 2020. We asked the employees on their knowledge, attitude, practice, risk assessment in the workplace, and their perception on the new protocol. All analysis was conducted using SPSS.

Results and Conclusions: A total of 4,895 respondents was participated in the survey with the mean age \pm SD was 39.88 ± 8.56 years, and the mean \pm SD length of work was 12.37 ± 8.05 years. The majority of respondents were male, permanent workers, and work in the operation division. Respondents had a high level of knowledge and well attitude towards COVID-19, but they had some obstacles in complying to health protocols, such as lack of soap and clean water, unable to avoid contacts with other workers and families. These variables were found to be significant in increasing the risk of COVID-19 as perceived by the workers, i.e., unable to avoid meeting with coworkers, often checking the news related to COVID-19, unable to keep at least 1-metre distance, unable to wash hands regularly, and to wear masks all the time ($p < 0,05$).

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COVID-19 as an Occupational Illness: An International Comparison of Recognition Regulation in Selected Countries

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Introduction: The COVID-19 pandemic has changed the practices of occupational health in many aspects. Due to heavy caseloads, the traditional approach of contact tracing may not be implemented comprehensively, impeding the determination of causality of workplace exposure on COVID-19. The current study examines measures adopted by selected countries for recognizing work-related COVID-19.

Material and Methods: Regulation and rules of recognition of work-related COVID-19 in various countries were obtained through a systematic review of published literature and official government websites. The US, France, Germany, South Korea, Taiwan were among the fifty countries included in the comparative analysis. Data on approved and total claims cases were obtained through open data of national Workers' Compensation systems and analyzed by types of regulation.

Results: Some countries stuck to the case-by-case investigation of causality, while others introduced unique measures, including the rebuttable presumption of compensability. In the latter cases, the work-relatedness of patients from certain high-risk occupations was automatically recognized unless the dominant evidence proved the contrary. As with traditional understandings, health care professionals and first responders were defined as high-risk in most presumption rules. However, in the context of substantial community transmission, occupations with frequent public contact, like aircrews, customs personnel, and store clerks, were also included in some countries.

Conclusions: The presumption rules had an active role in facilitating the compensation of work-related COVID-19.

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Oil and Gas Industry in the Era of COVID-19: Work Culture Adjustment and Its Challenges

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Introduction: The global pandemic COVID-19 has greatly affected all industries, including oil and gas. This study aims to provide lessons learned from oil and gas industry on how the pandemic COVID-19 has changed the work culture and how the employers faced the challenges from these adjustments.

Material and Methods: The study used qualitative approach using online focus group discussions (FGDs) with employer's representatives from Health, Safety, and Environmental division. The groups were categorized based on the characteristics of the companies, e.g., number of employees, type of ownership.

Results and Conclusions: Six online FGDs with 20 companies were conducted. All companies abide the protocols as regulated from the Government. Nevertheless, there were variation in setting up screening and quarantine protocols for workers. The following areas were identified as common issues: authority of COVID-19 task force team, communication, risk assessment for workers, quarantine protocols, work environment management, and contact tracing in workers' families. Several companies had innovation by holding routine health seminars for workers and their families, providing health information related to COVID-19 from and to workers, and giving rewards for those who need to work on the site.

This study provides insights into the multiple ways that employers can adjust in their work culture in the era of COVID-19.

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Can we monitor and contain health professionals' work-related stress in an emergency? The experience acquired during the COVID-19 pandemic at the Local Health Unit Cuneo1 (Northern Italy)

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Introduction: COVID-19 pandemic has a big impact on health professionals' work load, at organizational/psychological level. The Local Health Unit Cuneo1 adopted a strategy to monitor its staff on work-related stress and to return specific alerts.

Material and Methods: A survey was approved by the Direction as institutional task of personnel's risk assessment.

Step1-sept2020: a validated questionnaire to detect requests/resources imbalance. Data analysis assessed distress in specific groups (at 5% significance level), by an Analysis of Variance model with distress as outcome (>value, >pressure) and sex, age, profession as predictors.

Step2-ongoing: structured interviews to managers of COVID-19 front-line structures, then descriptively analyzed.

Results: Respondents were 1/3 of staff (1373/4155). General distress (range: -40; +92) reached a mean of 1.2, that was adverse being a positive value but slight. The model highlighted significant alerts. Women had more worries than men (mean: -3.0 vs -6.8; p=0.006). Older staff showed higher distress than 21-30yrs (-10.8): 41-50yrs (-3.1; p=0.006); 51-60yrs (-4.1; p=0.024); >60yrs (-1.5; p=0.004). Nurses had high distress (1.8): 7 points higher (p=0.006) than physicians' (-5.1); administrative staff (-2.0) and technicians (-3.0) had moderate distress; psychologists had the minor one (-12.6). A total of 9 interviews were done in step2: all showed a medium pressure level.

Conclusions: These data allowed implementing focus groups and training to overcome organizational and psychological matters related to COVID-19 and to building robust readiness to face possible future health emergencies.

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One year facing Covid. Systematic evaluation of factors associated with mental distress among hospital workers in Italy

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Introduction: Covid-19 pandemic is a severe challenge for healthcare workers (HCW) mental health. Several studies reported frequent adverse psychological outcomes in HCW. To identify risk factors of psychological impairment (Psi), we systematically examine workers in a University Hospital in Milan (Italy), using psychometric scales in the context of the occupational health surveillance.

Methods: We enrolled 990 HCW (Jul20-Jul21), whose psychological wellbeing was screened by a 1st level questionnaire collecting individual/occupational data, personal/familiar/occupational Covid exposure, general psychological discomfort (GHQ-12), post-traumatic stress symptoms (IES-R), anxiety (GAD-7). HCW showing Psi (i.e. > cut-off in at least one among GAD-7, IES-r, GHQ-12) have been further investigated by a 2nd level questionnaire (psycho-diagnostic) composed by PHQ-9, DES-II and SCL-90.

Results: 316 workers (32%) showed sign of Psi at the 1st screening. Women, nurses, younger workers, subjects working in Covid area and having an infected family member showed significantly higher Psi risk. Psi prevalence was strongly associated to the pandemic time trends but sensibly decreased after Jan 21, when HCW received vaccination. Only a proportion of subjects with Psi, presented clinically relevant symptoms (2nd level screening). Those symptoms weren't associated to working in Covid area, with Covid infection in family, with pandemic waves or workers' vaccination.

Conclusions: To evaluate psychological wellbeing of HCW constitutes a unique condition to detect occupational, and non-occupational risk factors for Psi in high stress contexts.

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Combating COVID-19 and workplace safety among non-healthcare workers in Hong Kong, Nanjing and Wuhan, China

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Introduction: We aimed to develop a new tool to measure workplace safety towards infection control and prevention of COVID-19 for non-healthcare workers in China.

Methods and materials: During 07/2020 to 04/2021, 6684 non-healthcare workers were recruited from Hong Kong, Nanjing and Wuhan of China and responded a standard questionnaire of prevention measures towards infectious control. The workplace safety towards SARS-Cov-2 and COVID-19 index (WSSC index) was developed and validated using exploratory factor analysis and confirmatory factor analysis. Robustness of the index was verified by the uptake of SARS-Cov-2 testing.

Results: Fourteen variables were identified in the WSSC index, with three sub-domains of workplace's implementation of OSH prevention measures, company's OSH management and worker's prevention behavior and awareness. The new WSSC index obtained a good internal consistency reliability (Cronbach's alpha coefficients: 0.76-0.91), good composite reliability (composite reliability: 0.70-0.95) and satisfactory fit of the model (GFI=0.95; SRMR=0.05; RMSEA=0.07). Workers with higher scores of the WSSC index were more likely to uptake virus testing.

Conclusions: This novel index is a validated tool to horizontally measure the performance of workplace safety towards SARS-Cov-2 & COVID-19 among non-healthcare workers across different

industries and cities of China. Whether the tool is valid for longitudinally monitoring is under testing.

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Employee Assistance Program (EAP) to take care of Psychosocial health of employees of IndianOil during COIVID-19 pandemic

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Introduction: COVID-19 pandemic and the abrupt transition to New normal has compounded the stress-related challenges. Anticipating the challenges, Employee assistance program was initiated in IndianOil to take care of psychosocial health of employees during COVID 19 pandemic.

Materials and methods: To provide psychosocial support to the employees, Employee Assistance Program was started. This program aims to help, support, and enhance the mental and psychosocial wellbeing of the employees. The program has been developed to provide support and guidance to employees in dealing with mental and psychosocial issues also be delivering emotional, mental and physical enhancement support to employees during these extraordinary times. Under the above initiative, Emotional Wellness Workshops are periodically conducted by leading psychiatrists & clinical psychologists for the employees and their families. The employees who need further assistance on a one-to-one basis, have the option to contact on a dedicated Toll Free Number to Counsellors for Counselling Sessions. Level 1, Level 2, Level 3 & Level 4 interventions with clinical psychologists and psychiatrists were undertaken to understand and resolve the concerned issues.

Result: EAP helped the employees to discuss and manage day today stress at work and at home under the New normal. It improved the emotional health, building employees resilience and confidence levels, thereby improving the productivity of the organization.

Discussion: EAP served as useful platform for employees to get support for their mental and psychosocial issues which were aggravated during the COVID pandemic.

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The second Italian cross-sectional survey on Occupational Health and Safety: the secondary analysis to support the COVID-19 pandemic management

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Introduction: The COVID-19 pandemic has spread worldwide, with considerable impacts on both health and safety of workers. COVID-19 emergency highlighted the importance of risk perception surveys and the availability of data on OSH issues. Since 2014, INAIL (Italian Workers' Compensation Authority) conducted two editions

of the periodic survey on Occupational Safety and Health (OSH), involving the main OSH actors.

Materials and Methods: The 2nd wave of the survey, conducted in 2019 and addressed to representative workers and employers' samples, provided an important contribution to support the decision-making process of the Italian Government for action-oriented policy in order to determine priority and interventions on the COVID-19 emergency. A secondary analysis of data collected through the survey was useful for the drafting of the technical documents developed to support the release phase of the containment measures after the first lockdown (March-April 2020) for progressive reopening of work activities that had been suspended by regulatory restrictions.

Results: Data referred to workers perception on biological risk, commuting, eating habits during working time and health surveillance by occupational physicians were considered. These data were analyzed according to economic sector and geographical areas based on the level of COVID-19 contagion.

Conclusions: The epidemiological trend highlighted the importance of work as a substantial factor to consider both when implementing strategies aimed at containing the pandemic and shaping the lockdown mitigation strategy required for sustained economic recovery.

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COVID-19 infection and Long-COVID. Effective guidance for return to work

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Following the outbreak of a novel coronavirus disease, COVID-19 became a big challenge for public health. The world of work was severely affected during this crisis, while the pandemic highlighted the need to improve the interface between public health and occupational health, as well as to assess possible effects on occupational safety. Apart from acute health effects, a number of those infected are suffering from chronic symptoms for more than 12 weeks after the infection, a syndrome known as long-Covid. Building on existing information, non-binding guidelines to help employers and workers facilitate a smooth and effective return to work for workers suffering from long-lasting health effects of Covid-19 infection were developed by EU-OSHA. The guides cover all stages of the illness, including the acute phase, and address the time before and during return to work. Easy-to-follow advice is provided on how to keep in touch during sick leave, the back-to-work interview, measures such as temporary adjustments to working hours or duties, and where to get help. The proposed practices suggest that workers and managers should engage in a dialogue and hold a return-to-work meeting that, based on mutual understanding, will have as an outcome appropriate adjustments to work duties. Different categories of work demands, including cognitive, physical and emotional demands, are addressed. The proposed approach considers the return to work as part of the recovery process.

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Development of Participatory Training Program for Preventing COVID-19 in Staff of Facilities for Mentally Retarded Children

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Introductions: In this study, we conducted a training program for preventing COVID-19 in facilities for mentally retarded children by using a participatory approach, with our aim to explore the impacts on the training program.

Method: New action tools were developed through three steps. First, we reviewed relevant references and collected existing action tools related to COVID-19 respond. Then we visited the facilities and collected good practices for preventing COVID-19. Finally, we discussed the practical ways and requirements for action tools effective in the facilities with disabilities. We conducted a two-hour program for 4 times at the facilities. The program was consisted of short lecture about COVID-19 and group discussions based on action checklist exercise.

Results: The staff members reviewed existing measures at the facilities and discussed point to be improved about COVID-19 preventing. In addition, they shared their concerns and doubts about COVID-19 measures that they felt in their daily tasks during group discussions. They felt difficulty, because of the children with disability sometimes were not able to use face masks, wash your hands and gargle regularly to prevent infection. However, many good practices for standard precaution adapted for disabled children were shared through the group discussions.

Discussion: By using a participatory approach that emphasizes social dialogue and action-oriented rather than one-way lecture-type training, staff members empower multifaceted actions for prevention COVID-19 with their own initiatives.

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Air pollution exposure, SARS-CoV-2 infection, and immune response in a cohort of 3,700 healthcare workers

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Introduction: The role of air pollution on SARS-CoV-2 infection is still unclear. We aimed to verify this association in a cohort of healthcare workers (HCWs), a group identified as at high risk since the beginning of the pandemic.

Material and Methods: We included HCWs who performed a nasopharyngeal swab (NS) for detection of SARS-CoV-2 at the Policlinico Hospital (Milan, Italy) in February–December 2020. Daily average concentrations of particulate matter $\leq 2.5 \mu\text{m}$ (PM2.5) and nitrogen dioxide (NO₂) were assigned to each worker's residential address and treated as time-dependent variables. We generated person-days at risk and applied multivariable Poisson regression models adjusted for age, sex, BMI, smoke, job title and province to evaluate incidence rate ratios (IRR) and 95% confidence interval (CI) of positive NS. The association between air pollution and anti-nucleocapsid antibodies was assessed among swab-positive workers through multivariable linear regression models. The study was approved by the hospital Ethics Committee (828_2021bis).

Results: 635 (17%) positive swabs were recorded among 3,712 included HCWs. A 10 $\mu\text{g}/\text{m}^3$ increase in PM2.5 and NO₂ average concentrations in the five days preceding NS was associated with a higher risk of testing positive [IRR: 1.11 (CI: 1.02; 1.21) and 1.10 (1.03; 1.18), respectively]. Among swab-positive HCWs, we observed a 49% decrease in antibody titer (CI: -60; -36) associated with a 10 $\mu\text{g}/\text{m}^3$ increase in PM2.5 mean levels in the month preceding NS.

Conclusions: Our study suggests a potential role of air pollution exposure in influencing the immune response to SARS-CoV-2 infection.

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COVID-19 outbreak investigation in a hospital using computational flow analysis

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Introduction: Over the last two years, the COVID-19 has caused unprecedented disruption worldwide. Healthcare workers (HCW), particular those working in hospitals have been the most affected from increased risk of contracting COVID-19 from hospital environment and patient care. Although various efforts have been taken by the hospital to reduce the risk, however, outbreaks still continue to occur. This case study reports on an outbreak investigation using computation flow analysis to investigate an outbreak in a non-COVID-19 ward.

Material and Methods: This is a case report of an outbreak that occurs in a non-COVID-19 ward in a teaching hospital in Malaysia. The outbreak investigation was conducted, which includes contact tracing, risk assessment, walk-through survey, airflow measurements and computational flow analysis (CFA).

Results: The outbreak occurred in one of the five bedded cubicles in a non-COVID-19 ward. The index case was a patient that was admitted for non-COVID-19 related medical conditions. The index case subsequently transmitted the disease to three patients and one HCW. On initial assessment, the HCW was not considered to have

acquired COVID-19 from the index case, as the HCW have no unprotected contact with the index case. However, after the walk-through survey assessment, it was noted that airflow may be a contributing factor. An airflow measurement and CFA was conducted and reviewed the possibility route of transmission.

Conclusion: The use of airflow assessment and CFA should be considered in a respiratory diseases outbreak investigation.

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Corporate response to the COVID-19 pandemic and the usefulness of the study group for multidisciplinary occupational health staffs

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Objective: The spread of the COVID-19 has had a significant impact on OH activities. We report on the corporate response to the pandemic and the usefulness of study groups based on surveys and discussions at the Sanpo-society (the study group for multidisciplinary OH staffs).

Methods: (1) During the first wave (April–May 2020), we conducted a survey on the pandemic response at the Sanpo-society. (2) In the second wave (September), we summarized the discussions at the summer seminar "Impact of the pandemic on corporate OH activities and health promotion."

Results: (1) We received responses to the survey from 122 companies, and in most of them, OH activities had been affected by the pandemic. Major issues mentioned were refraining from meetings, installing disinfectants, promoting telework, shortening work hours, and health monitoring. The most common issues were shortage of masks and disinfectants, impact on business performance, anxiety about infection, and the physical and mental stress of telework. (2) Discussions at the summer seminar revealed the enormous impact of the pandemic on corporate activities and the limitations of OH activities. However, this resulted in the expansion of OH activities and health education online and a major shift toward telecommuting for OH and safety management.

Discussion: The enormous impact of the pandemic on OH activities was evident from both the survey responses and the seminar discussions. Despite the lack of evidence and experience, the number of participants in Sanpo-society doubled, helping to resolve problems and share multidisciplinary information among companies.

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Healthcare workers SARS COV 2 infection assessment in Terni Hospital, Umbria, central Italy

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Introduction: The risk of SARS CoV 2 infection in healthcare workers (HCWs) has been demonstrated to be very high; we

performed this survey to better understand work-related risk factors and the role of preventive measures.

Material and methods: Between March 2020 and March 2021, 453 HCWs filled in a health surveillance form after a close contact with a positive SARS-CoV-2 case. Information on occupational task, SARS-CoV-2 infection source and contact mode, use of personal protective equipment (PPE), disease symptoms and diagnostic tests have been collected and analysed using SPSS software.

Results: Of the 453 HCWs who filled in a health surveillance form 134 (67% female, mean age 44 years), had a SARS-CoV-2 positive molecular swab test and 105 were compensated by work insurance. Results showed that working in high risk infection area (OR 1.97 (95% CI 1.27–3.05)), being physician, nurse, nurse assistant or hospital cleaner (OR 1.86 (95% CI 1.27–3.05)), not wearing PPE (OR 3.09 (95% CI 2.03–4.70)), having a close contact exposition (OR 2.93 (95% CI 1.54–5.58)), not knowing infection source (OR 5.27 (95% CI 3.40–8.17)) were risk factors for getting SARS-CoV-2 infection. The multivariate logistic regression showed an increased risk for having a close contact exposition (OR 6.61 (95% CI 3.17–13.81)) and unknown SARS CoV-2 infection source (OR 6.62 (95% CI 3.38–12.94)).

Conclusions: Prevalence of SARS-CoV2 HCWs infection is relevant, active surveillance allowed to early detect the infection and know possible risk factors that can be managed to improve preventive measures with the aim of avoiding work-related SARS-CoV-2 infection.

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Implementation of Risk-Based COVID-19 Safeguards in Upstream Oil & Gas Company

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Upstream oil and gas company operated in Indonesia produce about 160,000-barrel oil per day with nearly 25,000 workers and wide operation areas. The company is committed to protect its people from COVID-19 in the workplace and at the same time maintaining the same level of operation. Company established a risk-based safeguard protocol to achieve it. The protocols were developed using the references from WHO, CDC, IPIECA/OGP and Ministry of Health. They were adjusted with the worker's health risk and criticality of the facilities. Risk of personnel and impact to operation were evaluated to create risk-based program. Safeguard covers layers of protection and the use of technology. level of risk for people, asset, and location will determine the layer. General approaches were established to cover all operation areas such as but not limited: screening program, emergency response & case management, WFH & travel limitation, education & vaccination program. Additional layers are added where the risk of exposure and impact to worker and production increasing. For critical facilities, full compartmentalization program with strict quarantine, testing and work segregation are mandatory. Company able to maintain lower number of cases among worker comparing to competitor and general population. Company operates safely with limited workplace cluster although few of them have impacted minorly to oil production lost and down time operation during the peak of the pandemic. Managing COVID-19 in oil & gas industry is quite challenging. Risk-based approach program are proven to be effective.

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Body Mass Index (BMI) and serum levels of SARS-CoV-2 specific antibodies in a group of Healthcare Workers after COVID-19 vaccination

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Introduction: Obesity is considered one of the possible risk factors for hospitalization and intensive care in Covid-19 patients. It is believed that obesity may compromise some steps of the immune response and may affect the development of post-vaccine immunological memory. The aim of our study was to assess the post-vaccination IgG response against the spike protein (S-RBD IgG) in relation to age, gender and body mass index (BMI).

Material and Methods: The study involved 766 Healthcare Workers who received two doses of BioNTech/Pfizer vaccination (December 2020-March 2021) and were tested for S-RBD IgG (CMIA) 20-40 days after the second vaccine dose. These subjects were always negative to SARS CoV-2 nasopharyngeal periodical swabs and were negative to Ab anti SARS-CoV-2 S1/S2 IgG (CLIA) measured before the first dose of vaccine.

Results: The 766 workers (70.8% female and 29.2% male) were all positive for the antibody levels determined after the second dose of vaccine (S-RDB IgG range: 190.8-63093 AU/mL). Multivariable data analysis showed that the increase in the S-RBD IgG was more pronounced in younger subjects ($p < 0.001$) and in women ($p < 0.05$). Data analysis also showed an increase in the levels of S-RDB IgG in subjects with greater BMI ($p < 0.05$).

Conclusion: At a first check (20-40 days after the vaccination), the SARS-CoV-2 antibody levels in the studied sample were influenced by age and gender, as expected. Contrary to data reported by others, subjects with greater BMI showed an increased antibody response, but this finding, as well as the temporal trend of antibody levels, need to be further investigated.

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The role of the occupational physician in the management of the pandemic in an Italian company

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Introduction: The pandemic from SARS Cov-2 resulted in a re-engineering of work processes to ensure the health and safety of workers. The occupational physician has assumed a fundamental role for the activities of prevention of the spread of the infection. In Italy, prevention measures to ensure control of the spread of the virus in the workplace and to counteract the Covid-19 epidemic

have been guided by a protocol shared between the union representatives and the government.

Method: The application of the protocol in a large fashion company has involved the occupational physician since the beginning of the pandemic, with active participation in the management committee. The protocol has been spread to all workers. In the company are employed 1274 workers present throughout Italy.

Results: From the beginning of the pandemic to September 2021 the occupational physician monitored no. 326 workers who reported situations, outside the work environment, of positivity to the buffer and/ or contact. It also monitored 80 workers with pathologies susceptible or that could have been aggravated by an infection with SARS Cov-2. 84% of workers have been vaccinated.

Conclusions: The integrated management of prevention has allowed to maintain a high level of risk awareness among workers and a reassuring health presence in the company staff. The implementation of the protocol and strict compliance with the precautionary measures has meant that there has been no infection in the workplace. The role of occupational physician in the vaccination campaign has been decisive for arranging subsequent prevention actions.

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The implementation of an e-learning tool to improve mental health of healthcare workers and teaching staff during the corona pandemic

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Introduction: The corona pandemic triggered an increase in mental health issues, especially among employees working in the healthcare and education sector. Therefore, it is essential to monitor employees' mental health, and empower employees with skills to manage strain outcomes. In this context, e-learning (i.e. StressBalancer) might improve employees' mental health by training employees' coping skills in order to prevent strain outcomes while working at a safe distance. This article contains observations regarding the implementation and use of StressBalancer.

Material and methods: StressBalancer is an e-learning tool that focuses on improving employees' mental health by empowering them with active coping skills to deal with stressful work situations. StressBalancer was transformed to fit the changed work situation that healthcare and education employees faced during the corona pandemic. Employees working within these sectors were able to use StressBalancer free of charge during two major peaks in the pandemic. The number of requests received were registered through an onboarding platform.

Results and conclusions: An increase of 1% (healthcare sector) and 55% (education sector) in registrations was noted between the first and second peak. These observations show an increase of interest in the tool. Further, we could draw lessons from the pandemic. 1. E-learning could be effective in supporting mental health at a safe distance. Intervention studies are needed to further investigate effectiveness. 2. Actively listening to current needs of organizations and employees proved to be an important element in supporting them.

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UN-Wide Health Survey: Data Driven Strategies for Post-Pandemic Recovery and Resilience

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Introduction: Between May and August 2021, the UN Health Intelligence Working Group has conducted the UN-Wide Health Survey to assess the impact of the pandemic on physical and mental health of the UN global workforce and to build evidence-based occupational health and safety strategies.

Material: 23 UN agencies with total of 158,572 employees participated in this Survey, administered in English, French, Spanish, and Arabic through the common platform provided by the Agenda Consulting, UK.

Methods: The holistic and comprehensive Survey addressed the following topics:

- Demographics, employment, work patterns
- COVID-19 pandemic experience
- Physical health
- Mental health
- Domestic abuse
- Office set up/Ergonomics
- Medical Information, doctor's visits, preventative screening
- Plans for improving health.

Health Risk Stratification was conducted per Dee Eddington's methodology.

Results: Overall, 19,034 responses were collected, with response rates varying among participating agencies from 8-54%. Results showed a very high prevalence of preventable health risks and disorders, most of them worsened significantly during the pandemic. Health risk stratification showed 57% of respondents to be in medium or high health risk categories.

Conclusions: This comprehensive, global health risk assessment provided a powerful, large pool of data to guide future UN Occupational Health and Safety Strategies, and mental health and wellbeing services. The collaborative implementation of evidence-

based interventions with shared resources will help recovery, increase resilience, and prepare the UN workforce for the post-pandemic world.

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Anxiety & Depressive Symptoms among Oil & Gas Field Workers Amid COVID-19 Outbreak in Indonesia

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Introduction: The COVID-19 pandemic that has been going on since March 2020 has forced many upstream oil and gas companies in Indonesia to make some changes in order to be able to continue operating while controlling the spread of COVID-19 among field workers. The pandemic itself can cause stressors related to mental health, especially coupled with changes in the work system that these workers must undergo. The aim of our study was to assess the prevalence and associated factors of anxiety and depressive symptoms among Indonesian upstream oil and gas field workers during pandemic.

Materials and Methods: A cross-sectional study was carried out in November 2020-February 2021, after obtaining approval from the ethics committee of the Faculty of Medicine, University of Indonesia. Data on the subjects' state of emotional and mental symptoms were collected using General Anxiety Disorder (GAD-7) to assess the anxiety symptoms and Patient Health Questionnaire (PHQ 9) to evaluate depressive symptoms.

Results: A total of 1,542 completed forms were analyzed. The prevalence of workers experiencing moderate-severe depression was 2.4% and prevalence of moderate-severe anxiety symptoms was 2.5%. Factors associated with mental health symptoms were female gender (OR 2.09(1.29-3.38), age less than 40 years (OR 2.47(1.80-3.38), bachelor or doctorate graduate (OR 2.74(1.87-4.01) and change in workloads (OR 2.87(2.12-3.88).

Conclusion: The mental health problems among upstream oil & gas field workers requires attention, especially for prevention and early detection to maintained and improve these workers' mental health during pandemic.

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Mental Emotional Disorders and Its Associated Factors among Workers of Upstream Oil and Gas Companies operating in Indonesia during COVID19 Pandemic

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Introduction: The COVID19 pandemic that started since March 2020, has forced companies to reduce the number of workers on site and to prolong the on-site working duration. With this change, there was possibility of increased mental health problem among the workers including mental emotional disorder (MED).

Material and Methods: The data was obtained from an online form filled by workers. The variables were sex, age, education level, marital status, physical activity, employment status, duration of working in the said company, the position of work, presence of shift work, rotation system, change in working system, change of work load, change of working time, and change of income. We also integrated the Indonesian version of Self-Reporting Questionnaire (SRQ) 20 to determine MED.

Results: The prevalence of MED among the 1542 respondents from 27 companies was 8.8%. Female sex (OR 3.37, p value <0.001), Age < 40 years-old (OR 3.68, p value <0.001), Single marital status (OR 2.36, p value <0.001), higher education level (OR 3.56, p value <0.001), poor physical activity (OR 1.72, p value <0.013), Working period ≤ 10 years (OR 1.84, p value <0.03), presence of change of working time (OR 1.55, p value <0.016), and presence of work load change (OR 3.07, p value <0.001) were factors significantly associated with presence of mental emotional disorder.

Conclusion: The prevalence of MED among the workers was higher than national data. Both personal and occupational factors were significantly associated with MED.

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The impact of the spread of covid-19: study of the incidence of anxiety disorders in the mental health unit 3 of asl salerno

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INTRODUCTION: The pandemic, a source of stress for individuals, has developed or worsened symptoms of anxiety or depression. The pandemic required a new organization of the Mental Health Services. The UOSM 3 of the ASL Salerno predicten a new assistance path, to guarantee continuity to the patients taken into care and to manage the new requests related to the pandemic.

SCOPE OF THE WORK: The incidence in 2020 of the different diagnosis classes and the distribution of socio-demographic variables (age, sex, occupation) was measured, comparing it with previous years. It was evaluated how the presence of anxiety-depressive, obsessive-compulsive and post-traumatic stress spectrum symptoms affected areas of psychosocial functioning.

MATERIALS AND METHODS: Through the GDSM Company Information System, the volumes of users who had at least one access to the Service from 01/01/2018 to 31/12/2020 were detected. The volumes of users who had turned to the Service for medico-legal reasons, for taking charge, for taking on treatment and for consultancy were compared. The distribution of diagnoses over the total of those taken in care was verified.

RESULTS: The results agree with recent studies, for the percentage of taken in care and distribution of diagnoses. Over the past 3 years there has been a decrease in the incidence and at i there has been a significant increase in the incidence of diagnoses of

neurosis. The data show that levels of anxiety, depression, and stress-related symptoms increased during the lockdown period, especially in women, and that this affected the subjects' psychosocial functioning.

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Remote work during Covid-19 pandemic: The prevalence of musculoskeletal pain in Latvian employees

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Introduction. Covid-19 restrictions in the spring of 2020 brought huge changes in the work environment and increased the ergonomic and psychosocial factors' importance for remote and on-site workers. This study aimed to analyse the prevalence of musculoskeletal pain in Latvian employees, focusing on a change in the work environment because of remote work.

Material and Methods. The results of an online structured survey conducted in October of 2020 among Latvian employees (n=1037) from the State Research Programme "Covid-19 mitigation" project were analysed. The presence of musculoskeletal pain in at least one body region (lower back, neck, hands, legs) during previous year was an outcome of the research. The programme IBM SPSS 26 was used for descriptive data analysis.

Results. A higher prevalence of musculoskeletal pain was observed among women (35.0 vs 22.8%); employees who started to work remotely during Covid-19 (37.1 vs 26.4%), and employees with working hours >10 per day (48.6 vs 32.2%). One-fifth (19.2%) of employees felt anxiety during remote work associated with new work and living environment, and almost half of them also experienced musculoskeletal pain. A higher prevalence of pain was among workers who did not change working hours despite the necessity and ignored work and family care balance during the remote work period. Also, half (49.7%) of employees whose remote workplace wasn't convenient and suitable for work with a computer experienced pain.

Conclusions. Ergonomic and work organisation failures in remote work associated with higher musculoskeletal pain prevalence in employees than demographic factors.

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Remote workers' perceived health during the COVID-19 pandemic: a mixed methods study of influencing factors

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Introduction: For many workers, the COVID-19 pandemic resulted in an unexpected overnight switch to remote working. Initial studies conducted during the pandemic indicated that remote workers had poorer health levels than those that remained within their workplaces. Few studies have explored the reasons for this. The current study aimed to determine if workers who had the facility to work remotely during the first year of the pandemic had

experienced a change in their perceived health levels and their reasons for this.

Material and Methods: An online questionnaire that included both open and closed-ended questions was distributed to the workers of 15 organisations within the IT and communications sector in Malta (N = 459). Qualitative data were analysed via Thematic Analysis.

Results: 44% reported that their health had not changed during the first year of the pandemic when compared to the previous year, 33% felt their health had regressed, whilst 23% felt it had got better. In terms of those who reported a change, the reasons for this were linked to five themes: General determinants of health, such as physical activity and nutrition; the development of diseases and disorders, including common mental health disorders; work-related determinants of health, such as social contact and the working environment; pandemic-specific factors, including COVID-19 restrictions; and personal factors, such as caring for children.

Conclusions: Remote workers' health was influenced by a multitude of factors that included those related to work, health behaviours, the situation at home and the wider social environment.

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The Relationship Between Occupational Safety and Health and Occupational Health in the fight against COVID-19 in Schools: The case of Teachers in Botswana

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Introduction: Botswana has 828 schools with 30 000 teachers. When COVID -19 broke out schools were ill-prepared to deal with the infections. This paper examines the relationship between Occupational Safety and Health and Occupational Health in the fight against COVID-19 and the impact it has had on teachers. Occupational Safety and Health(OSH) and Occupational Health(OH) are critical factors in ensuring the safety and health of employees and in reducing the risks of contracting COVID-19 by teachers in schools. The fight against COVID-19 in schools has been a major challenge in Botswana due to inadequate OSH instruments that can be used in Occupational Health to provide services for teachers. A survey that randomly sampled 10% of urban and rural schools from August 2021 to January 2022.

Methods:

1. Observational study based on a 10% sample of schools in urban and rural areas.
2. Examination of official COVID-19 statistics compiled during the pandemic
3. Assess the strength and weakness of the available legislation (the latest version of Factories Act enacted in 1973).

Results: A good number of teachers in Botswana contracted COVID-19 and many more were affected through the loss of life. The study is expected to yield the following results:

- Whether sampled schools were properly designed (the existence of OSHMS) Hierarchy of controls, Risk Management Plans and adherence to health protocols.
- increased number of infected teachers.

- The extent at which legislation has helped or failed the situation.

Conclusion: Inadequate legislation compromised the health of teachers OH services was provided by unskilled personnel.

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Effects of face masks on physical performance, physiological response and subjective respiratory effort during a submaximal bicycle ergometer test

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Introduction: Evidence on undesirable side effects of face masks worn during the COVID-19 pandemic is controversial.

Materials and Methods: The present study, explores whether wearing a medical face mask (MedMask) affects physical working capacity (PWC) at the heart rate of 130 and 150 beats per minute in comparison to no mask, a filtering face piece mask with exhalation valve class 2 (FFP2exhal), and a cotton fibric mask (community mask). Secondary, physiological and subjective responses were analyzed such as a potential moderating role of subjects' individual physical fitness level and gender on face mask effects. A submaximal bicycle ergometer protocol was applied in an intra-individual cross-over design using either no mask, a MedMask, FFP2exhal, or a community mask on four days in randomized order. PWC130 and PWC150 were measured as well as transcutaneous carbon dioxide partial pressure, oxygen saturation, breathing rate, blood pressure, perceived respiratory effort and perceived physical exhaustion.

Results: Using the MedMask did not lead to a reduction in PWC and a systematic or relevant change in physiological response, neither was this the case when the FFP2exhal or community mask were worn. Perceived respiratory effort was up to one point higher on a zero to ten scale when using face masks ($p < 0.05$) compared to the no mask condition. No differences occurred in general perceived exertion.

Conclusion: These results provide reason to believe that physical performance and physiological responses when wearing face masks are similar to not wearing a face mask, although some more respiratory effort is required.

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A model proposal to ensure the health maintenance in a Colombian University during the Pandemic Covid-19

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Introduction: The Covid -19 Pandemic had caused a worldwide crisis leading to many negative consequences on healthy habits, biomechanical system, and mental health to students and workers. The National University is the main University in Colombia; it has

around 30.000 students and 10.000 workers. Due to the Pandemic, many workers had to work from home, which generated consequences that had to be interrupted.

Material and Methods: Through the application of many virtual surveys, we could choose the main topics to be included in this strategy. Finally we selected the next ones and worked on them from our office:

- biomechanical, due to the new physical ergonomics conditions.
- psychosocial, related to many factors as epidemic Pandemic behavior, new family issues at home, addictions, etc.
- nutrition facts, because of inadequate eating habits.
- cardiovascular, due to the aspects listed above, and sedentary lifestyle.
- occupational health facts, remembering the importance of preventing work-related injuries.

Results and Conclusions: Many employees and students at our university had been highly motivated to go back on having healthy habits, which, in some cases have had a positive impact on their families; who have been sharing the same home space with the workers during the Pandemic. According to the intervention developed by our Occupational Health Office, in alliance with the University's Faculty of Medicine, we are improving our workers lifestyle, which will have positive impacts on them and their families. It represents such an important aspect that will ameliorate our community public health results.

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Conception of ergonomic interventions and challenges during Covid-19 pandemic

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Introduction: The Covid-19 pandemic shifted ergonomists' focus from work optimization to health-related interventions. For over a year, safety measures were primarily linked to limitation of infection with the new coronavirus. The paper aims to propose a framework for conception and evaluation of ergonomic interventions and to present major challenges faced in implementation of the framework during the pandemic.

Material and Methods: The proposed framework comprises comprehensive methodology for assessment of physical environment parameters and ergonomic risks, and proposal of solutions. Methods used are RNUR, software solution based on REBA and OWAS and proposed methodology for physical environment assessment based on ISO standards and Romanian standards for determination of noise, dust, lighting and microclimate. Analysis of key challenges faced during implementation and potential causes are also presented in a dedicated section.

Results: The framework was applied for development of ergonomic interventions in two companies. The most prominent risks identified were noise, uncomfortable postures, standing, manual load handling (lifting, pushing, dragging, carrying), torso twisting/bending.

Conclusions: The Covid-19 pandemic negatively impacted the success of implementing participatory ergonomics principles, imposing the need to re-adjust strategy and find creative solutions

for ensuring success of the interventions. However, the interventions were successfully finalized, the remaining objective being long-term evaluation of the intervention.

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Ergo@Home Guideline – a Tool for Working from Home Using Information Technology, in Pandemic

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Introduction: For most people, Covid-19 pandemic was a challenge regarding work. It “accelerated” the transition to online activities in many fields, where teleworking and telestudy concepts were applied, based on nowadays information technology. The aim of this work is to elaborate a guideline for teleworking and telestudy in Romania.

Material and methods: A multidisciplinary team of ergonomists, architects, different health care specialists was involved. They studied and systematized the legal framework of working from home, the common and emerging risk factors identified in computing activities, their effects on health and prophylactic recommendations.

Results: The guideline is structured in three parts: the first is dedicated to ergonomics principles in office work, the second describes solutions for organizing home space for work using the green concept and the third approaches occupational risks, their health effects and some medical advice. The multidisciplinary approach concerning the prophylactic recommendations to teleworking is the key to maintain wellbeing and health. To prolonged sitting posture, visual and neuropsychological overload, there are added the emerging risks in the context of teleworking: lack of direct relationship, home office organization, confusion between working and personal time, internet quality, increase of sedentary lifestyle and implicitly the risk of cardiovascular, metabolic and musculoskeletal diseases.

Conclusions: The elaboration of a teleworking and telestudy ergonomic guideline will be useful to employees and employers, students and organizations, in order to maintain one’s health

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Sars-cov-2 risk management in the italian education sector: the Inail’s contribution

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INTRODUCTION: The handling of the pandemic in Italy has implied, by Decree of 4 March 2020, the interruption of all school activities; one of the most complex and hurtful measures by virtue of its impact on such a vitally important milestone.

MATERIAL AND METHODS: As regards to the reopening of schools, for the year 2020-2021, a risk classification model for sector of economic activity, elaborated by INAIL, has been applied, in accordance with criteria of probability of exposure, proximity, mass gathering. The above approach has been adopted by the Technical Scientific Committee established by the Government as support to coordination activities to overcome the emergency. The integrated risk level of the education sector has been rated as medium-low, but its mass gathering risk level is considered to be medium-high.

RESULTS: The measures for the reopening of schools have regarded different aspects: Systemic measures (territorial support system, new recruitment of school workers, contact with the NHS, mobility plans); Organisational measures (ex. classroom layout, timetable, consumption of meals); Preventive and protective measures (distancing, disinfection and hand hygiene, use of mask, information and training), Territorial control measures (monitoring of suspected cases, contact tracing, follow-up of absences).

CONCLUSIONS: The resumption of school activities has required a complex balance of safeness, students’ and school workers’ well-being, quality of learning contexts and processes, in respect of the Constitutional Rights to Education and Health. It has also represented an opportunity to regenerate the italian school.

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The support of healthcare workers suffering from COVID 19

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Introduction : The COVID-19 pandemic has focused attention on the challenges and risks faced by frontline healthcare workers (HCW). This study aimed to describe the quality of management of HCW affected by the COVID-19.

Methods : This is a cross-sectional study enrolling all HCW of Farhat Hached Academic hospital who had been affected by COVID-19 during the period from september to December 2020.

Results : During the study period, 27 HCW were affected with a mean age of 42.3 ±10 years and a ratio-sex of 0.25. The most represented category was nurses (33.3%) followed by technicians (26.1%). Gynecology department had the highest number of affected HCW (14.4%) followed by pediatric department and administration in 7.2% and 5.7% respectively. The mean of seniority was 14.5± 11 years. The majority of participants (97.4%) reported a medical care. Twelve HCW (4.5%) were hospitalized with an average length of hospital stay of 7.55 ± 6.12 days. The average length of sick leave was 18.68 ± 10.99 days. During the lockdown, 38.6% of HCW took care of their children without any external help. All of the HCW were supported by phone calls from colleagues in 88.4% of cases, the hierarchy in 67.4% of cases, occupational medicine in 60.3% of cases.

Conclusion : The impact of COVID 19 is greater in HCW than in the general population. The affected staff should have a

multidimensional management to avoid post covid sequelae in both physical and mental levels.

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Occupational stress at work during the Covid-19 pandemic: hospital nurses' coping strategies

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Introduction: The Covid-19 pandemic has been increasing nurses' exposure to occupational stress and despite the relevance of organizational strategies, coping strategies may also play role in stress reduction. This study aimed to analyze coping strategies of hospital nurses to deal with occupational stress during the Covid-19 pandemic.

Materials and Methods: Qualitative-exploratory study performed with hospital nurses in Brazil. We carried out individual online interviews following an open-ended questions script. Data were recorded, transcribed, and analyzed using thematic analysis. All ethical concerns were respected.

Results: Based on the theoretical framework, we found three categories: 1) Problem-focused coping strategies: proper use of PPE; better workplace organization; dealing with the problem in work and seeking help from experts to do it; not postponing activities that can be done at the moment; establishing effective communication; reflecting on stress events; reducing workloads when possible. 2) Emotion-focused coping strategies: use of prescribed drugs for depression and anxiety; getting support from families and friends; increase of food and alcohol consumption; watching non work-related movies and TV series; reading; practicing physical activities; making handicrafts; singing and listening to music; praying; enjoying quality time with family and pets. 3) Meaning-focused coping: spirituality; playing with coworkers to relieve the tension; focussing on patients care and on the bright side of things. **Conclusions:** Coping strategies help nurses to stay at work despite precarious workplace conditions and safety.

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Salivary cortisol and cortisone as a biomarker in stress research among health-care workers during COVID-19 pandemic : A Moroccan pilot study

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Introduction: Since March 2020, health workers in Morocco were at the front line of the COVID-19 response. Our study aims to assess the magnitude of mental health outcomes and associated factors among the emergency professionals during the COVID-19 outbreak and the impact on salivary cortisol as a biomarker for stress.

Methods: This cross-sectional study involved 210 health workers in public hospitals among which 40% of nurses, directly involved in the COVID-19 response, in Morocco. An online-based questionnaire was shared with participants twice a month. The degree of depression and anxiety symptoms was assessed using the 9-item Patient Health

Questionnaire and the seven items Generalized Anxiety disorder. Salivary Cortisol and cortisone were quantified using LC/MS.

Results: 56.8% were women. A considerable proportion of participants reported symptoms of depression (53.0%) and anxiety (49.8%). Multivariable logistic regression analysis showed that being a woman, married, and being a parent of children, and involved in work since March 2020, were associated with severe depression and anxiety. Cortisol levels decreased in weekends and throughout the working day, with low values being at midnight.

Conclusion: COVID-19 has alarming complications for the psychosocial functioning and mental health of healthcare professionals. This study conducted in Morocco showed that stress among teams of doctors and nurses is a real fact that needs attention from governmental and civic institutions.

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Beyond Flattening the Curve of COVID 19: Consultative Guidance for Workplace Readiness for Safe Return Post-Phase I lockdown Restrictions - IAOH Mumbai Initiative

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With the current level of knowledge, it is challenging to predict an end to this pandemic and hence essential to understand that living with COVID-19 is an unforeseen reality to be accepted. As we gradually, look toward life after the worst of the COVID-19 coronavirus pandemic, indicating flattening of the curve, business recovery will be paramount. This includes assessing business operations, bringing employees back to work, and ensuring a safe workplace. It would make sense for organisations to consider all the options and develop capability to mitigate the risks. IAOH Mumbai Branch, by virtue of its mandate as a thought leader in the space of Occupational Health, constituted a Task Force to work on series of advisories guiding this process of safe return for benefit of industries of all sizes – MNC to Indian Conglomerates to MSMEs. This consultative document with detailed guidelines were published in May 2020, at the peak of COVID19 pandemic when vaccination seemed like a distant possibility, with the specific objective of preparing the workplaces to receive the workforce and ensuring their workplace safety. The document has enumerated measures for employee protection and maintenance of hygiene at workplace at length, inclusive of, advisory for entry health assessment through self-declaration form, usability of temperature screening, disinfection and guidelines on use of PPE for diverse employee groups, indoor air quality and air conditioning, temporary isolation rooms, contact tracing, Hands only CPR process etc. focusing and emphasizing enterprises' commitment to minimization of exposure to COVID-19 at workplace.

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ARE YOU ALL RIGHT (AYA)? Association of cumulative traumatic events among Danish police officers with mental health, work environment and sickness absenteeism

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Introduction: This presentation will present the result of a study protocol on the prospective cohort study Are You All Right? (AYA) investigating exposure to traumatic events at work on mental health problems and absenteeism among Danish police officers. The study also investigates potential risk and protective factors at work.

Method and analysis: The AYA-study represents a cohort of the entire permanent staff employed in the Danish National Police Force in the period of 2021-2023 entailing approximately 11.000 individuals. Prospective survey data are collected over a three-year period beginning in the spring of 2021. Electronic surveys are sent out at baseline with 1, 2- and 3-years follow-up. Further, short surveys are sent out every third month covering exposure to traumatic events and current mental health status. The survey data are paired with workplace register data on sickness absence.

Results: The ongoing and comprehensive data collection provides valuable knowledge about the impact of work-related traumatic events on mental health and sickness absence among police officers. We investigate the development of mental health problems over time, which is important, because we study the prolonged effects of repeated exposure to traumatic events.

Conclusions: The AYA-study is an important step in securing knowledge that is crucial for the clinical understanding of mental health problems in police officers and the improvement of prevention initiatives.

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Employees with low socioeconomic position as partners in workplace health promotion, an innovative intervention and evaluation

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Introduction: The aim of this study was to evaluate the perceived changes of an innovative WHP intervention and evaluation. In this study, there was close collaboration between the researchers and employees with low SEP. The central themes for and relevant changes of the intervention were defined together with employees with low SEP.

Methods: The intervention consisted of a series of structured stakeholder dialogues in which dilemmas around the – by employees defined – health themes were discussed. The intervention was implemented in a harbor service provider with approximately 400 employees. Over a two-year period, 57 participants engaged in eight dialogues of one hour. 15 interviews and six participant observations took place for the evaluation of the intervention.

Results: Together with employees, high workload and mental health were defined as central themes for the dialogue intervention in the male-dominated workplace. The dialogue intervention contributed to changes, on different levels: individual, team, and organization. Overall, the stakeholder dialogues advanced the understanding of factors contributing to high work load and mental

health. In reply to this, several actions were taken on a organizational level.

Conclusions: Approaching employees as partners in WHP allows to understand the health issues that are important in the daily reality of employees with low SEP. Through this understanding, WHP can become more suitable and relevant for employees with low SEP.

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A Generic Model for Promoting Mental Health with Collaboration by Occupational Healthcare and Workplaces in 2021 – 2022

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Project background: In Finland, mental disorders are the leading cause of work disability (34% of sickness absence days (Kela 2020), 53% of granted disability benefits (ETK 2020).

Aim: The aim of the two-year (2021 – 2022) project is to develop collaboration between workplace and occupational health service (OHS) providers. The new operating model can be used to influence proactively, systematically and effectively on the psychosocial burden of the workplaces and to prevent mental health-related incapacity.

Methods: This abstract is based on the plans execute fieldwork and workshops. The project includes following steps: mapping the background, setting the goal in collaboration with the piloting workplaces, developing and piloting the generic model, monitoring and evaluating the implementation. Model for collaboration. In accordance of the generic model, in cooperation between different actors in the workplace and OHS, it is possible to:

- 1) assess the need for work ability support and the risks and resources of the work environment
- 2) set the development goals required by the situation and determine OHS needs
- 3) to choose the measures for supporting work ability and affecting the work environment
- 4) agree on the responsibilities of the various actors and the coordination of measures and the overall process
- 5) take the necessary measures
- 6) take care of monitoring and evaluating the effectiveness of the measures.

Outlook: This project creates a generic model for collaboration among the workplace and OHS in support of mental work ability and mental health.

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Health Equity and the Future of Occupational Safety and Health: Towards a Biopsychosocial Approach

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Introduction: Occupational safety and health (OSH) has evolved into a largely technical field focused on identifying and eliminating physical, chemical, and biological hazards found in the workplace.

Central to this approach has been an understanding of cause and effect rooted in the biomedical model of health. Changes to work, the workforce, and our understanding of the relationship between work and health highlight the need to expand and complement this reductionist model by finding ways of accounting for the social, political, and economic interactions that contribute to or detract from worker wellbeing.

Material and Methods: For the past five years the NIOSH Occupational Health Equity (OHE) program has turned its analytical gaze on OSH institutions and research practices to identify effective ways of integrating a biosocial approach to OSH.

Results: This resulted in a three-pronged OHE strategic plan to 1) promote health equity focused research, 2) ensure that NIOSH research is inclusive of the diversity in the workforce, and 3) promote the recognition of work as a fundamental determinant of health inequities. Implementation of this strategic plan has allowed NIOSH to better account for the social structures that circumscribe OSH as field and how these social structures contribute to the inequitable distribution of work-related benefits and risks across the population.

Conclusions: This presentation discusses health equity as a central component of the shift to a biopsychosocial approach and the implications and opportunities this paradigm shift offers OSH professionals, researchers, and institutions.

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Occupational Health Risk Assessment (OHRA) Tool – A way to determine exposure estimation and risk management

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Introduction: OHRA is a tool for controlling the health risks associated with occupational health hazards. This helps us for the identification of an acceptable level of health risk, provides strategy for exposure evaluation and formulating levels of controls.

Material and Methods: OHRA includes two components qualitative evaluation based on estimating potential risk evaluation, followed by quantitative exposure evaluation. Methods for conducting qualitative risk assessment are first, determine risk level against defined criteria (Exposure control, exposure duration, airborne potential, and frequency of activity during task) along with the health effect rating based on the CMR & Toxic hazard classification established by GHS/ACGIH.

Results and Conclusions: The assessment result of the OHRA is scientifically robust and data obtained is highly reliable for qualitatively assessing the risk for chemicals. This model used for estimating exposure risk and decision for sampling. Some physical properties and information of the activity and provides a broad scope of estimated exposure of substances. However, determining exposure levels, ideally quantitative assessment method (personal breathing zone exposure) is primary for final risks for chemicals. due to implementation of OHRA, Approximate 30% reduction of chemical sampling during annual monitoring program. OHRA can serve as a screening approach for determining potential exposure risk for controlling chemical and occupational hazards. Quantitative approach can be applied in combination with qualitative risk for risk management.

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Developing strategies in Occupational Health for effective protection of work force form health hazards at workplace

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Introduction: With new developments in this era of Industry 4.0, we at IndianOil are geared up for digitalization of our Occupational Health Services and further align ourselves with the new business requirements. IndianOil being a petrochemical industry involving hazardous operations and generates quantum of Occupational Health & Industrial Hygiene data.

Materials and methods: Embracing the new age of digital technology, IndianOil reviewed the Occupational Health Management System existing in all Refinery Units for capture of employee medical records, OH & industrial hygiene data & its analysis. Existing functional modules of OHS Data Management System in Refinery Units were integrated with the central server. Areas of concern of individual units were taken care of, for improvement in the IndianOil Integrated OHS management System.

Result: Digitalization of Occupational Health Services data assured real time HSE data capture, real time monitoring of Occupational Health activities and its dependable analytics & reporting. In Indian Oil Corporation, the concept of health protection of employees from existing and upcoming health hazards has undergone a radical change after digitalization.

Discussion: Digitalization of OH records enabled us for an online world of streamlined OH Services in IndianOil with proactive rather than reactive approach to mitigate health hazards at workplace. OHCs in Units which have developed data generating and storage systems, suitable to their own needs of reporting of the monthly/yearly health status of employees and activities, are now more action oriented rather than informative in nature.

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Reduction of Volatile Organic Compounds by Implementing Best Engineering Practices at Chemical Analysis Laboratory

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Introduction: At chemical analysis laboratory, chronic exposure of VOCs above threshold value lead to adverse health impact to the workers. Some of compounds like benzene, 1-3 Butadiene are human carcinogens. So measurement of exposure level and implementation of control measures are very important.

Materials & Methods:

Study Design – Cross Sectional

Data Collection – To assess risk of chemical exposure, six personal breathing zone exposure samples were collected for benzene and VOCs for specific activities (e.g. bottle washing, sampling, chemical draining etc.) at different interval. Personal sampler (Make-SKC) was used to collect organic vapor from environment at a flow rate of less than 50 ml/min for the duration of about 7-8 hours. Charcoal-tube was used for sampling and samples were sent to third party for laboratory analysis. Direct reading instrument VOC meter also used for source identification and measurement of specific

Hydrocarbon for different manual activities. Based on exposure levels, control measures were implemented.

Results: Baseline exposure levels for VOCs were 35 to 59 ppm during auto titration, 15 to 20 ppm during moisture analyzer with bomb sampling and 18 to 20 ppm during use of high temperature water bath activities. Control measures like local exhaust ventilation, fume hood and close loop systems were implemented after which final exposure levels are less than threshold limit values (TLV / TWA).

Conclusions: A comprehensive exposure measurement of hazardous activities and recommended best control measures will help to ensure safe & healthy working environment inside laboratory.

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Experienced collaboration among occupational health service professionals and organizations- implementing smoking cessation treatment and support

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Objectives: Occupational health (OH) professionals, i.e. physicians, nurses and physiotherapists, need to address the prevention of work related diseases but also diseases related to lifestyle and health promotion as an important part of their daily practice. Our focus has been the implementation of smoking cessation treatment and support (SCTS) among OH professionals. The aim of the present study is to explore how an inter-professional collaboration is viewed between OH professionals.

Methods: We collected data through an online survey completed by a cross-sectional sample of OH professionals (n = 157). To analyze the differences between the three OH professional groups, we performed ANOVA, the Kruskal-Wallis, and chi-square tests.

Results: The role clarifications of OH professionals were often undetermined and an internal collaboration was occasional. Physiotherapists reported to be motivated in SCTS but they felt they were left out from internal collaboration when carrying out SCTS. They also reported to need more education concerning smoking cessation (SC) practices. Follow-up of SC was often unorganized among OH-professionals and in each individual case it was dependent on professional's responsibility.

Conclusion: The roles and responsibilities of professionals demand rethinking concerning traditional practices in SC. All in all, OH services need to enable an inter-professional collaboration when carrying out SCTS. All OH professionals should implement SCTS systematically and take into account their special professional role. This may concern also prevention of other work-related and lifestyle diseases.

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Impact of HIV on Cognitive Performance in Professional Drivers

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Introduction: The intellectually demanding modern workplace is dependent on good mental health, yet there is little understanding of how neurocognitive dysfunction related to HIV presents in employed individuals like professional drivers. HIV-associated

neurocognitive dysfunction is also associated with poor long-term outcomes.

Material and Methods: We administered a neuropsychological test battery spanning seven cognitive domains and obtained behavioral data, anthropometry and medical biomarkers from professional drivers (68 people with HIV, 55 people with cardiovascular risk, 81 healthy controls) in Cape Town, South Africa. We compared cognitive performance across groups and used multiple regression modelling to investigate whether between-group differences persisted after considering potential confounders age, income, home language, depression, and Framingham Risk Score.

Results: Professional drivers with HIV compared to the other groups presented with lower cognitive performance, largely characterised as asymptomatic/mild impairment, on processing speed and attention and working memory; and presented with the highest proportion of cognitive 'impairment' as measured using global deficit scores. Group membership remained a predictor of cognitive performance after controlling for potential confounders. The lower performance on neuropsychological testing in drivers with HIV did not generalise to self-reported impairment on activities of daily living.

Conclusion: Drivers with HIV may be at risk of poorer long-term health and employment outcomes. Programs that monitor and support their long-term cognitive health are needed.

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Potential occupational exposure to respiratory and gastrointestinal bacterial pathogens at wastewater treatment plants, South Africa

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Workers at wastewater treatment plants (WWTPs) provide an invaluable public service while also being at constant risk of exposure to microbiological contaminants. This study aimed to provide a qualitative profile of human pathogenic bacteria present in wastewater that could pose an occupational health risk to WWTP workers if inhaled or ingested. Raw (influent) grab wastewater samples were collected from five municipal WWTPs in Pretoria and analyzed for bacterial community composition using Illumina Miseq 16S amplicon sequencing. The most predominant phyla were Bacteroidota, Campilobacterota, Proteobacteria, Firmicutes, and Desulfobacterota, accounting for 85.9% of the total bacterial community. A comparison of bacterial profiles across the 5 WWTPs revealed that, while some WWTPs contained exclusive genera, the predominant genera in raw wastewater did not differ considerably irrespective of plant location and size. Interestingly, 23 genera known to contain species of medical importance to human health such as Mycobacterium, Coxiella, Shigella, Arcobacter, and Aeromonas were identified. Furthermore, WHO-listed inherently antibiotic-resistant opportunistic genera including Pseudomonas, Acinetobacter and Streptococcus were identified. Overall, up to 78% (18/23) of the pathogenic genera identified can cause airway obstruction, gastrointestinal problems and opportunistic infections and are classified in Risk Group 2/3 according to the South African Regulations for Hazardous Biological Agents (HBA). In conclusion, this study suggests that WWTP workers may be occupationally exposed to several pathogenic genera classified as HBA.

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Knowledge, attitudes, and awareness of asbestos among the residents of St. Kitts and NevisDenrick Jeffers, *Ro-Ting Lin**China Medical University, Department of Occupational Safety and Health, College of Public Health, Taichung, Chinese Taipei*

Introduction: Many small and developing countries still allow asbestos use due to their vulnerability to the economic pressure from powerful asbestos exporting countries. The lack of awareness of asbestos hazards is a potential reason for the continued use of asbestos in such vulnerable countries. St. Kitts and Nevis is one such country where asbestos has not been banned. This study aimed to investigate the knowledge, attitude, and awareness of asbestos among the residents of St. Kitts and Nevis.

Materials and Methods: We used an online questionnaire to collect participants' knowledge about asbestos-containing products, awareness of asbestos exposure and health risks, and attitudes about preventive measures to asbestos exposure among 1,009 residents age ≥ 18 years in St. Kitts and Nevis.

Results: Over 50% of participants ever heard the term "asbestos" (71%) and knew what asbestos is (56%). Only <30% of participants knew asbestos-related diseases (26%) and their latency periods (20%). As for attitudes, >70% of participants thought the general public should be concerned about asbestos exposure in their daily life, and it is the government's duty to prevent such exposure. 54% of participants thought that a total ban is the best option to prevent asbestos exposure in the country.

Conclusions: Residents of St. Kitts and Nevis were aware of asbestos but had low awareness of health effects related to asbestos exposure. The government of St. Kitts and Nevis should consider implementing educational programs to increase the knowledge and awareness of asbestos-related diseases and taking actions towards a total asbestos ban country.

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Investigating Associations Between Physical Activity and Presenteeism – A Scoping Review*Valérie Hervieux¹, Caroline Biron¹, Justine Dima²**¹ Université Laval, Management, Québec, Canada, ² Haute école d'ingénierie et de gestion du canton de Vaud, HEG, Cheseaux, Switzerland*

Introduction: Considering that physical activity plays a key role in the health of workers, numerous scientists recognize the relevance of further studying its relationship with presenteeism. However, studies about this association show some discrepancy in the measurement and in the results obtained. Clarification through a scoping review of the literature on the subject is warranted.

Methods: A search strategy was conducted in six scientific databases. Two independent reviewers led a screening process for study selection. Studies written in English about the relation between physical activity and presenteeism were considered for inclusion. Data on definitions and measurement of presenteeism and physical activity were extracted.

Results: After screening 9773 titles and abstracts and 269 full-text articles, 57 unique articles fulfilled our eligibility criteria. Most articles were published since 2010 and originated predominantly in USA. In terms of design, 33 studies were observational, 12 were

longitudinal, 10 were randomized control trial and 3 were interventions. Nearly half of studies (44%) referred to presenteeism as the "lost productivity due to health problems or illness". The WLQ was the tool the most used among those studies to assess presenteeism. Most of the studies 86% showed that physical activity had either a neutral (39%) or a positive (47%) effect on presenteeism.

Conclusions: Despite existing disparities in the measurement and definition of presenteeism and physical activity, this review shows that physically inactive employees have a higher risk of presenteeism than physically active employees.

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A furnished house without walls: Examining the work and health support systems of self-employed workers in Ontario, Canada*Tauhid Hossain Khan, Ellen MacEachen**University of Waterloo, School of Public Health Sciences, Waterloo, Canada*

Introduction: Today's labor market has changed over time, shifting from full-time, secured, and standard employment relationships to entrepreneurial and precarious working arrangements. This precarity has a profound impact on workers' health and well-being, undermining the comprehensiveness of social safety net structures, employment standards, and occupational health and safety laws and policies. Globally, self-employment has emerged as a key precarious work relationship with workers being vulnerable and unprotected in terms of social security.

Methods: Drawing in-depth interviews with 24 solo self-employed people in Ontario, this paper reflects on how self-employed workers are protected with available support systems, broadly including policy, financial and emotional supports. Thematic analysis was conducted based on the narratives participants provided. The project was approved by the REB, University of Waterloo, Canada.

Findings: The findings indicate that self-employed workers drew on both formal and informal support systems. However, they more relied on an informal support system (e.g., social and cultural capital) than formal (government-provided supports). Both structural (premium affordability, lack of information, lack of self-employed-focused support programs) and non-structural factors (e.g., lack of trust in government systems, discretion) resonate with poor access to formal supports for self-employed workers.

Conclusion: Meagre government-provided formal supports may adversely impact the health and wellbeing of self-employed workers.

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Risk factors and evaluation of occupational fatigue among logistic truck drivers in Malaysia*Atikah Hasan, Shamsul Bahri Mohd Tamrin**Universiti Putra Malaysia, Department of Environmental and Occupational Health, Faculty of Medicines and Health Sciences, Serdang, Malaysia*

Majority of transport and logistic drivers greatly affected by fatigue. Fatigue and its associated risk factors are the causative factor for accidents, injuries and death in a wide range of workplace accidents. In fact, the effect of fatigue further resulted

in performance degradation, lowered productivity and impaired health. The present study is aimed to determine the prevalence and risk factors associated with fatigue drivers in logistic company. In this cross-sectional study, data were collected using questionnaire including questions related to socio-demographic and occupational characteristics. Swedish Occupational Fatigue Inventory (SOFI) was used to assess subjective level of fatigue. A questionnaire was answered by 181 truck drivers employed in the logistic company. The result showed that the prevalence of fatigue is 41.3% over the past 12 months. On average, truck drivers completed over 200 km driving per day (49%). The mean values of the occupational fatigue level by categories were lack of energy (5.28), physical exertion (4.20), physical discomfort (3.33), lack of motivation (3.27) and sleepiness (3.22) respectively. The major causes of driving fatigue were associated with sleep deprivation (77.9%), traffic congestion (67.4%) and prolonged driving hours (60.8%). Job stress was found to be strongly associated with occupational fatigue ($p < 0.001$).

Conclusions: The results provide evidence that sleep deprivation and working long hours have an adverse effect on driving fatigue. Obtaining baseline information including demographic background and prevalence rate are essential to establish preventive measures.

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Updated Information On Administrative Regulation On Occupational Health In China Since 2018

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Introduction: The 19th National Congress of the Communist Party of China in October 2017 and 1st Session of the 13th National People's Congress in March 2018 play key role in promoting development of Chinese society. This article present updated information on reform of occupational health (OH) management.

Methods: The related information were collected and current practices were introduced.

Results: National Health Commission (NHC) of State Council, established on basis of National Health and Family Planning Commission, is responsible all management work related OH, except for supervision of coal mine safety work, still by newly established Ministry of Emergency Management (former SAWS). The State Council strives to implement the advancing reform to delegate power, streamline administration and optimize government services and has an inter-ministerial joint annual conference system for occupational disease prevention and control. New agency entitled with Division of Occupational Health within NHC was established. NHC has revised several regulations, e.g. OH management in workplaces, classification of occupational hazards, diagnosis of occupational diseases, OH services management. Against pneumoconiosis, NHC, jointly with other 9 Ministries and approved by State Council, announced Action plan for pneumoconiosis prevention and treatment in 2019 and has promoted construction of pneumoconiosis rehabilitation stations in some provinces. To prevent Covid-19 epidemic, NHC released several guidelines to instruct the enterprises how to do.

Conclusion: The improvement of systematicness of OH management system is still expected.

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Outlining the utopia – Multisectoral collaboration between public primary health care and occupational health services

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Introduction: Increased collaboration between public primary health care and occupational health service (OHS) professionals in Finland could improve coordination of care for patients at risk of work disability. Previous research has shown that achieving such collaboration is difficult despite its potential benefits. Understanding professional's perspectives has been emphasized as the key to building such collaboration. This study carried out as a part of Longer careers and better productivity through supporting work ability - operational models for multidisciplinary cooperation project funded by European Social Fund (ESF) aims to understand professionals' experiences of multisectoral collaboration between public primary health care and OHS when dealing with patients' work disability.

Material and Methods: Total of 20 semi structured interviews, with 29 participants from the public primary health care sector and OHS were conducted in five cities in Finland. Interviews were analyzed by inductive thematic analysis.

Results: Participants indicated a desire to restore the collaboration between public primary health care and OHS in work disability prevention issues. Lack of time and personnel resources were cited as the main reasons for reduced collaboration. Collaboration also had challenges, such as an unreliable information flow and insufficient patient guidance, leading to situations where professionals felt as though they were losing control over patient care.

Conclusions: A model of co-operation in work disability cases, would benefit the two health care systems who share patients but treat them in solitude.

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Unfree and at high risk: Understanding child labour and occupational risks from the viewpoint of those involved

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Why do young workers suffer many times the injury rate of adults? We cannot answer this question without first understanding how children of poor families, such as those making bricks, become child laborers. We are learning that the process of transitioning into work starts early in life, at the same time as children are learning language, culture, religion, and morality. This lead to the development of a worldview that legitimizes child labor in the eyes of its victims, also tends to overlook or accept the health risks it entails. Yet emerging data indicate that, in addition to the excessive physical loads the children are expected to carry, there is the heavy

psychological load of responsibility towards younger siblings and disabled family members. This load is not diminishing as child labour rates overall are increasing. Current research being undertaken with underprivileged communities in Pakistan is exploring potential points of intervention, for example, determining to what extent children are 'socialized into work' by their parents and siblings or alternatively by their own experiences and mistakes, as well as the factors which provide positive reinforcement. It seeks points of intervention from the regulatory angle as well. Why are basic health and safety laws so widely ignored? The upheaval of COVID 19 on top of a steady trend toward increased global production and communication are putting pressure on both young workers and those who employ them. Health professionals must document the effects of these changes on young workers' health and design counter-measures that are adapted to local social environment.

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Sleep quality among self-employed workers in Korea: analysis of the 5th Korean working conditions survey (KWCS)

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Introduction: Self-employed workers are considered more vulnerable to health problems. This study aimed to analyze poor sleep quality among self-employed workers compared to paid workers in Korea.

Materials and Methods: This study analyzed the fifth Korean Working Condition Survey (KWCS) data. To assess sleep quality, 23,938 paid workers and 10,812 self-employed workers were analyzed with chi-square tests and multivariate logistic regression analysis.

Results: The prevalence rate of experienced difficulty falling asleep, difficulty maintaining sleep and extreme fatigue after waking up in self-employed workers was 13.5%, 12.4%, and 17.1%, while the prevalence in paid workers was 11.9%, 10.6%, and 13.3%, respectively. For self-employed workers, adjusted odds ratio (OR) was 1.13 (95% confidence interval, 1.05-1.35) for experienced difficulty falling asleep, 1.08 (0.99-1.17) for difficulty maintaining sleep and 1.11 (1.03-1.19) for extreme fatigue after waking up.

Conclusions: This study revealed that self-employed workers had a high risk of poor sleep quality compared to paid workers in Korea.

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Evaluation of the impacts of occupational health and safety management of international firms in developing countries

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Introduction: Globalization is a reality that concerns all professional fields: industry, trade, infrastructure, and imposes itself on developing countries with other priorities through the presence of international firms. Thus, the objective of this study is to assess the impacts of the health and safety management of international firms in developing countries.

Material and methodology: It was a retrospective study of five years (2016-2020) years to assess the impacts in the implementation of health and safety programs, the reporting of occupational accidents and diseases and the evolution of national health and safety regulations. We included the international firms most present in Senegal. Our data sources were: questionnaires, investment programs of the State of Senegal in the field of hydraulics, public infrastructure and agribusiness. This data was collected and analyzed from the Excel file.

Results: The layout and operation pattern differs from one firm to another. The agri-food sector remains the most decisive.

Conclusion: In conclusion, the review of the investment of international firms in national occupational health and safety policies has contributed considerably to the improvement of workers' living conditions despite the weak control of companies.

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Precarious Working And Living Conditions In Banana Culture In A Region Of Ribeira Valley, Brazil: A Qualitative Study

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The banana culture is important for economic sectors and common in the Ribeira Valley, Brazil, and the workers are exposed to health risks at work. **Aim:** To investigate the working and living conditions of banana culture workers in a region of Ribeira Valley, Brazil. **Methods:** A list was obtained from the Family Health Strategy Program, of workers linked to rural properties related to banana culture and from three neighborhoods in Registro city. Selection of banana culture workers occurred for individuals and semi-structured interviews, based on a previous elaborated script, for thematic content analyses. Also, tasks survey and observations of working activities occurred and were registered in a field diary. **Results:** Participated in this study 14 workers, 12 male, and 2 females, aged between 19 to 52 years old, most of them with low education levels. In the interviews emerged working overload, musculoskeletal disorders, undersized team for demands, strict supervision, moral harassment, fear of unemployment, health risks related to the exposure to pesticides, failure to provide adequate Proper Protective Equipment-PPE from employers, difficulties in accessing health services, precarious housing, and some situations indicating contemporary slave labor. **Conclusion:** There is a need for better Public Policies' actions and inspections for better working and living conditions for the workers in banana culture in this region.

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Why we need to bridge the gap between research in occupational health and safety and human resources management?

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Introduction: Occupational health and safety (OHS) is a complex field where all disciplines intersect. Currently, it is not only a question of taking into account the physical health of the worker, but also of including the psychological health and social aspects of

the worker. Over the past decades, OSH has seen a lot of advancement, especially in recent years. In addition, this analysis is important in view of the economic costs that work-related accidents cause to the global economy.

Method: Through a meta-analysis, a focus on existing research in OHS was made, with the objective of identifying gaps and mapping future research for academics in human resources management (HRM).

Results: The review of the literature showed, identified and classified the articles into five distinct themes: antecedents and work-related factors influencing OHS; industrial policy and regulations surrounding OHS; OHS management practices; OHS management approaches and models and OHS management results. OHS research is poorly integrated into HRM research. The importance of the latter was accentuated during the Covid-19 pandemic, by revealing the gaps to be filled in OHS. Thus, the benefits of OHS management in organizations have a huge impact on increasing productivity, performance and decreasing absenteeism rate.

Conclusion: There are many opportunities for HRM researchers to add value to the field, but also for organizations. To respond to the problem, the transfer of knowledge remains an essential element for the advancement of OHS practices.

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Work-Related Psychologic Distress Among Teachers: A Rural-Urban Comparative

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Introduction: The job content in teaching involves high demand and low control, which predisposes to psychological distress. It is possible that differences in basic infrastructure in rural and urban areas may influence the psychological health status of teachers. The study assessed work-related psychologic distress among secondary school teachers in rural and urban areas in South-West Nigeria.

Materials and Methods: A cross-sectional study design was utilized. 578 teachers from rural areas and 596 from urban areas (a total of 1174) were selected using a multistage sampling technique. Socio-demographic and occupational characteristics were recorded and the GHQ-12 assessed psychologic distress, using the cut-off score ≥ 3 . Approval was obtained from the Ethical Committee of the Ministry of Health.

Results: Overall, 38.1% of teachers were psychologically distressed, 42.7% in rural and 33.5% in urban schools. Factors associated with psychological distress among all teachers were being married ($p=0.007$), working in rural schools ($p=0.001$), teaching in public schools ($p=0.007$) and teaching >5 subjects ($p=0.001$). Teachers in rural schools were statistically significantly younger than those in urban locations, had fewer years of teaching experience, taught larger classes, had other jobs apart from teaching, had more dependants but spent less time at work daily.

Conclusion: Teachers in rural schools had more psychological distress than those in urban schools due to individual and job characteristics. Work conditions of teachers in rural schools need to

be improved to provide an incentive for them to remain in remote areas.

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Work Exposures to PM 2.5, PM 10 and Heat Stress among Traffic Policemen In Puducherry City: An Interim Analysis

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INTRODUCTION: Personal exposure estimates to hazards at workplace are crucial to assess health risks. The present study aims to analyze the environmental factors influencing concentrations of Particulate Matter (PM) 2.5 and 10 and the Heat stress exposures of Traffic Policemen in Puducherry city.

MATERIAL AND METHODS: PM 2.5 and PM 10 data was collected in the breathing zone of the traffic policeman at crowded junctions using a direct reading Optical Sensor. Readings of Relative Humidity Globe and Air Temperature were measured with a Heat Stress meter, and air velocity with a Vane Anemometer and recorded every 15 minutes over the entire duration of the shift. Corrected Effective Temperature (CET) as indicator of Heat Stress was calculated using the Effective Temperature Nomogram. Data collected from November 2020 to August 2021 were divided as Wet months (November 2020-March 2021) and Dry months (April 2021-August 2021) and analyzed for this study.

RESULTS: Percentage of values above safe levels for PM 2.5 were higher in wet (68.2%) than dry months (65.8%) and vice versa for PM 10; wet (29.1%) and dry months (40.5%). CET levels above safe limit was 22.4% during wet months and 94% in dry months. Regression analysis estimated that Relative Humidity, Air Temperature and Air Velocity were significant predictors and influenced the change in CET levels.

CONCLUSIONS: Exposures were above safe limits in all the months of the study period. Manning the junction from a booth during periods of elevated PM 2.5 levels could reduce exposure. Resting in shaded area and ensuring adequate hydration could keep heat exposures within safe limits.

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Analysis Of The Industrial Effluents' Toxicity And Health Risks: Case Of Three Industries From Douala City In Cameroon

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Introduction : Water is an indispensable natural resource for life. Human pollution of this resource could have serious consequences for the lives of future generations. The city of Douala, the economic capital of Cameroon is the most industrialized city in the country.

Three potentially polluting industries in the Douala were selected for this study: Textile, brewing and soap.

Objective : The overall objective of the study was to analyze the toxicity of effluents from these industries and to identify the potential health risks associated with their releases.

Methodology: It was a prospective cross-sectional descriptive study conducted from May, to July 2016.

Results : The macroscopic, physico-chemical and genotoxic studies of effluents confirmed the existence of real health risks in the short, medium and long term. On the physico-chemical side, very alkaline pH of the discharge waters from these industries, above normal temperatures and turbidity were recorded. Very high concentrations of heavy metals (lead and mercury in particular) were recorded in all of these discharges and in water from one well. The genotoxicity test on these effluents showed a strong inhibition of the growth of the onion roots. All these data confirm the health risks facing riparian populations. These are risks of respiratory, skin, water, vector, carcinogenic, etc.

Conclusion : In view of these results, we propose the implementation of an environmental and social management plan for plants for sustainable development.

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Respiratory Disorders And Associated Factors Among Workers In The Cotton Textile Industry In Ouagadougou, Burkina Faso

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Introduction: Exposure to cotton dust can cause respiratory disorders with sometimes considerable socio-health consequences. The low application of collective or individual protection measures, smoking, and the use of illicit drugs are factors that favour and aggravate the occurrence of those respiratory pathologies

General objective: Studying the extent of respiratory disorders and the associated factors among workers in the Faso cotton textile industry in Ouagadougou in 2020.

Methodology: This was a descriptive cross-sectional study carried out between September 1 and December 31, 2020 in the Faso cotton textile industry in Ouagadougou. Data analysis was performed by R 3.6.0 software. The association between the identified factors and the variable of interest was determined by the odds ratio (OR) and its 95% confidence interval [95% CI]. The significance level chosen was 5% (p <0.05).

Results: The prevalence of functional respiratory disorders (FRT) was 36.84%. Obstructive and mixed disorders (TVO + TVM) represented 10.12%. A statistically significant association was not found between age, type of worker, smoking behaviour, job tenure, sector of activity and the occurrence of obstructive disorders.

Conclusion: Our study shows a significant prevalence of respiratory disorders among Faso cotton workers. It allows attention to be drawn to the monitoring of the environment and the regular monitoring of workers.

18. OCCUPATIONAL HEALTH FOR HEALTH WORKERS

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Prevalence of Psychosocial Stress and its Risk Factors among Healthcare Workers in Nigeria: A Systematic Review and Meta-Analysis

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Introduction: Healthcare workers experience psychosocial stress in their workplace. Available statistics are at variance, hence the need to know the overall prevalence of psychosocial stress among Nigerian healthcare workers and associated risk factors through meta-analysis

Methods and Material: PubMed, CINAHL and Google Scholar databases were searched for articles. Search terms included 'psychosocial stress', 'occupational health', and 'Nigerian healthcare worker'. Articles were included if they used validated psychosocial stress assessment instruments. Of the 17 articles with data on psychosocial stress prevalence, eight met all inclusion criteria. Each article independently reviewed by the authors and relevant data abstracted. Statistical analysis with MedCalc version 18.10.

Results: Overall, the prevalence of psychosocial stress was 61.97% (95% CI: 41.013 – 80.823) based on analyzed eight articles with the sample size of 1763. Work overload rate at 67.72% (95% CI: 33.24 – 93.76) was the most prevalent psychosocial stress risk factor. Others risk factors were poor communication and staff attitude and, lack of resources and equipment at 50.37% (95%CI: 13.35 – 87.16) and 62.4% (95%CI: 7.70 – 99.9) respectively. Headache, with neck and back pain, was the most prevalent psychosocial stress-related health outcome at 73.26% (95% CI: 66.14 – 79.82).

Conclusions: Prevalence of psychosocial stress is high among health-care workers in Nigeria, necessitating preventive measures.

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Elevated occupational safety risks for home care workers: Policy gaps in a pandemic

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Introduction: Personal Support Workers (PSWs) regularly enter private dwellings to care for clients. The work is low-paid, insecure and physically and emotionally demanding. In Ontario, the 'assisting occupations in support of health services' occupation ties with 'motor vehicle and transit drivers' for the worst rate of lost-time workers' compensation claims (8% according to the Workers Safety & Insurance Board).

Materials and Methods: This qualitative research included in-depth, semi-structured interviews with 16 key informants in government, industry, and advocacy organisations. Data were coded thematically, and analysis drew on Interpretive Policy Analysis. This research was approved by a university Research Ethics Board.

Results: We found work conditions for PSWs worsened during the pandemic. Worldwide PPE shortages led to conserving PPE so that PSWs often had to use the same mask for all sites they visited in a day. A shortage of workers led to creation of rapid PSW education programs and caused elevated concern about training adequacy for complex care needs. Remote assessments limited supervisors' ability to evaluate client conditions or home environments. Taking public transportation between client homes, others living in the home, and clients themselves, were seen as increasing risk of exposure to COVID-19. Participants described that PSWs may feel morally obliged to work despite the right to refuse unsafe work. Conclusion: Some emergency policies had unintended consequences that elevated risk for workers and their clients.

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Management Of Occupational Exposure To Bloodborne Pathogens – Hiv, Hbv, Hcv, In Maputo Public Hospitals

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Background: In Low income countries, occupational blood borne pathogens exposure is a serious risk to healthcare workers (HCW). HIV, HVB and HBV infection prevalence's are the highest. Worker conditions are very poor and unsafe practices are common.

Methods: We conducted a cross-sectional study, analyzing the reports of HCWs exposed to blood borne pathogens, in 4 Maputo Public Hospitals, between 2016-2017, in order to evaluate the management of occupational blood borne accidents program. All reports forms were analyzed for key elements of the exposure management, (i)exposure reporting and its compliance with the national guideline, (ii) background education of the workers who reported exposure, (iii) assessment of infection risk – (a) type and severity of exposure, (b) infection status of worker and source person, and (iv) Treatment or follow up.

Findings: Of the 4 health care facilities, only 2 (50 %) of them, including the main national referral hospital, report the occupational accidents with blood borne pathogens, using the appropriate report form. Under-reporting is highly significant. 233 accidents were reported, 144 (63%) by males and 89 (37%) by female workers. Students and nurses reported 63 accidents (27%) each, Physicians 54 (23%) and servants 31 (13%). Needlestick injuries are largely the most prevalent type of exposure 216 (92, 7%), mucus membrane exposure 17 (7, 3%). All HCWs were tested for HIV and also the source when available. All HCWs had appropriate follow up. There is no guideline and no procedure is done for exposures related to HBV and HCV. HCWs are not been vaccinated against HBV.

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Health Effect of Surgical Smoke and Its Associated Factors among Perioperative Healthcare Worker in Hospital Kuala Lumpur

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Introduction: Surgical smoke is recognized as an occupational hazard containing various hazardous substances. Various acute and chronic health effects were reported among perioperative

healthcare workers. This study aimed to determine prevalence of health effects from surgical smoke exposure and its associated factors in Hospital Kuala Lumpur.

Methodology: Cross sectional study conducted among 196 perioperative healthcare workers in Hospital Kuala Lumpur using pre-tested questionnaire. A stratified proportionate random sampling was conducted in 9 surgical based departments. The questionnaire consists of sociodemographic characteristic, employment factor, surgical factor, control measure factor and health effects of surgical smoke. Data was analyzed with logistic regression analysis p value set at 0.05.

Results: Prevalence of acute health effects of surgical smoke was 55.6%. Most common symptoms reported were upper airway irritation (36.8%), headache (30.4%), eye irritation (19.4%) and asthma like symptoms (13.4%). Assisting role in surgery (AOR=11.4, 95% CI=1.5, 86.2, p<0.05), higher number of surgeries per week (AOR=14.0, 95%CI=2.2, 92.1, p<0.01) and longer duration of ESD activation (AOR=82.2, 95%CI=3.7, 18.4, p<0.01) were significant predicting factors of having at least one acute health effects of surgical smoke.

Conclusion: Three predicting factors were found to be associated with the health effects. Safety control measures should be considered to reduce the risk of health effects from surgical smoke exposure among perioperative healthcare workers.

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A Team-level Participatory Approach Aimed at Improving Sustainable Employability of Long-term Elderly Care Workers: Preliminary Results of a Randomised Controlled Trial

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Introduction: Staff currently working in elderly care experience several difficulties, including staff shortage and poor working conditions. As this poses a threat for employees' sustainable employability, it is important to fulfil employees' human basic need for autonomy, relatedness and competence.

Material and Methods: We will evaluate the Healthy Working Approach (HWA) in a randomized controlled trial in elderly care organisations working with self-managing teams. HWA is a participatory workplace intervention in which teams will uncover what problems they face related to autonomy, relatedness and competence, come up with solutions and evaluate whether the solutions had the preferred effect. The intervention and waiting-list control group will be followed over the course of one year. Linear mixed model analysis will be used to evaluate the effect on primary (need for recovery) and secondary outcomes (i.a. satisfaction of the needs for autonomy, competence and relatedness). The Ethical Committee Social Sciences of the Radboud University approved of the study (number: ECSW-2021-012).

Results and Conclusions: Baseline data includes 104 elderly care workers, mostly female (90%) and between 25 and 54 years old (64%). The mean need for recovery score is 33 (on a 0 – 100 scale). A fifth of participants score high on need for recovery (>54.5). Additional results from the six months follow-up will be presented at the conference, including the effect of the intervention on need for recovery, secondary outcomes and information about the implementation process.

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Assessment of Frontline Healthcare Workers Quality of Work Life (QoWL) during the Covid-19 pandemic - A comparative study between China and UK

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Introduction: The COVID-19 epidemic left high proportion of healthcare workers (HCWs) faced with considerable levels of anxiety, depression, and insomnia. Previous studies have shown excessive workload and inadequate working conditions are two main issues among HCWs. Assessing QoWL has been considered as an important way of understanding how HCWs evaluate their work environment.

Material and Methods: A cross section survey among frontline HCWs from China and UK (n = 345) was undertaken based on seven dimensional QoWL factors : General Well-Being (GWB); Home-Work Interface (HWI); Job & Career Satisfaction (JCS); Control at Work (CAW), Working Conditions (WCS); Stress at Work (SAW); employee engagement (EEN). Cronbach α was used to measure the internal consistency within each domain and to test the exploratory factor structure confirmatory factor analysis (CFA) was applied. Descriptive analysis and One-way ANOVA was performed to examine the association between demographic and job characteristics with QoWL. Ethics clearance was granted by faculty ethics committee.

Results: Acceptable Cronbach α score, and CFA were achieved. Overall, 72.8% of the HCWs confirmed working under pressure during the pandemic and 54.2% felt excessive level of stress associated with workload. Significant differences were found between gender and three dimensions, i.e. EEN (F = 6.51, p = 0.011), GWB (F = 3.91, p = 0.049), HWI (F = 5.22, p = 0.023).

Conclusions: The study conclude organisations and related stakeholders should invest in workplace programmes aimed at alleviating stress at work and excessive workload issue among frontline HCWs.

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Comparison of job insecurity, quality of life, and work ability between age-matched temporary and permanent workers in the healthcare sector

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Introduction: Previous studies have addressed the association between non-permanent employment and adverse outcomes in health and quality of life. Aim of this cross-sectional study was to compare job insecurity, quality of life, and work ability between employees in a tertiary hospital, working under permanent or temporary terms.

Materials and Methods: Included were consecutive healthcare employees, who answered the following questionnaires: a) Job Insecurity Index (JII), b) WHO-5 wellbeing index (WHO-5), c) Work Ability Index (WAI).

Results: Included were 288 employees, with the majority (73.3%) being under permanent employment. No difference was observed between the 2 groups in age (p=0.073) and in sex distribution (p=0.614). The analysis of the JII Questionnaire showed that, although in the cognitive dimension of job insecurity no difference between 2 groups was found, in the emotional dimension, permanent employees were in a significantly better position, feeling less insecurity. However, WHO-5 Scale, revealed that in all 5 items, permanent workers had worse scores, with 4 out of 5 differences being statistically significant. In line with this, the mean score of WAI of temporary workers was significantly higher (40.06±4.99 vs 38.29±4.67, p=0.005), indicating better work ability.

Conclusions: In a sample of employees in the healthcare sector, employment under temporary terms coincides with a sense of lower job security, although wellbeing and work ability are better, compared to age- and sex-matched, permanent employees. Further research is certainly necessary, so as to reach into definite conclusions.

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Occupational Exposures to Radiofrequency Electromagnetic Fields and the risk of cancer

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Introduction: Previous cohort and case-control studies have investigated possible associations between occupational exposure to radiofrequency (RF) electromagnetic fields (EMF) and a range of cancers. The findings to date give no consistent evidence of a causal relation between occupational RF EMF exposure and cancer, however previous studies have too many deficiencies to rule out an association and further research is warranted. A key concern across all previous studies is the quality of the RF EMF exposure assessment.

Methods: We plan to overcome previous methodological shortcomings by applying a newly developed job exposure matrix (JEM) to three separate case-control studies investigating glioma, follicular lymphoma and multiple myeloma, respectively. We further plan to investigate the validity of the JEM by conducting personal exposure measurements of workers in the highest exposure occupations identified by the JEM. We will also investigate how the level of occupational RF EMF exposure correlates with the level of risk perception to environmental RF EMF exposure.

Results: Initial results from this long-term project will be presented on the possible risk of occupation RF EMF and cancer. We will also present initial results on the agreement between local measurements and the highest exposure occupations identified by the JEM.

Conclusion: Our investigation will add to the body of knowledge on whether occupational RF EMF is a risk factor for cancer outcomes.

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Morbidity profile of staff working at a primary health care facility in Haryana: A cross sectional study

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INTRODUCTION: Healthy workforce increases productivity, decreases work absenteeism. This study was conducted to assess the morbidity profile of staff of a primary health care facility in Haryana.

MATERIALS AND METHODS: A cross sectional study of all the staff of a primary health care facility was done. Written consent was taken from the participants. Interview consists of questions on socio-demographical characteristics, known chronic medical/ surgical illnesses, occupation related exposures/ problems and illnesses suffered in last 1-year. Haemoglobin, weight, height, BP and RBS were checked using HemoCue, electronic digital weighing scale, stadiometer, sphygmomanometer and glucometer respectively. All the instruments were calibrated and checked.

RESULTS: A total of 30 staff participated in the study, 77% were males and 33% were females. Median age of the participants was 39 years with age ranging from 19 - 57years. Three participants were known cases of Hypertension. Musculoskeletal problems (30%), blood/ fluid splash on skin (13%), cuts (13%) followed by needle stick injuries (10%) and patient related violence (10%) were the commonly reported occupation related problems. Twelve participants were suffering from Anaemia. Among the participants, 50% were over-weight and 7% were obese. High blood pressure levels were recorded for 13 participants. Mean RBS level was 76.3 mg/dl (with SD = 11.14), with a range extending from 55 – 106 mg/dl.

CONCLUSION: Regular assessments are needed for maintaining healthy workforce.

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Hepatitis B immunity status and COVID-19 vaccination coverage among nurse aides working in the emergency department in a secondary hospital in Portugal

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Introduction: Emergency healthcare workers (HCW) are the first point of contact for patients with traumatic injuries and acute illnesses. These professionals are at increased risk for respiratory and blood borne infections, as is the case of hepatitis B virus (HBV) infection and coronavirus disease 2019 (COVID-19). Vaccination is a major tool for preventing HBV infections. The protection provided by the COVID-19 vaccines are yet under evaluation. The objective of this study is to evaluate the HBV and COVID-19 vaccination coverage and the serological hepatitis B immunity among nurse aides working in the emergency department (EM) in a secondary hospital in Portugal.

Material and Methods: A descriptive cross-sectional study was conducted by analyzing the Occupational Health Service database

of Centro Hospitalar do Baixo Vouga in Aveiro, considering active nurse aides working in the EM in August 2021.

Results and Conclusions: Of the total 71 workers included in the study, 61 (85.9%) had completed the vaccination against HBV. From these fully vaccinated HCW, 45 (73.7%) had confirmation of protective Hepatitis B surface antibody (HBsAb) levels (>10 mIU/mL) and 11 (18.3%) had unknown HBsAb levels. Regarding COVID-19 vaccination, 68 (95.7%) of the 71 total workers, had complete vaccination. From these, 43 (63.2%) had the last shot more than 6 months ago. Overall, there is a good adherence of nurse aides working in the EM to HBV and COVID-19 vaccination. In what concerns to HBV vaccination, it is important to implement a more robust system to diminish cases of workers only partially vaccinated or with unknown immunity status.

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Importance Of Hand Hygiene Compliance In Reducing Occupationally Acquired Infections For Emergency Departments And Emergency Medical Services

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Introduction: Healthcare workers are frequently exposed to infectious diseases through patients presenting for care, placing them at a risk for occupationally acquired infections that can lead to illness and death. ED and EMS providers are at further risk due to human, institutional, and environmental factors within their settings of work. While protection from various infectious diseases requires consideration of the pathogen in question and the necessary personal protective equipment, hand hygiene (HH) remains the easiest and most important method for the protection of HCWs from OAI. **Methods and Materials:** This was a literature review study that leveraged previous outbreak case studies as a platform of success and failures.

Results and Conclusions: While the rates of HH compliance are low across the healthcare industry, both EDs and EMS are distinct sectors that complicate the ability to remain compliant. Studies have shown HH compliance in the ED to be as low as 29%, internationally, and 38% in United States' EMS systems. The infection prevention infrastructure within the U.S. is necessary to protect frontline workers and can serve as a model which can be adopted around the world to promote greater protection of our HCWs. EMS and ED staff are crucial to the resilience of the country, especially in the midst of a pandemic. Due to the nature of the profession, it is necessary to enact targeted, multi-facet efforts for EDs and EMS entities that promote systematic changes involving administrative support, motivation, training and education, and availability of HH supplies.

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Sharps Injury and Other Exposures to Blood: Compliance with Policy at a University Teaching Hospital

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Introduction: Sharps injuries and other exposures to blood are common in healthcare. These injuries have many hazards,

including the transmission of HIV, Hepatitis B and Hepatitis C. Employer adherence to appropriate legislation is essential to safeguard healthcare workers and appropriately control risks. This audit aims to evaluate the compliance of current practice for these injuries with local policy in a large teaching hospital in the United Kingdom.

Materials and Methods: An audit sample was generated, including all blood-borne virus exposures and a random 20% sample of other injuries which occurred in 2019, using the Trust's Occupational Health computer system. Inclusion and exclusion criteria were employed, and standards defined in line with Trust policy.

Results: An increase in all injury types was recorded compared with the last audit. Most injuries were caused by sharps (81%), particularly hollow-bore needles. Only one standard achieved 100% compliance (Hepatitis B exposure assessment) although compliance with standards for HIV and Hepatitis C exposures was also good. However, compliance with standards for Occupational Health follow-up, both after initial exposure, and long-term, fell significantly short. Identified areas for improvement were employee education, Occupational Health reporting measures, appropriate injury documentation and timely follow-up scheduling.

Conclusion: This audit demonstrated mixed compliance with standards, with recommendations made and implemented to improve this. Continued engagement with audit is essential to ensure compliance with policy, and safeguard healthcare workers.

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Occupational Infections among Dental Health Care Workers in Germany – 14-Year Time Trends

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Introduction: Dental health workers (DHW) are at increased risk of acquiring occupational infections. Due to various protective measures and a positive epidemiologic development in the general population, it might be assumed that infection risk for DHW have decreased. In order to proof the hypothesis, the time trend was analyzed.

Material and Methods: Secondary data from an accident insurance company were analyzed in terms of reported and recognized occupational diseases (OD) in DHW from 2006 to 2019. Claims concerning COVID-19 in DHW submitted until February 2021 were analyzed and full time equivalences (FTE) per 1,000 DHW compared with those for other HW.

Results: From 2006 to 2019, 271 claims were reported and 112 recognized as OD, representing an average of eight per year. The number of claims and confirmed ODs has decreased by 65.6% and 85.7%, respectively. The decrease was most evident for hepatitis B (HBV) and C (HCV) infections while the number of tuberculosis (TB) infections was stable. A total of 44 HCV, 33 HBV, 6 TB, and 24 latent TB infections were recognized as OD. Between March 2020 and February 2021, 155 COVID-19 claims were registered, and 47 cases were recognized as OD in DHW. The rate of ODs per 1,000 FTE was 0.4 in DHW, 28.9 in hospital HW and 10.5 in all HW.

Conclusions: The positive time trend assumed for the infection risk in DHW was confirmed until 2019. The pandemic than changed the picture completely. Instead of eight ODs per year, the number of ODs because of COVID-19 alone increased more than fivefold.

Therefore, continued attention should be paid to infectious disease prevention for DHW.

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The relationship between job demands, job engagements, and burnout among healthcare workers during the COVID-19 pandemic

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INTRODUCTION: The Covid-19 pandemic has placed unprecedented psychosocial pressure on healthcare workers. Despite this, this study has assessed the relationship between job demands, job engagements, and burnout among healthcare workers and compared findings between countries.

METHODS: This cross-sectional self-reported online survey among 1266 HCWs (78% females, aged 42.9±10.8 years) from RN Macedonia, Croatia, and Bosnia and Herzegovina during 2020 was carried out. The following study questionnaires: MBI, the Hospital Experience Scale, the Hospital Survey on Patient Safety Culture, and QRCP the Questionnaire Sur Les Ressources et Contraintes Professionnelles were used. All examinees per job contacts divide into three groups: those who had no COVID-19 positive contact, self-isolated patients, and only positive COVID-19 patients.

RESULTS: Comparison findings indicated a high level of burnout in each country without significant differences (the mean of EE in Croatia was 23.70, in RN Macedonia 24.08, and B&H 21.88; and mean of DP in Croatia 6.75: in RN Macedonia 6.28: in B&H 5.98, $P > 0.05$), and insufficient number of HCWs, too. In an inversion, they were HCWS with the lowest level of dedication to work tasks than others. There was a significant correlation between job dissatisfaction and: EE (0.534, $P < 0.000$), DP (0.535, $P < 0.000$), and night working shift (0.299, $P < 0.000$).

CONCLUSION: It is necessary to provide a sufficient number of HCWS, reduce night working and psycho- support, and strengthen job satisfaction among HCWS who have only contact with COVID 19 patients.

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High Risk Bubble, Bubble and Seal program can help continue business of hospital in Fourth wave or COVID-19 pandemic in Thailand

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Introduction: With the fourth wave of COVID-19 pandemic in Thailand. COVID-19 and their variants transmitted in the family and community. This is difficult to screen and highly contagious, they dodged the detection system and disseminated in various inpatient

wards so that many patient and healthcare workers became the high-risk exposer. Many HCWs were quarantined so that there was shortage of personals. We redesigned the previous prevention program and adapted the new type of quarantine system so that they can still work without risk to the others.

Material and Method: We invent the bubble and seal system for HCWs. If the COVID-19 patient dodged to admit in ward and detected later. We did the COVID test for all the high-risk exposer and quarantine them. We seal the ward with no new patient admit and we arrange the room for those who needed quarantine near the sealed ward so that they can work, they were in the high-risk bubble. For those who went home they must go straight to their home and not stop anywhere and vice versa to hospital.

Result and Conclusion: In the 4th wave of pandemic. Our team did exposure investigation 5,019 times and got high risk exposure 886 persons (17.7%). There were 401 high-risk exposed HCWs (45.3%) who worked in high-risk bubble instead of staying home. Those high risk exposed cluster were support workers 35.1%, nurses and doctor clusters were 29.3% and 27.2%. There was no transmission among those who worked in high-risk bubble. The bubble and seal method and high-risk bubble can arrange the safe work and decrease the transmission of the virus and continue the business of the hospital.

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A case study on the lumbar muscle loads and physical activity intensity in a care worker during the day shift

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Introduction: The purpose is to clarify the lumbar muscle loads (LMLs) and physical activity intensity (PAI) in a care worker during the day shift.

Material and Methods: The subject was a 20s woman care worker working at a nursing-care facility. The surface electromyograms (sEMG) from bilateral paraspinal muscles at L3-4 and the PAI were measured, and motion-time study was conducted during the day shift in Nov 2020. The sEMG at the 30 ° trunk flexion was recorded as the reference voluntary contraction (RVC) before the start of her working. This study protocol has undergone approval by the Clinical Research Ethics Review Committee of Kyoto Women's University. (Permission No: 2019-9-modif. 1).

Results and Conclusions: The subject cared for recipients mainly by manual handling while the facility had equipped repositioning or transfer aids/machines. The 10th percentile (%ile) value of myoelectric potential was equivalent to 22% RVC for the left and 20% RVC for the right side. The median value was equivalent to 77% RVC and 81% RVC. The 95%ile value representing high muscle load was equivalent to 195% RVC and 207% RVC, which frequently appeared when her assisting some recipients in move/transfer, excreting, bathing, cleaning the bath/dressing room, and cleaning up after recipients' meals. The time of the myoelectric potential that was equal to or higher than RVC

accounted for 33 ~36%, and the time of the PAI that was equal to or higher than 2 METs accounted for 59% of her working time. The prolonged LMLs including higher potential frequently and physical activity with non-negligible intensity were found out in this case study.

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SARS-CoV-2 health facility assessment following the quality assurance system to protect health workers in Thailand

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Introduction: Health workers (HWs) are among the highest groups at risk of infection during the SARS-CoV-2 (COVID-19) pandemic. This study aimed to evaluate the performance of health facilities following the quality assurance system.

Material and Methods: This action research was divided into 3 phases including 1) assessment tool development 2) audit system establishment and 3) implementation and evaluation. The COVID-19 control measure tool was developed using expert opinions. Such tool was tried out and tested the reliable among 30 hospitals. The overall Cronbach was 0.78. The staffs of the Regional Office of Disease Prevention and Control have been trained to audit the hospitals using the tool. The performances of the hospitals have been classified into 3 levels including silver, gold and diamond. Data were analyzed using frequency and percentage.

Results and Conclusions: Such tool was divided into four aspects including 1) organizational management, 2) surveillance programme implementation 3) health assessment and the welfare support 4) COVID-19 training and guideline and 5) environmental and personal protective equipment management. Total 154 hospitals participated in this study. Hospitals have achieved diamond level, gold level, silver level and failure to meet the criteria for 69 (44.8%), 49 (31.8%), 29 (18.8%) and 7 (4.5%), respectively. The occupational health strategies should address on work tasks assessment, COVID-19 investigation, fitness for work assessment and ventilation improvement to prevent and control COVID-19 among HWs more effectively.

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Vaccine hesitancy and reasons for or against adherence among nursing students: comparison between flu and covid-19 vaccines

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Introduction: Healthcare workers are a target category for many vaccinations since they have an increased risk to contract and transmit communicable diseases to patients. The aim was to evaluate intentions to be vaccinated against flu and COVID-19 in a population of nursing students and to compare the reasons for or against adherence to these vaccinations.

Material and Methods: An anonymous online survey was conducted among 422 nursing students to collect data on demographic characteristics, vaccine attitudes, and specific reasons for intentions to be vaccinated or not for flu and COVID-19.

Results: About 70% and 81% students declared their intention to be vaccinated against flu and COVID-19, respectively. The participants' main reasons for supporting flu vaccination were to protect oneself (87%) and to protect patients (73%), whereas for supporting COVID-19 vaccination the main reasons were to protect family and friends (95%) and to protect oneself (88%). Conversely, among participants who were opposed to receiving the flu vaccine, the main reasons were the opinion that the vaccine has suboptimal protective efficacy (24%) and the lack of information about the vaccination (22%). Considering the COVID-19 vaccine, the main reasons against it were the fear of adverse events (58%) and the lack of information about the vaccination (43%).

Conclusions: The lack of information was one of the main reasons for opposing vaccinations. It is fundamental to consider vaccine hesitancy reasons in healthcare students and face it properly, since they will have to provide recommendations to patients and promote adherence to vaccination programs.

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Prevalence and Determinant Factors of Health Workers Burnout during COVID-19 Pandemic in Indonesia

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Introduction: Health workers are people on the front lines who are at high risk of contracting COVID-19. This study aims to understand the prevalence and factors affecting burnout syndrome among health workers in Indonesia.

Materials and Method: A cross-sectional online survey using Google Form platform was disseminated to health workers from August 11th to 25th 2020. We used Indonesian version of Maslach Burnout Inventory (MBI) questionnaire to assess the three domains of burnout, i.e., emotional exhaustion, depersonalization, and personal accomplishment.

Results and Conclusions: A total of 1,461 health workers from 33 provinces in Indonesia participated in this study. About 82% of health workers reported moderate level of burnout. High emotional exhaustion was experienced in 22.1% respondents, high depersonalization among 11.2%, and low personal accomplishment in 29.4%. Job category was associated with high level of emotional exhaustion (RR = 1.66, 95% CI = 1.27-2.16, $p < 0.05$) and depersonalization (RR = 1.51, 95% CI = 1.12-2.04, $p < 0.05$). Experience in treating COVID-19 patients was also associated with high level of emotional exhaustion (RR = 1.62, 95% CI = 1.21-2.15, $p < 0.05$) and depersonalization (RR = 1.55, 95% CI = 1.11-2.15, $p < 0.05$). Moderate level of burnout syndrome was reported among health workers and was significantly associated with job category, marital status, and experience in treating COVID-19 patients.

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Safe health care for both patients and workers – what can we learn from health care workers' narratives of workplace incidents posing risk for patient and worker injury?

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Introduction: Health care workers (HCWs) are at high risk for occupational injuries and 10% of patients are affected by an adverse event. Knowledge about how HCWs manage these risks is needed for improved safety. The aim of this study was to explore HCWs' experiences of workplace incidents that led to injury or posed risk for patient and worker.

Material and Methods: This study has a qualitative design using the critical incident technique and an inductive approach for analysis. Semi-structured individual interviews were held with 34 HCWs from three regions in Sweden. An Ethical board approved the study. Results: 71 workplace incidents were identified. Team interplay and trustful relationships were highly valued for patient and worker safety. Support and validation from colleagues and managers were important for disclosure. Insufficient manager response and unsatisfactory opportunities to debrief the incident could shape persistent negative emotions. Fear of being hurt was evident as well as sadness over being injured at work, and the HCWs described shame and self-regret. When the workplace had not taken the expected actions, anger and resignation were expressed turning into long-term distress.

Conclusions: Work situations leading to injury or posing risk for patient and HCW injury are emotionally distressing for HCWs. Team interplay may facilitate safe and dynamic practice and help HCWs to overcome negative emotions, but organizational support is imperative for individual closure. For safer healthcare for both patients and workers, employers need to develop strategies for active risk management and support after an incident.

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Occupational health information systems for health workers during the COVID-19 pandemic in South Africa

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Introduction: Reliable health information systems (HIS) are crucial for sound decision-making for occupational health services (OHS). Strengthening OHS is essential for a healthy and safe healthcare workforce during the COVID-19 pandemic. This study aimed to assess the presence and utilization of OHS HIS in South African hospitals during the COVID-19 pandemic.

Methods: A cross-sectional survey was utilized to assess OHS HIS use to inform the COVID-19 outbreak response to protect health workers (HWs) in four hospitals. A validated online questionnaire was administered among purposively selected hospital managers, trade unions and OHS teams. Data were then transferred to Stata for analysis.

Results: Seventy-three HWs, representing a combined workforce of 14,743 HWs, participated. Fifty-five percent were female and 65% had an undergraduate qualification. OHS HIS reports were deemed poorly organized by 64%; 31% indicated poor data collection; 37% noted poor data storage, and $\geq 33\%$ were unhappy or frustrated with the use of HIS for OHS planning. Over 67% felt OHS HIS needed reforms; $\leq 14\%$ reported access to IT developers, and 52% access to IT infrastructure. Only 33% knew the minimum set of OHS indicators, and 51% reported that there was demand for OHS information. None of the hospitals were utilizing electronic OHS HIS including for COVID-19.

Conclusions: Overall there is poor knowledge and utilization of OHS HIS, despite the availability of an electronic system in two of the hospitals. It is essential, that all the hospitals are provided with access to OHS HIS, and training and awareness conducted to improve OHS management.

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Stress, Anxiety and Depression among Physicians during COVID-19 pandemic in Indonesia

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Introduction: Healthcare system's capacity in Indonesia is struggling to accommodate increasing healthcare demands during the COVID-19 pandemic. It has the lowest number of ICUs than other Asian countries, a shortage of mechanic ventilators, a shortage of Personal Protective Equipment (PPE), and testing capacity. These circumstances may lead to mental health problems such as stress, anxiety, and depression among physicians as the first liner in the system.

Material and Methods: This study was a cross-sectional survey of physicians in East Java Province, Indonesia. The online survey was held from 15 September to 01 December 2020. We used the Generalized Anxiety Disorder scale (GAD-7), the Patient Health Questionnaire (PHQ-9) for depression, and the Anxiety Questionnaire.

Result: Among 516 participants, more than 50% physicians were worried about being exposed at work, compromised their health, and worried about their home life. Path analysis showed that perceptions of the workplace ($\beta=0.24$, $p\text{-value}<0.001$) and home ($\beta=0.19$, $p\text{-value}<0.001$) were significantly associated with higher scores of anxieties. The significant relationships also persist between perceptions of the workplace ($\beta=0.19$, $p\text{-value}<0.001$) and home ($\beta=0.21$, $p\text{-value}<0.001$) and a higher score of

depression. Physicians' perceptions of the workplace are related to their concerns about home life during the COVID-19 pandemic ($\beta=0.68$, $p\text{-value}<0.001$). Anxiety has a positive link with depression ($\beta=0.81$, $p\text{-value}<0.001$).

Conclusion: The COVID-19 pandemic is affected the mental health of physicians in Indonesia.

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Notified Occupational Diseases Among Healthcare Workers in a Portuguese Hospital and the Impact of the COVID-19 Pandemic: Data from a 5-year period

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Introduction: Occupational diseases are annually responsible for the death of approximately 2.0 million people worldwide. Healthcare workers are at higher risk of developing several occupational diseases such as infectious diseases, musculo-skeletal disorders and mental distress. This study aims to provide a profile of the main notified occupational diseases and the affected workers in a Portuguese hospital over the last 5 years.

Materials and Methods: A cross-sectional observational study was conducted using data from the Occupational Health Service of Centro Hospitalar do Baixo Vouga for the notified occupational diseases in hospital workers between July of 2016 and June of 2021.

Results and Conclusions: A total of 355 cases of occupational diseases were notified among hospital workers in these 5 years. Our data showed that COVID-19 infection was the most reported disease since the onset of the current pandemic, with a total of 269 cases, 72 in the year 2020 and 197 in the first semester of 2021. Musculoskeletal disorders were the second most notified group of diseases, representing about 20% of all cases, and the most commonly reported diseases in the pre-pandemic years. Occupational diseases were more prevalent in nurses, followed by hospital aides and physicians. The notification of these diseases was highest among female workers. Ultimately, changes in working conditions and the introduction of new agents may give rise to emerging occupational health risks and diseases. The detection and investigation of these new diseases are essential from a perspective of early recognition and prevention.

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An experimental study on the lumbar workload at different bed-heights in the manual therapy among physical therapists

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Introduction: Many physical therapists (PTs) have complained of work-related musculoskeletal disorders, and their manual therapy is cited as one of the risk factors. The aim of this study was to clarify the lumbar load at two different bed-heights in the manual therapy among PTs.

Material and Methods: Simulative tasks were massaging lumbar region (MAS), and passive hip abduction range-of-motion exercise (ROM). These tasks were imposed on 33 male PTs three times for each task on a mat platform (PF) with 45 cm in height and a height-adjustable bed (BA), respectively. The evaluation indexes were surface myoelectric potentials from bilateral paraspinal muscles at L3-4, anterior inclination angle of the trunk, calculated flexion torque of the body, and the perceived stress by New Borg scale. These indexes were statistically compared by the bed-height. This study protocol has undergone approval by the Human Research Ethics Committee of Bukkyo University (Permission No: 2019-34-B), and that of Shiga University of Medical Science (Permission No: R2020-095).

Results and Conclusions: Mean anterior inclination angle (BA, PF) were 16°, 73° for MAS, and 25°, 81° for ROM. The flexion torque value on PF was 3.3 times higher for MAS and 2.5 times higher for ROM than that on BA. The myoelectric potential in the left on BA was higher for ROM than that on PF. Anterior inclination angle increased and the myoelectric potential decreased with progression of the ROM task on PF. The stress score on PF was higher than that on BA. The lumbar workload in manual therapy was considered to be able to reduce by adjusting the bed-height to each PT.

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Fire risk assessment and emergency evacuation simulation in hospitals: Case study in a hospitals affiliated by Shiraz University of Medical Sciences

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Fire is one of the most dangerous phenomena that causes major human and financial losses. There is a high risk of fire in hospitals and health centers due to the existence of sources and flammable processes as well as the presence of disabled and sick people. There have been many fires in these centers, including the incident of Sina Athar (with 19 dead) and the incident of Nasiriyah Hospital in Iraq (94 killed), two of the most famous in recent years. One of the ways to reduce the consequences of fire is the immediate evacuation of people from the fire, however due to the presence of disabled and sick people and possibility of interference in treatment process, hold emergency preparedness exercises is less practical. Therefore, it is very important to identify weaknesses and improve the readiness of people to evacuate in an emergency situation using simulation. The aim of this study was to evaluate the fire risk and simulate emergency evacuation in one of Shiraz hospitals. In this study, the Failure Mode and Effect Analysis method (FMEA) was used in combination with multi-criteria decision making methods. To determine the weight of the criteria, Intuitionistic Fuzzy Multiplicative Best-Worst Method (IFMBWM) and in order to determine the ward with high fire risk, the Interval valued

Intuitionistic Fuzzy Combinative Distance-based Assessment (IVIFCODAS) was used. In the second phase, in the part of the hospital that had the highest risk of fire, simulations were performed with FDS + Evac softwa

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Occupational sharps injuries and splash exposures among healthcare workers in Arab countries: protocol of a systematic review and meta-analysis

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Introduction: Sharps injuries, including needlestick injuries, and splash exposures constitute serious occupational health problems for healthcare workers, carrying the risk of blood-borne infections; however, data are scarce and not systematically summarized in the Arab countries. The aim of this study is to conduct a systematic review and meta-analysis about sharps injuries and splash exposures of healthcare workers in Arab countries, with the objectives to determine the incidence and prevalence of these events, their risk factors, and the applied preventive measures.

Material and Methods: The protocol is developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) guidelines. PubMed, EMBASE, Scopus, CINAHL, Web of Science and Africa-Wide Information electronic databases will be searched without any filters or restrictions for publication years. Two reviewers will independently screen the records in the systematic review software Covidence based on the PECO statement. Data from the selected studies will be extracted using a piloted data extraction sheet and the RoB-SPEO tool will be used for assessing the risk of bias of the selected studies.

Results: The study findings will be synthesized narratively in summary tables regarding the incidence and prevalence of sharps injuries and splash exposures, risk factors and preventive measures. If findings allow, meta-analysis will be conducted on the frequency of sharps injuries and splash exposures, and on the effect size of risk factors.

Conclusions: The results of this review will provide gap-filling information on

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Seasonal influenza vaccine behavior and COVID-19 vaccine uptake among healthcare workers

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Introduction: We aim to explore the association between seasonal influenza vaccine behavior (from 2018 Southern Hemisphere to 2020/2021 Northern Hemisphere influenza seasons) and COVID-19 vaccine uptake among healthcare workers.

Material and Methods: This study used electronic vaccination records of staff who have worked in a tertiary hospital for at least 3 years. Multivariable logistic regression was used to predict early adopters of COVID-19 vaccine (receive the vaccine within the first

month of vaccine roll-out). We used Cox proportional hazards models to estimate hazard ratios (HRs) for the probability of COVID-19 vaccine uptake at 260 days (from 30 Dec 2020 to 15 Sept 2021). Results: Of the 6121 staff, 81% were females, 39% were nurses, 84% had at least three past influenza vaccines and 12% had one to two past influenza vaccines. The COVID-19 vaccine uptake was 96%. Staff who had ≥ 3 influenza vaccines (OR 3.3, 95%CI 2.6–4.1) and staff who had 1–2 influenza vaccines (OR 1.4, 95%CI 1.1–1.9), had higher odds of COVID-19 vaccine uptake in the first month of vaccine roll-out compared to those who did not receive any, after adjustment for age, gender, years working in hospital and health-care groups. At 260 days, HRs for COVID-19 vaccine uptake among staff who received ≥ 3 past doses of influenza vaccines and staff who received 1–2 doses of influenza vaccines, compared to those without, were 2.0 (95%CI 1.7–2.3) and 1.3 (95%CI 1.1–1.5) respectively.

Conclusion: Seasonal influenza vaccine uptake is a strong predictor of COVID-19 vaccine adoption and should be promoted even when there is no epidemic.

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Insights into the needs and preferences for eMental health information among prospect healthcare providers: a qualitative study

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Introduction: Since fall 2020, electronic mental health services (eMHSs) like health apps can be prescribed by physicians and psychotherapists in Germany. However, prospect healthcare providers such as medical students remain reluctant to adopt eMHSs. Reasons include scepticism and lacking awareness, which can be counteracted by tailored multi-component information material. However, to date little is known about the most important attributes of information on eMHSs.

Material and Methods: A total of 21 semi-structured interviews were conducted (n=16 medical and n=5 psychology students) across Germany based on a topic guide. Interviews were recorded, transcribed and content-analyzed using MAXQDA.

Results: Most students reported having little knowledge about eMHSs. The issue of digital health has barely been raised in their study, even though it is perceived as a crucial topic for personal needs as well as in preparation for their work as healthcare providers. Students favored light, neutral colors and a combination of short, compressible texts with matching images or videos when asked for design preferences. Information about data protection, associated costs, the underlying evidence base and the match with personal needs were perceived as important for utilization intentions. There was interest in tailored information focusing on students, but not exclusively on healthcare students.

Conclusions: This study provides first insights into the preferences regarding eMHS information among prospect healthcare providers. Next, a discrete-choice conjoint experiment will be conducted to test relevant information features on eMHSs.

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Hepatitis B vaccination policy for student health workers (HWs): objectives, problems and possible solutions

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Introduction: Hepatitis B virus (HBV) infection is a serious occupational risk for HWs. For prevention of HBV, vaccination is the key. With the introduction of universal vaccination, large cohorts of youngsters vaccinated against HBV at birth or adolescence are currently entering healthcare training, not knowing their immunity status to HBV.

Material and methods: To update and optimize the immunity status of student HWs, a cost-efficient strategy must be worked out. Pre-vaccination testing of student HWs includes at least two complementary objectives: detecting those already immune against HBV infection and those infected with HBV, through the presence of HBsAg Results: We recommend that both objectives regarding pre-vaccination testing should be met by developing a strategy wherein anti-HBs serum levels are determined in student HWs. Those with levels < 10 mIU/mL should subsequently be tested for persistent HBV infection. Student HWs testing negative for persistent HBV infection and having anti-HBs levels < 10 mIU/mL should be tested for the presence of an anamnestic response, defined as an increase in anti-HBs concentration to levels ≥ 10 mIU/mL one month after a new dose. This is used to demonstrate protection, even after the disappearance of vaccine induced anti-HBs antibodies. The proportion having an anamnestic response after adolescent or childhood complete vaccination is 91 to 95% according to several studies. Conclusions: Student HWs not exhibiting an anamnestic response should be given a full course of HBV vaccine. If anti-HBs levels remain < 10 mIU/mL thereafter, they should be considered non-responders

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The COVID-19 vaccination campaign and the health impacts on professionals at a Primary Health Care service in the city of São Paulo, Brazil

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Introduction: The vaccination campaign is seen as fundamental to control the pandemic caused by the COVID-19, but it can also lead to work overloads in professionals' health of Primary Care services. Aim: To analyze the health impacts of the COVID-19 vaccination campaign on professionals' health at a Primary Health Care Unit located in the city of São Paulo, Brazil.

Methods: Two stages. First, there was a documental analysis of procedures and guidelines for the COVID-19 vaccination campaign, observations of activities, and remarks registered in a logbook. Second, a selection of professionals who had been for more than one year in the Primary Health Care service and had been directly involved in the vaccination campaign. An interview script was used to obtain personal data, and for individual and semi-structured interviews about working conditions for

thematic content analysis. This research was approved by a Research Ethics Committee.

Results: Nine professionals participated in the study, one male and eight females, aged between 26 and 55 years, nursing, nutritionist, social worker, and administrative assistant workers. In the analysis of the interviews were found as significant changes and new requirements in working processes, staff undersized for the demands, musculoskeletal disorders, work overload, fear of illness caused by the virus, experiences of moral violence at work, health exhaustion, and a lack of professional recognition.

Conclusions: There are impacts on professionals' health at a Primary Health Care, and attention, respect, and safety are required for the workers.

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Risk assessment of physical exposure among healthcare workers when performing patient handling – Translation and cross-cultural validation of the TilThermometer for a Swedish version

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Introduction: Work-related musculoskeletal disorders are common in the healthcare sector due to physical demanding work tasks. Risk assessment is one cornerstone for preventing of injuries and promoting a safety culture. The TilThermometer has proved to be useful in the Netherlands for assessing healthcare workers' physical exposure and is part of the CEN ISO TR 12296-2013 Ergonomics – Manual Handling of People in the Healthcare sector. The aim of this study was to translate the risk assessment instrument TilThermometer from Dutch to Swedish, evaluate its linguistic validity and perform a cross-cultural adaptation for a Swedish healthcare context.

Material and Methods: The translation and cross-cultural adaptation followed a structured process containing eight steps: 1) Translation, 2) Synthesis, 3) Back-translation, 4) Synthesis, 5) Linguistic review, 6) Expert panel review according to Delphi-method and 8) Semi-structured interviews, using qualitative content analysis.

Results: This process resulted in a Swedish version of the risk assessment instrument TilThermometer and assured linguistic validity and cross-cultural adaptation to a Swedish context. Consensus was reached in the expert review after two Delphi rounds. Interviews emerged into: 1) "User-friendly and understandable instrument", 2) "Further development", and 3)

"Important part of the systematic work-environment management".

Conclusion: The Swedish TilThermometer is now ready to be tested in the Swedish healthcare sector. Next phase is to continue further testing the psychometrics aspects, inter-rater reliability and feasibility of TilThermometer.

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A retrospective study on the impact of the first wave of the COVID-19 pandemic on the Health Care Workers in Italy

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Introduction: The COVID-19 pandemic had a huge impact on Health Care Workers (HCWs) as they played an essential role in the management of the pandemic. The Italian Workers' Compensation Authority (INAIL) and the Italian National Institute of Health (ISS) developed a retrospective study to analyse COVID-19 cases among HCWs during the first wave. The aim of this study is to understand trends and characteristics of infections among HCWs.

Materials and Methods: Data were collected retrospectively and anonymously from administrative source of Regions between May-September 2020, referring to HCWs infected from the beginning of the pandemic until 30 April 2020. We used a questionnaire asking socio-demographic and occupational information and characteristics of contagion and disease outcome.

Results: We received 15,926 valid questionnaires, 63.7% from Lombardy. The mean age is 49 years; 67.4% are women. 47.9% are nurses, 20.5% doctors and 19.7% health and social care professionals. 78.0% work in hospital setting, 13.3% in local setting, 8.7% in other fields. Regarding hospital setting, the medical area counts 21.2% of cases, followed by 15.6% in the departments converted to COVID-19 care and 10.2% in surgical area. 22.8% of HCWs were hospitalized, 1.2% were hospitalized in intensive care and 0.4% died.

Conclusions: This study highlights the main reasons of the overload put on the national health system by the first wave of the pandemic. Improved knowledge, availability of PPE and a tight vaccination campaign for HCWs strongly changed the trend of infections among health workers, with substantial elimination of serious and fatal cases.

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The Invisible Pregnancy: Maternity Protection in the Hospital Workplaces

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Introduction: The increase of female presence in the different productive sectors reinforces the importance of maternity protection. Working in the hospital sector challenges women's reproductive and productive roles.

Material and Methods: This study conducts a narrative review on work and maternity in the hospital sector through peer-reviewed scientific articles and gray literature.

Results: As a fundamental human right, maternity protection must include maternity leave before childbirth, health and employment protection, non-discrimination against pregnant and nursing women, and breastfeeding support. The health sector is an essential source of jobs for women. The occupational risks in hospital workplaces threaten sexual and reproductive health and increase congenital anomalies. Advanced maternal age has become common and increases the chances of negative impact on mother and fetus health. Medical leave is mainly for pregnancy complications and the risk-benefit during pregnancy for cases of high occupational exposure. Employment may be associated with a reduced risk of preterm birth. Adjustments in the workplace and greater work control by pregnant women can reduce risks and shorten sick leave during pregnancy. Furthermore, removing pregnant women from work can make them invisible as procreative, economic, and social agents, compromising social reproduction as a whole.

Conclusions: Global labor and family policies must promote maternal and child health, in addition to women's complete fulfillment of their human and social reproductive roles. Studies are needed to expand the knowledge of work-maternity relationships.

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Development of a Patient Monitoring System Using Wireless Devices: Ensuring Patient Safety and Reducing the Burden of Nursing

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Introduction: The purpose of this study is to develop a "Patient Monitoring System" to reduce the time required for finding missing patients, thereby ensuring patient safety, reducing the workload of nurses, and reducing search costs. As Japan's population ages in recent years, the number of patients with dementia in addition to their primary disease is increasing, and some patients now sneak away from the hospital during hospitalization, and nurses have to rely on clues to locate them.

Material and Methods: We created a portable wireless device for collecting location information by utilizing the ZigBee network developed by Shigeyuki Tateno et al. We then conducted a demonstration test of the remote monitoring system that estimates information about the subject's location in real time by having five nurses in a care and welfare facility carry a prototype of the device in their pockets for eight hours inside the facility. This study was reviewed by the Ethics Committee of University of Occupational and Environmental Health, Japan (Reception number H29-230).

Results and Conclusions: The status of the device's communication was stable for the eight hours without any interruptions. We were also able to identify the location of the subjects and which room they were in. The portable wireless device was light and did not interfere with the nurses' work. We assume that this portable wireless device will be useful in the practical application of the "Patient Monitoring System". In the future, we plan to conduct a search test on patients in a medium-sized hospital.

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Assessment of an ergonomic intervention in a nursing home: preliminary results

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Introduction. The prevalence of musculoskeletal disorders and the ageing of nursing staff make preventive interventions in healthcare workers (HCWs) indispensable. This study aims to evaluate an occupational ergonomic intervention in a nursing home in Northern Italy.

Material and Methods. The preventive intervention consisted of the introduction of 25 ergonomic beds with lateral tilting. 32 enrolled healthcare assistant (90% female; 15,6 % > 55 years age) were assigned to manual handling patient tasks, before and after introduction of the ergonomic beds. Both during the pre-intervention and post-intervention phase, organizational and health surveillance data were acquired. An ad hoc structured questionnaire and other validated tools, e.g. Work Ability Index (WAI), were administered through focus groups to assess the well-being perceived by the HCWs. Statistical elaborations included an evaluation of the variation of the endpoints between before and after the intervention.

Results. Overall, ergonomic beds have achieved better results in terms of safety, comfort, reliability. Physical effort perceived was reduced in 97% of HCWs. In addition, the analysis of the questionnaires showed a positive impact also in terms of absenteeism reduction (from 16.6% to 2.5% of total working days). On the other hand, the WAI showed a discordant trend compared to the other scales administered, probably due to the stressful working conditions which health workers faced while managing the patients with COVID-19 infection.

Conclusions. Preliminary results confirm the effectiveness of the ergonomic intervention.

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The Number of Active Tuberculosis Patients as a Cause of Latent Tuberculosis in Infectious in Hospital Personnel

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Objective: To examine the cause of LTBI among healthcare workers in a university hospital

Research Design and Methodology: A historical cohort study with a population of medical personnel with a history of close contact with TB patients, presenting in negative IGRAs as their baseline. There were 66 cases of close contact to TB patients as well as 66 cases of non-close contact to TB patients. The statistical analyses included multiple regression analysis. The reported values were relative risk and adjusted RR with 95%CI.

Results: The sample group consisted of 132 participants, who were exposed to active TB patients or suspected tuberculosis with Mycobacterium tuberculosis in sputum (AFB negative), CXR is unclear, the PCR for TB / GeneXpert results are negative. In the same environment, there were 66 people in the non-close contact group. The demographic characteristics were not different. Conversion of to IGRA from negative to positive was 9 cases, 5 cases in the exposed group (7.6%) and 4 cases in the non-exposed group (6.1%). Close contact with TB patients or suspected TB ≥ 3 cases per year (RR=5.00,95%CI:1.429,17.493). The multiple regression analysis revealed that IGRA conversion was related to close contact with active TB patients ≥ 3 cases per year in closed areas (adjusted RR=3.420, 95% CI:1.06,10.998).

Conclusion: Frequent contact to TB patients or suspected TB in a university hospital in Northeastern Thailand ≥ 3 times per year is related positive IGRA conversion. The management of tuberculosis patients in hospitals needs to minimize exposure of health care personnel to TB patients to reduce the risk of TB infect

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Dependence Between The Hard And Strenuous Work Process And The Ergonomic Factors Among Ambulance Workers In Bulgaria

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Introduction: The work among ambulance workers is characterized with very high levels of physic and mental pressure and stress. In addition to this the main risk factor are ergonomic risk factors like lifting and carrying stretchers and weights, long work shifts, night shifts and daily various emergency cases.

Materials and Methods: The study was conducted among 468 workers in two emergency healthcare centers in Bulgaria in period of one year. The male participants are 58.3% and 41.7% are female. The distribution by position is: nurses - 35.8%, ambulance drivers 26.1%, doctors 18.1%, paramedics - 14.2% and sanitation workers - 5.8%. A sociological method was used - a survey. The results of the study are presented using descriptive statistics and Chi-square test.

Results: The distribution by position of workers which think that ergonomic risk factor are important and have negative impact on their health are: ambulance drivers 71.1%, doctors 61.4%, paramedics 53%, nurses 52.4% and medical orderlies with 51.9%. The doctors which believe that the hard and strenuous work process have negative impact on their health are 65.5%, followed by paramedics with 56.1%, ambulance drivers - 52.5%, nurses - 50.3% and sanitation workers with 22.2%. The participants which claim that the hard and strenuous work process and simultaneously the ergonomic risk factors have negative impact on their health are 65.6%.

Conclusions: The negative impact of the hard and strenuous work process and the ergonomic risk factors on the health of ambulance workers is clearly visible. It's necessary to take urgent measures for their limitation.

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Major Depressive Episode and Insomnia Among Hospital Workers Following the First Peak of the COVID-19 Pandemic in Southern Brazil

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Introduction: The covid-19 pandemic has increased the overburden and stressors to which hospital workers are exposed. This study aims to describe the prevalence and factors associated with major depressive episode (MDE) and insomnia among hospital workers of a referral hospital for covid-19 in Southern Brazil right after the first peak of the epidemic.

Material and Methods: This cross-sectional study evaluated sociodemographic, behavioral and occupational aspects through a self-administered questionnaire. MDE was evaluated by the Patient Health Questionnaire-9 and insomnia was assessed by the Insomnia Severity Index. The project was approved by the Research Ethics Committee of the Faculty of Medicine of the Federal University of Pelotas (Case 4.040.039 evaluated on May 21st 2020).

Results: More than 1100 subjects answered the EDM and/or insomnia questionnaires (response rate over 65%) finding a prevalence of 15.4% (95%CI 13.4 to 17.4 n=1146) and 31.2% (95%CI 28.6 to 33.9 n=1154) respectively. Residents, nurses, technicians/nursing assistants had higher prevalence of depression and insomnia than physicians. The prevalence was higher among women, people with a family history of depression, professionals who reported risk factors for to COVID-19 and those who witnessed one or more situations of moral dilemma. Insomnia was also higher among professionals who mostly worked the night shift.

Conclusions: Considering the prevalence of MDE and insomnia among hospital workers. it is essential to review work processes in order to reduce occupational stress and to reduce long term effects of the pandemic on health.

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Design of interventions to support older healthcare workers to return to work after work-related injury or illness

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Introduction: The health/social care sector in Australia accounts for 13% of all workers and has been identified as a major source of work-related injury. The ageing population has increased need for

healthcare, yet the ageing workforce means a high number of workers exiting the workforce. Working in close collaboration with the insurer responsible for the healthcare system in New South Wales and Australian Capital Territory, this multi-stage mixed methods project sought to design interventions to support older healthcare workers to return to work after work-related injury/illness.

Materials and methods: Evidence gained from literature and workers' compensation claim analysis on existing interventions and risk factors for injury and no return to work was presented to focus groups made up of insurance and healthcare system stakeholders. Across a series of sessions the first 4 of 6 intervention mapping steps were completed.

Results: Five possible interventions were presented to the insurer to implement alone or in conjunction with the health organisations to prevent work-related injury or support return to work including: exercise; lifting training and/or equipment; education (at time of injury); return to work management, and; workplace environmental changes.

Conclusions: The insurer has already begun to act on the recommendations and create a "Best Practice" guide to support workers and employers alike. Success of this project was largely due to the ability to engage with stakeholders both "on the front line" who regularly deal with injured workers and policy makers to determine what is possible to deliver in practice.

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Alcohol use and risk of work injuries among health care workers: a pilot study

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Introduction: Alcohol use accounts for 11% of all workplace injuries and alcohol-related absenteeism amounts to \$2 billion/year. Literature is lacking of information on potential association between occupational injuries among health care workers and alcohol use. This study aims to conduct a pilot study on alcohol induced injuries in health care workers and analyzes the use of Carbohydrate-Deficient Transferrin (CDT) in health surveillance programs in occupational settings.

Materials and Methods: A retrospective study was conducted in a large Local Health Unit in Italy. The sample consisted in 75 cases defined as workers who sustained an occupational injury. We analyzed serum ALT, AST, γ GT, MCV and CDT levels. CDT refers to a temporary alteration in the glycosylation pattern of transferrin that occurs in sustained heavy alcohol consumption (50–80 g of alcohol/day for at least 2 weeks).

Results: As for the type of occupational injury, biological injuries 36% are the most common ones, followed by slipping and falls 33%, commuting accidents 15%, musculoskeletal injuries caused by

manual handling 9% and verbal/physical aggressions 7%. Globally the majority of samples had low or medium CDT levels but no one was positive (cut-off value equal to 2%); no gender difference was detected.

Conclusions: In the health care sector, alcohol plays a minor role in the occurrence of occupational injuries. The use of CDT in health surveillance protocols could play a role, such as a specific biomarker, as well as a deterrent for operators who may incur in important work sanctions.

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Hepatitis B immunization survey at fitness assessment of newly recruited hospital care workers

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Introduction: Hepatitis B virus (HBV) immunity assessment is mandatory in hospital care workers (HpCW) since HBV is preventable even after significant percutaneous exposure. Anti-HBs specific IgG antibody serum concentration (atHBsIgG), should be above 10 IU/l, a widely accepted protective cutoff. Since most of newly recruited HpCW had a 3-dose recombinant hepatitis B vaccine (rHBvac) under age 16 without any post-vac control, we've conducted a atHBsIgG biohazard preventive survey.

Methods: Two year (y) survey (2020–2021) of 550 newly recruited HpCW (F:429 78%; F/M:3.5) submitted to work fitness assessment (13.1% of 4200) with blood testing that included atHBsIgG (IU/l) by CLIA immunoassay.

Results: 75 (13.6%; F:60, 34.1±11.4y; M:15, 31.6±8.2y) had aHBsIgG <10 U/l. A single rHBvac boost was administered to 39 (52.0%); a month later, 19 (48.7%) showed protective atHBsIgG but 10 (25.6%) were unresponsive and so fulfilled 3-dose rHBvac. Discussion: A high proportion of new HpCW had low HBsIgG at admission but had a swift response upon single-dose revaccination (boosting fast-responders). A few are "boosting slow-responders" (after 2nd/3rd dose) and some remain "non-responders", candidates for rHBvac+adjuvant.

Conclusion: Screening of atHBsIgG is mandatory since percutaneous HBV infection risk (correlated to HBeAg+/HBv-load) implies that lower-than-protective atHBsIgG could impair an effective immediate response to a sudden incidental circulatory viral load.

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Enhanced personal protective equipment can cause acute kidney injury in health care workers during COVID-19 pandemics

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Introduction: Enhanced personal protective equipment (PPE) can expose health care workers (HCWs) to high heat stress and dehydration. The objective of this study was to assess the risk of acute kidney injury (AKI) among HCWs during the pandemic.

Material and Methods: We recruited 52 HCWs worked on the mobile COVID-19 screening bus in the summer of 2021. We

measured the body water content, pulse, core body temperature, blood pressure, creatinine, and urinary analysis before and after the work shift. We obtained the amount of water intake, environmental and personal measurements of temperature, humidity, and heat stress index during the work shift. Physicians interviewed the study subjects to confirm their medical history. Paired sample t-tests were used to test the pre and post-measurements.

Results and Conclusions: After excluding 18 subjects who did not wear PPE in the pilot study, 34 HCWs were used in the analyses (male: 11.8%; female: 88.2 %). Most of them were nurses, with a mean age of 30.53 years old (SD 6.82). After a work shift, 14.7% of the subjects had incident AKI (1.5 times reference value or increase ≥ 0.3 mg/dl). Core body temperature increased 0.27 degree (95% confidence interval [CI]: 0.16 to 0.38), creatinine level increased 0.161 mg/dl (95% CI: 0.11 to 0.22, $p < 0.001$). The estimated glomerular filtration rate (eGFR) showed a significant decline in renal function (-16.82 ml/min/1.73m², 95% CI: -22.47 to -11.17, $p < 0.001$). There was a protective effect of hydration ($p = 0.09$). In conclusion, wearing enhanced PPE can cause kidney injuries. There is an urgent need to develop regulations to prevent AKI among HCWs.

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Enhance the resilience of health care workers through the clear procedures for adverse events management, and psychological support: Croatian experience

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Introduction. Occupational stress is an important factor affecting health. Difficult working conditions, unexpected situations, and emotional engagement are psychological strains of healthcare workers. Adverse event (AV) is unintended harm to the patient caused by medical management rather than by the underlying disease or condition of the patient. Resilience after AVs is one's capacity to cope with those stressors. We present a Croatia case study in this paper.

Material and Methods. This study will cover the regulations and quality standards related to adverse events, register of adverse events in University Hospital Centre Zagreb (UHC Zagreb) and survey for healthcare workers.

Results. In Croatia, the law on quality of healthcare requires management of adverse events. Within the documentation of the quality management system in hospital, there is a procedure on the adverse events management (AEs), which clearly defines how to report AEs. Department for quality created a register for AEs and collect the data. Commission on quality of UHC Zagreb discusses AVs and preventive measures. Every year Department for quality research stress at work in a hospital. Employees give high marks to their clear role at work. During the COVID 19 pandemic, significantly more employees stated that they needed psychological support due to emotionally demanding work. A te for psychological support starts to work for all employees at the beginning of the pandemic. At the international level, UHC Zagreb is part of the European researchers' network working on second victims (ERNST), which is important for future activities to increase employee.

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A multilevel approach to individual and organizational predictors of stress and fatigue among healthcare workers of Paris university hospitals: A longitudinal analysis from the STRIPPS survey

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Background: Healthcare workers are at high risk of experiencing stress and fatigue due to the demands of their work within hospitals. Improving their physical and mental health, thus the quality and safety of care, requires considering factors at both individual and organizational levels. Our objective was to identify the predictors of stress and fatigue in healthcare workers in several wards from Paris university hospitals using a 1-year follow-up.

Material and Methods: Multicenter prospective cohort study. Participants were drawn at random from 32 hospital wards in Paris. Perceived stress and fatigue levels were assessed with the PSS-10 and the Pichot scale respectively, every 4 months at T0, T1, T2 and T3. A 3-level longitudinal analysis was performed accounting for repeated measures (level 1) across participants (level 2) nested within wards (level 3).

Results: 730 healthcare workers were included (nurses=52.6%; auxiliary nurses=41.1%; physicians=4.8%; midwives=1.5%). Across time, stress remained stable whereas fatigue showed an increasing trend ($p = 0.02$). Best individual-level predictors to explain perceived stress and fatigue were work overinvestment, presenteeism, lack of hierarchical support, low perception of safety culture, professional status and the best ward-level predictors were medical specialty and lower number of beds of the ward.

Conclusions: Our results may help identify at-risk healthcare workers and wards, where interventions to reduce stress and fatigue could be focused. These interventions could include manager training to favor better staff support and overall safety culture in healthcare.

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The need for strengthening occupational safety and health management approach for healthcare workers in Indonesia primary healthcare centers: Lesson from COVID-19

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Introduction: The COVID-19 pandemic has an impact on all people in the world, but burdens more on health workers as frontliners

who are directly involved in handling and tackling the pandemic. It is known that a total of 2032 health workers died from being infected with COVID-19 during the pandemic, both health workers who served in hospitals and primary healthcare centers in Indonesia. This calls for a need to strengthen the occupational safety and health management system for health workers in Indonesia.

Materials and Methods: A qualitative study was conducted through the focus group discussion method on 18 heads of primary healthcare centers and 18 laboratory workers in Yogyakarta who were selected purposely.

Results: There are two important points found in this study. First, although the need for supporting facilities and infrastructure for health workers such as personal protective equipment and personal hygiene facilities is ideally met, most health workers stated that they had experience of being infected with COVID-19 at least 2 times during the pandemic. Second, in addition to the impact on physical health, the mental health of health workers is an important issue that is expected to be paid more attention to in a pandemic situation.

Conclusions: Occupational safety and health regulations for health workers at the primary healthcare centers have not been optimally enforced. Improvements in preventive management related to occupational safety and health aspects for health workers at the primary healthcare centers need to be carried out immediately.

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Health Care Workers' Compliance with Glove Use: study in Croatia

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Introduction: Natural rubber latex is commonly used in health care for medical gloves. The use of powder latex gloves has been banned in many countries due to the risk of developing adverse effects exposed to them. Latex gloves with powder are used on a daily basis in Croatian hospitals.

Material and Methods: This study was approved by the Ethics Committee of the University of Zagreb School of Medicine. The Participants were healthcare workers who work in hospitals and use latex gloves every day. self - reported questionnaire was used for latex allergy screening and the participants could report all the skin problems related to the use of latex gloves. Data were collected in May 2018.

Results: In the study participated 455 healthcare workers. Of all participants, after latex glove use, half of them had symptoms of hand dermatitis and 18 % reported urticaria. Contact dermatitis develops more significantly in the participants who wear gloves more than 5 hours a day ($P=0.001$). Most of the participants who suffered from hand dermatitis related to latex didn't have any symptoms when they were on holiday or sick leave. Participants with symptoms of contact dermatitis associated with wearing gloves are more likely to develop an allergic reaction. They have urticarial when they are in contact with elastic straps ($P=0.00$), blowing balloons ($P=0.03$), using condoms, diaphragms, and other sexual aids ($P=0.00$).

Conclusion: Awareness of latex products and powdered latex gloves as an occupational hazard is important, as well as continuing education about latex and raising awareness about latex allergy in everyday life.

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Effectiveness of BNT162b2 COVID-19 vaccine among healthcare workers of a large hospital, Milan, Italy

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Introduction: Registration studies have shown high efficacy of BNT162b2 mRNA COVID-19 vaccine. We evaluated vaccine effectiveness (VE) of BNT162b2 mRNA COVID-19 vaccine in a cohort of healthcare workers (HCWs) of a large hospital in Milan, Lombardy, Italy.

Material and Methods: Follow-up started on 27 December 2020 (beginning of the vaccination campaign). HCWs without history of SARS-CoV-2 infection before the start date and with at least a nasopharyngeal test afterwards were included. Vaccination was treated as a time-dependent variable. For selected periods after vaccination we calculated incidence rate ratios (IRR) and 95% confidence intervals (CI) of infection with a Poisson regression model adjusted for gender, age, occupation, and 30-day periods, and then VE as $(1 - IRR) \times 100$ using unvaccinated person-time as reference. Databases were closed on 27 September 2021. The study was approved by the hospital's ethics committee (Milano Area 2, Prot. No. 828_2021bis).

Results and Conclusions: We included 3,809 HCWs, 131 still unvaccinated and 3,678 vaccinated (3,576 with two doses). We identified 134 infections (62% symptomatic). Adjusted VE was 77% (CI: 43-91) from day 14 after the first vaccine dose and 87% (CI: 79-92) at least 7 days after the second dose. After full vaccination schedule VE was 89% (CI: 82-94) for symptomatic and 77% (CI: 45-90) for asymptomatic infections. In conclusion, we found high effectiveness of BNT162b2 vaccine in reducing incidence of both symptomatic and asymptomatic infections. The follow-up is continuing to assess long-term effectiveness, also considering emerging SARS-CoV-2 variants.

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What are the most prevalent occupational health conditions among physical therapists? A systematic review

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Introduction: The objective of this systematic review was to investigate the prevalence and incidence of health conditions related to the work of physiotherapists.

Material and Methods: Systematic searches were conducted in MEDLINE, EMBASE, CINAHL, PSYCINFO, LILACS, SciELO and NIOSHTIC-2 from inception to October 2020. Observational studies including occupational health of physiotherapists that clearly describe the rates and frequency distribution (incidence and prevalence) of these aspects were eligible. The primary outcomes assessed were signs and symptoms and/or occupational diseases in physical therapists. Two reviewers rated the risk of bias and the overall quality of evidence using GRADE tool for observational studies. Due to the heterogeneity of the data, the results were presented through descriptive analysis.

Results: A total of 68 studies were included with 20,656 participants. Of these, 57 studies reported work-related musculoskeletal disorders (24 low back pain), 06 studies burnout syndrome and 05 other symptoms and diseases. The overall prevalence of signs and symptoms and/or occupational diseases ranged from 7% to 96%. Musculoskeletal disorders in multiple body region had the highest prevalence from 21% to 96%. Low back pain was the most prevalent among musculoskeletal diseases ranged from 14% to 90%. Burnout syndrome was reported the highest prevalence among other occupational diseases from 7.6% to 54.2%.

Conclusions: The most prevalent occupational health impairment among physical therapists was musculoskeletal diseases.

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Impact of occupational constraints on the quality of life of caregivers

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Introduction: Nursing staff are exposed to an unfavorable work environment that includes, among other things, high psychological demands, poor interpersonal relationships and understaffing. The purpose of this work was to study the impact of professional constraints on the quality of life of caregivers.

Methodology: We conducted a cross-sectional study with 131 care staff of the district hospitals of Mahdia governorate in Tunisia over a period of 03 months. The collection of data was based on a previously completed survey form including socio-professional characteristics of participants. The quality of life was assessed in its mental and physical dimensions by the SF12 scale.

Results: Our population was predominantly female with a sex ratio of 0.59 and an average age of 41 years. Mental quality of life was impaired in 48% of health care workers with a mental health score <50. This alteration was significantly correlated with gender, age, job tenure and frequent interruption of care tasks. The physical component of quality of life was impaired in 61.8% of health care workers and statistically influenced by gender and poor team relationships.

Conclusion: The preservation of nursing health in the face of a work environment that seems to be pathogenic therefore appears to be a necessity. An ergonomic intervention on the environments and the work organization of nurses must be expected.

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Job satisfaction among doctors in Morocco

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Introduction: Job satisfaction is one of the important variables in work and organizational psychology and is regarded as an indicator of working life quality. Various studies have been performed worldwide on healthcare workers' job satisfaction but none have investigated this topic in Morocco. The aim of this study is to determine the level of job satisfaction among doctors in Morocco.

Material and methods: This study was conducted using a French version of the job satisfaction survey developed by Paul E. Spector. The survey was conducted during an occupational health course held in the Faculty of Medicine of Casablanca.

Results: In our sample of 135, only 111 questionnaires were usable. The responses indicated an average level of satisfaction of 126,72 (possible range from 36 to 216). Half of the participants (50,45%) were dissatisfied within their working environment and only 4,5% were satisfied. Items like "nature of work" and "co-workers" showed high levels of satisfaction (61,26% and 48,65%) compared to "operating conditions", "pay", "promotion" and "fringe benefits" (10,81%, 8,11%, 7,21%, 4,5%). Job satisfaction scores showed a statistically significant difference according to gender for the fringe benefits facet (p=0,039). No difference was found between male and female doctors for the overall satisfaction.

Conclusion: Our study revealed that Moroccan doctors have low satisfaction levels regarding their working environments. More healthcare investments and fairer salaries must be implemented, as good health is paramount for a stable society and public health is the result of the work of our hardworking doctor.

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Study of the effects of alternating shift work on the health of health care workers at Treichville University Hospital (IVORY COAST)

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Introduction: Alternate shift work has deleterious effects on the health of health care workers. It is a major occupational health problem.

Materials and Methods: A descriptive and analytical cross-sectional study of health care workers who work alternating shifts in a university hospital in Abidjan was conducted over a five-month period. Socio-professional characteristics and medical data were collected using a questionnaire. Sleep quality was assessed using the EPWORTH sleepiness scale.

Results: The study of the socio-professional characteristics of the workers subjected to alternating work schedules revealed a majority male population (55.82%) with an average age of 25.75 years 17.02 and a predominant age group of less than 45 years (78.64%). Half of the workers had less than five years of professional experience (50%). The majority of the workers had a 24-hour shift. More than half of the staff (63.59%) had moderate daytime sleepiness. The analytical study showed statistically significant associations between work on alternate hours and the occurrence of hypertension ($p=0.038$), hypercholesterolemia ($p=0.009$), diabetes ($p=0.024$), UGD ($p=0.013$), spinal MSD ($p=0.004$), sleep disorders ($p<0.0001$). In the female population, there was a statistically significant association between alternate shift work and the occurrence of spontaneous abortion ($p=0.018$) and the threat of preterm delivery ($p=0.001$). Conclusion: Shift work has effects on the health of workers. They should be subject to special medical surveillance.

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The "Healthwise" Approach In Togo, From Pilot Centers To The National Strategy For The Promotion Of Safety And Health At Work For Health Workers (2016-2021)

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Introduction: In the majority of African countries and particularly in Togo, the safety and health conditions in their workplaces in the health sector are insufficient. Since 2016, the HealthWISE-WHO/ILO approach has been an effective tool for promoting occupational safety and health (OSH) in experimentation in the health sector in Togo. The objective of this analysis is to highlight the first positive impacts of this approach.

Materials and Methods: Analysis of the reports of the Health Centres Pilot Health Centres project by the HealthWISE-ILO/WHO approach and the implementation documents of the OSH Strategic Plan for Health Workers in Togo

Results: The promotion of the improvement of occupational safety and health through the HealthWISE approach in the thirteen (13) pilot health centres had led to a clear advance in the field. Indeed, of the thirteen pilot centres, eight (8) had carried out a summary assessment of occupational risks and all the centres appointed HealthWISE focal points. Ten (10) health centres were able to carry out improvement action plans. Improvement actions are illustrated by improvements made in maternity wards, offices and intensive care units in some hospitals. Since 2020, the achievements of the implementation of the HealthWISE action plans have enabled a rapid response by integrating the strategy into the national response to the emergency response to the covid-19 pandemic with a view to protecting health workers.

Conclusion : the ILO/WHO HealthWISE approach and the implementation of the national strategy have led to a significant improvement in OSH in the health sector in Togo.

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The impact of the COVID-19 pandemic in the Influenza vaccination coverage of healthcare workers in a portuguese general hospital: a 9-year study comparison

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Introduction: Influenza seasonal infection claims half a million lives in the world every year due to complications. The most effective tool to prevent the seasonal flu infection is with an annual Influenza vaccine. Healthcare workers (HCW) are part of a high-risk occupational category, since they contact directly with flu patients, therefore the vaccination of these workers is paramount. After the breakout of the novel coronavirus disease (COVID-19), the prevention of the viral respiratory infections resurfaced to the public attention, including to HCW. The aim of this study is to evaluate the Influenza vaccination coverage of HCW in a general hospital located in Portugal (Centro Hospitalar do Baixo Vouga, Aveiro), in a 9-year timeframe.

Material and Methods: This study determined the percentage of our hospital HCW who received the Influenza vaccine by our Occupational Health and Work Medicine Service, from 2012 to 2020.

Results and Conclusions: Data shows a record-high vaccination coverage in 2020, the same year which the COVID-19 pandemic reached Portugal. Comparing to the previous year, data shows a 30% increase in the percentage of vaccinated HCW from all types (48,5% vs 37,4%). In comparison to 2019, the percentage of vaccinated nurse practitioners increased 24% (44,9% vs 36,1%) and the percentage of vaccinated physicians increased 46% (64,0% vs 43,9%). Although is not possible to assume causality, this study suggests a correlation between the breakout of the COVID-19 pandemic and the increase in HCW Influenza vaccination coverage of this hospital.

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Work ability in Post-acute COVID-19 syndrome: one-month follow-up after Hospital discharge

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Introduction: Preliminary data suggest that about 10% of patients who have been tested positive for SARS-CoV2, remain unwell beyond three weeks. Little is known about work ability of COVID-19 survivors (C19W) after their discharge from the hospital.

Material and Methods: Sixty C19W (41M; age 53±9 yrs) admitted to Humanitas Research Hospital during the 2nd and 3rd out-breaks in Italy were consecutively enrolled at the time of hospital discharge (T0). Work Ability (WA) was assessed by the Work Ability Index (WAI) questionnaire after one month (T1) from hospital discharge. At T0, C19W were asked to retrospectively complete an additional questionnaire to assess their WA before COVID19 (PRE). The WAI score accounting for seven domains, ranges from 0 to 49 and provides a stratification in four WA categories. In the present study, we assessed the total WAI score at PRE and T1, in 33 C19W. Data are expressed as mean±DS. The present study was approved by the Internal Review Board (#2742/2020).

Results and conclusion: At PRE the WAI total score was 41.9±5.7 corresponding to “good category work ability” while at T1 was significantly lower (35.6±5.6; p<0.0001) corresponding to “medium category work ability”. Similar changes were observed in the WA domains except in the one exploring the “Prognosis of WA 2 years from now”. These results indicated that after one month from hospital discharge, the WAI of C19Ws survivors was still significantly reduced, thus suggesting the need for a whole-patient perspective clinical management including interventions to promote an appropriate return to work.

19. OCCUPATIONAL HEALTH IN THE CHEMICAL INDUSTRY 423

Before and After Study to Reduce Chemical Exposure and Noise Level Exposure through CASHE (Change Agents for Safety, Health & Environment) Program at large Scale Petrochemical Industry

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Introduction: Reliance Industries Limited (RIL), Hazira manufacturing division is large scale petrochemical manufacturing plant, producing wide range of polymers, and range of petrochemicals. To inculcate best practices in the field of occupational health and safety, an innovative idea was introduced in 2003 i.e., “CASHE” (Change Agent for Safety, Health & Environment).

Methods: In walk-through survey by a team comprising of members from Process, Safety and Occupational Health, a particular location having concurrent OH and Safety Hazards were identified, and quantitative assessment was done for Heat stress, Noise, Ergonomic issues, and chemical exposure monitoring. Similar parameters were studied post introduction of CASHE/ In first phase, comparison of our results with ACGIH guidelines gave us a clear picture of the existing occupational health hazard. In second phase, control measures were suggested, implemented and re monitoring was done.

Results: Before implementation of controls in the identified area, the noise exposure level was 90 dB and Emission of acetic acid vapor was as high as 1000 ppm. After implementing the best control measure of relocation by different design, there was significant reduction in noise exposure level by 15 dB and reduction in Emission level to 0 ppm.

Conclusion: CASHE program is back bone of Occupational Health improvements and reduction in OH Hazards. Control measures as implemented under CASHE program led to safer workplaces and

enhances workers safety. This promotes and exhibits the culture of considering Occupational Health & Safety of an employee over production target.

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Respirable pet coke dust exposure reduction at Crusher Unit, Gasification complex through effective control methods

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Aim and Objective: To reduce exposure of pet coke dust and its health hazards to the workers.

Methods: To access exposure, airborne exposure measurement (breathing zone samples) of respirable particulates (< 4 microns) was collected for identified workers. The airborne contaminants were measured near to the breathing zone with approved method NIOSH 0600 to detect the Petcoke (Respirable) dust. The dust was collected using personal sampler (Make-SKC, Model-Air Check 2000 & 5000) at a flow rate 2.5 Lpm for the duration of 7-8 hours. Total 6 personal breathing zone samples were collected and found above the TLVs.

Intervention: After Qualitative and quantitative survey, meeting with all stakeholders conducted. Control measures (Water fogging, close cabins for operators, appropriate PPEs) identified according to hierarchy of controls

Results: In baseline survey, Total six samples were found above the occupational exposure limit recommended by ACGIH. The exposure limit was compared with Anthracite coal dust due to similar property structure of petroleum coke. After implementation of control measures, again six samples were collected and exposure was found within limits.

Conclusions: Effective control measures implementation and awareness for hazards control and PPEs helps in reduction of pet-coke dust exposure to the workers. This will ultimately help to maintain workforce healthy.

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Research on Adverse Outcome Pathway (AOP) Development For chemical-induced and life factor-induced liver Disease

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The liver is major organ that metabolizes chemicals in the body, and exposure of workers to chemicals increases the prevalence of liver disease. Conventional method such as serum chemistry and hematology cannot differentiate between chemical-induced liver disease (CILD) and life factor-induced liver disease (LILD) early. However, Adverse Outcome Pathway (AOP) which is a new framework that use molecular indicator for chemical hazard assessment and regulation distinguish them on molecular level. Therefore, in this study, we built CILD and LILD AOPs and contribute to occupational disease prevention by confirming through what mechanism chemical substances affect LILD. CILD and drug-induced liver disease (DILD) AOPs were collected through AOP Wiki, and other LILD AOPs were accumulated by scientific paper survey. Also, networks of CILD and LILD AOPs

were constructed by shared key events (KEs) between them. On the basis of re-categorization of liver disease, 11 CLD and 11 DILD AOPs were secured. Other LILD AOPs; 9 alcoholic, 22 non-alcoholic, 13 virus and 6 miscellaneous liver disease AOPs confirmed. Networks of CLD and LILD AOPs were connected by shared KEs of activation of Cyp 2E1, oxidative stress, mitochondrial dysfunction inhibition of mitochondrial fatty acid beta-oxidation, up regulation of CD36 and SCD-1, activation or inhibition of PPAR α and activation of PPAR α/γ , ChREBP or SREBP, and LXR α . By these results, we suggest the possibility of effect of chemicals on LILD by shared KEs between CLD and LILD AOPs. Therefore, workers with LILD can be affected by chemicals and needs to protect them from exposure of chemicals.

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Project Report On Prevalence Of Hypertension And Diabetes In An Urea Fertilizer Industry

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In modern era, non communicable diseases like hypertension and diabetes are health problems of concern because of considerable rise in prevalence of these diseases globally. This study was done to explore prevalence of hypertension & diabetes & their relation to confounding factors like age, gender, tobacco habits & body mass index. The study was done in a fertilizer industry situated at Uttar Pradesh state in India. The study covered 779 employees of this factory. The study used secondary data available in hospital management system usually collected as a part of periodical medical examination of employees of IFFCO. The data was analyzed using descriptive statistics & chi-square test was performed. Data available was basic demographic data, history of tobacco habits, body mass index, known hypertension, known diabetes & department wise details in Microsoft Excel-2007. The study shows prevalence of hypertension 25.67% & diabetes 12.83%. The prevalence of both the diseases in this study setting was found to be more than the national average (17–40% hypertension, 8% diabetes). Another major concern was large population at risk in IFFCO AONLA Unit who had one or more confounding factors (e.g. age, tobacco habits, overweight) which would contribute to development of hypertension and/or diabetes in future. Hence the study concludes that preventive measure e.g. awareness campaigns for all employees as well as periodic screening and follow up of those diagnosed with such diseases should be integrated by management. Since health & work productivity are co related, such measures will reduce employee absenteeism and improve productivity.

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Debris from carbon fiber reinforced plastics in an occupational setting

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Introduction: Carbon fiber reinforced plastics (CFRP) is a leading functional material with superior strength and low mass density compared to metal. Recently, due to its excellent property, it has spread to a wide range of fields from sporting goods, such as golf clubs and fishing rods, to aerospace products. However, debris (microparticle) is easily released in the processing process of CFRP. The present study investigated the ambient level, size, and shape of particles generated from CFRP during various machining processes in an occupational setting.

Material and Methods: The particles in the working environment were monitored with real-time monitoring devices. The size and shape of particles were observed using scanning electron microscopy (SEM) and their chemical compositions were also analyzed using energy dispersive spectroscopy.

Results: Measurement by real-time monitoring devices showed that the microparticles containing nanoparticles were released in the processing process of CFRP. The majority of debris from CFRP observed by SEM was cylindrical with a diameter comparable to the diameter of the original carbon fiber, suggesting transversally split carbon fiber. However, some of the debris was fibrous with high aspect ratio of 3 or above, diameter less than 3 μm and length of 5 μm or above, suggesting longitudinally split carbon fiber.

Conclusions: Our findings indicate the potential hazard of debris from CFRP in the processing process of CFRP in occupational settings and risk assessment is needed for safe handling of CFRP.

20. OCCUPATIONAL HEALTH IN THE CONSTRUCTION INDUSTRY

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Protection against solar ultraviolet radiation in outdoor construction workers in The Netherlands: a feasibility study

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Introduction: Non-melanoma skin cancer (NMSC) incidence is increasing, and outdoor workers (OW) have an excess risk of NMSC showing up to threefold increase. Reducing the risk of NMSC is possible if appropriate measures are taken. However, sun-safety behavior in outdoor workers is poor. In this study we investigated an intervention aiming at increasing sunscreen use by construction workers, and if stratum corneum (SC) biomarkers show differences in UV-exposure between indoor and outdoor workers.

Material and Methods: A feasibility study was performed in construction workers in the Netherlands from May-August 2021. Dispensers with sunscreen (SPF 50+) were installed at the worksite. Sun safety behavior was measured using questionnaires. SC

samples were collected from indoor and outdoor workers, for the measurement of UV-biomarkers.

Results: Preliminary results from the questionnaires revealed that 40% of OW used sunscreen during worktime, where 17% of OW never thought of using it. A majority of OW never uses sunscreen on a daily basis. Knowledge about sun exposure and risks are well known. However, only half of the OW thinks it is important to use sunscreen during worktime. Immunological markers such as IL-1 α , IL-18, IL-8 and IL-1RA showed higher levels in OW. Overall, UV-biomarkers showed higher levels for sun-exposed body parts compared to non-exposed parts in both groups.

Conclusions: Sunscreen use in this study is not optimal among outdoor construction workers, however they are aware of the risks of sun exposure and its consequences. Levels of UV-biomarkers suggest chronic UV exposure in OW.

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The Relationship Between Occupational Noise Exposure and Noise Induced Hearing Loss in A Power Plant Construction Site in Mpumalanga, South Africa

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Introduction: The prevalence of noise-induced hearing loss has been well studied in both developed and developing countries and it is understood that developing countries such as South Africa have more challenges and a higher burden of the disease than developed countries. Construction is one of the sectors in which have a high prevalence of noise-induced hearing loss (NIHL).

Methods: A cross-sectional study involving 299 randomly selected construction workers was conducted. Structured questionnaires which included questions on exposure to occupational noise and other selected risk factors were distributed to study participants. Audiogram records to obtain information about the outcome (NIHL) were reviewed. Data analyses were performed using SPSS Version 26 software. Logistic regression was used to examine relationships between risk factors associated with NIHL.

Results: Out of a total of 299 study participants; 32.78% (n=96) of the study participants, had NIHL. Participants who worked as general labourers compared to those in engineering were less likely to develop NIHL, Adjusted odds ratio AOR 0.24, 95% CI (0.07– 0.80), and other occupations compared more likely to develop NIHL, AOR 2.92, 95% CI (1.05– 8.09). Those exposed to medium and high noise levels were more likely to develop NIHL, AOR 7.88, 95% CI (0.91 -68.43) and AOR 12.69, 95% CI (1.39 -115.94), respectively. Exposure to chemicals was significantly associated less with NIHL, AOR 0.40, 95% CI (0.16 -0.99). Conclusion: Exposure to occupational noise, occupation and exposure to chemicals were moderately associated with noise-induced hearing loss.

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Electromyographic Effect Of An Isometric Strength Training Program For The Scapular Waist And Upper Limbs In Construction Workers

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Objective: To compare the electrophysiological and strength effect (RM1 as a sustained body gesture over time) of an exercise program based on the development of strength with isometric muscular gestures of the shoulder girdle and upper limb in a group of construction workers with the in order to evaluate its impact on the health condition and control of biomechanical risk factors.

Results: Materials and Methods: Work activities have workloads similar to those of sports activity, due to their energy consumption (maximum oxygen consumption). Construction work is heavy work, comparable to a soccer game (1-2). Unlike athletes, workers do not undergo training to practice this profession, which is why they have a high prevalence and incidence of musculoskeletal injuries, mainly in the shoulder, according to the Professional Risk Fund of Mintrabajo-Col (3). The problem raised is managed by the state through the regulation of special prevention programs according to Law 50 of 1990 and Law 1355 of 2009 (3), however the impact of these is not evident, while strength-based training techniques to high-performance athletes (tennis players and basketball players) (4), present a significant reduction, in itself the rehabilitation techniques have been using isometric strength work successfully. Taking into account the above, a strength intervention program for the shoulder based on isometric exercises was proposed to stabilize the joint and its effect was measured by increasing the RM1 and on the recruitment of UM motor units with the platform supplied by mDurance for electromyography of surface.

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Application of safety observations as a tool for reducing incident potential – A case study

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Introduction: Leading indicators such as safety observations pivotal in preventing workplace incidents, injuries, & illness. Safety observations, a combination of safe and unsafe acts or conditions at the workplace, helps the management in establishing preventive strategies. Safety observations commensurate with level of risk involved, facilitates prioritization of efforts for risk mitigation and ensure safer work environment. From the concept of accident pyramid, focusing on at risk-behaviors can have a significant impact on reduction of incident potential. Majority of organizations approach this leading indicator with focus on high-risk observations, analysis of past incidents at a large construction company highlighted the need for paying attention to low and medium severity observations as they contributed to majority of recent incidents.

Materials & Methods: To achieve this objective of systematic change and the desired outcomes, various initiatives are taken across the company such as enhanced capturing of safety observations using digital tools with clear focus on low and medium observations, frequent reviews by leadership team, and reward/reprimanding employees to influence the behavioral aspects.

Results and Conclusion: While overall observations have increase have shown increasing trend, high potential observations

percentage got reduced from 10% in 2020 to 3% till July 2021. Implementation of appropriate safety measures, involvement of leadership and execution staff and increased awareness level has helped in curtailing the high potential observations and the reduction in incident frequency rate across the company.

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Association of smoking and cessation with airflow obstruction in silicosis workers: a cohort study from 1981 to 2019

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Introduction: Silicosis is an occupational lung disease with progressive fibrosis of lung tissues and irreversible decline of lung function. Workers with silicosis had high smoking rate, while chronic smokers were associated with poor lung function. However, little was known about effects of smoking and cessation in silicosis. The aim of this study was to evaluate the association of smoking and cessation with airflow obstruction (AO) in a cohort of workers with silicosis.

Material and Methods: Workers diagnosed as silicosis at the Pneumoconiosis Clinic of Hong Kong during 1981–2019 were recruited in our study. Spirometry test points were: 1) at the diagnosis of silicosis, 2) after 2–25 years of follow-up. Clinical data and smoking status were collected at the spirometry test. AO was defined as FEV1/FVC ratio less than lower limit of normal. The association of smoking / cessation with AO at baseline and during follow-up was assessed using multiple logistic regression analysis.

Results and Conclusions: Of the 4223 participants included in the study, 1927 were current smokers and 1797 were former smokers. The prevalence of AO was 37.3%. Smokers had increased risk of AO than non-smokers (current smoker: OR = 1.80, 95% CI 1.43–2.27; former smoker: OR = 1.87, 95% CI 1.49–2.36). However, after adjusted for baseline lung function, the risk of AO in former smokers was not significantly different from that in never smokers (OR = 1.25, 95% CI 0.90–1.74). These findings raised the awareness of “cessation due to illness” and highlight the urgency of smoking cessation promotion in silicotic workers.

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Occupational injuries and fatalities among workers in the construction sector during 2012–2017 in Thailand

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Introduction: Most of construction workers work at heights with equipment and building materials, these scenarios are potentially dangerous working conditions. This descriptive study aimed to explore the prevalence and causes of occupational injuries and fatalities among the construction sector during 2012–2017 in Thailand.

Material and Methods: Data derived from the Workers' Compensation Fund database during 2012–2017. Descriptive statistics were used to analyze data with spread sheets.

Results and Conclusions: The occupational injuries rate per 1,000 workers were 26.1, 23.0, 21.5, 20.7, 18.7 and 16.0 and the fatalities rate were 0.23, 0.18, 0.23, 0.21, 0.26 and 0.25 for the year 2012–2017, respectively. The ratio of occupational injuries rate and fatalities rate among construction sector to other sectors were 2.0:1.0 and 3.8: 1.0, respectively. In 2017, the number of occupational injuries and fatalities cases in the construction sector contributed 10.4 % and 24.4% of such cases in all sectors. The major cause of injuries was materials or objects collapsed or felt on top (21.4%) while the major cause of fatalities was vehicle accident (31.6%). This study concluded that the occupational injuries and fatalities rate in construction sector were higher than those of rate in other sectors. The trend of occupational injuries rate decreased during the 6 year of study but the fatalities rate still fluctuated. Therefore the preventive strategies and measures should address on construction manufacturers especially where they had severe occupational injuries cases.

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Predictors of elevated stress in workers in the stone benchtop industry

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Introduction: Artificial stone benchtops are a popular kitchen product, but dust from their preparation and installation contains respirable crystalline silica, which causes silicosis. Silicosis is a preventable, permanent lung disease. The aim of this study was to assess mental health in workers from the stone benchtop industry at risk of silicosis.

Material and Methods: Workers from the stone benchtop industry undergoing assessment for silica-associated disease were included. Demographics, occupational, medical and smoking history, Modified Medical Research Council (MMRC) dyspnoea scale, Perceived Stress Scale (PSS-10) questionnaire, spirometry and chest x-ray were collected. Univariate and multivariate regression analyses were conducted.

Results: Of the 547 participants, the majority were men, aged under 45 years, in the industry less than 10 years. With each increase of dyspnoea score, PSS-10 scores increased. Higher PSS-10 scores were also observed in those no longer in the industry, with a history of anxiety or depression, attending assessment early in the program, and a medium exposure duration. Participants who used an interpreter reported lower stress. No difference was observed across job title, age, gender, smoking, spirometry or chest x-ray categories after multivariate analysis.

Conclusion: This study identified workers with dyspnoea as likely to report higher stress. Other factors, such as leaving the industry, early attendance, and a history of anxiety or depression are also helpful in identifying workers at-risk of poorer mental health outcomes.

21. OCCUPATIONAL HEALTH NURSING

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Examination of the whole person approach for improving the emergency response skills of occupational health nurses

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Objectives: This study aimed to reveal the details of the four aspects proposed by the Korn Ferry assessment model to develop an evaluation index for assessing the emergency response skills of occupational health nurses (OHNs).

Methods: The study was designed as a qualitative descriptive study employing a group interview technique. Study collaborators were selected by snowball sampling from among OHNs with experience in emergency response at the workplace. A group of five OHNs were interviewed, and data was recorded using a digital voice recorder. **Results:** The extracted traits were the big five personality traits: "openness," "conscientiousness," "extroversion," "agreeableness," and "neuroticism." The extracted drivers were "participation in academic conferences/seminars," "passage of time from clinical experiences," "role models/aspirations," and "news of occupational hazards." The extracted competencies were "determination of life-threatening conditions and emergency care," "prevention of emergencies/preventive activities for containment," and "ethics and professionalism in emergencies," and the extracted experiences were "clinical experiences," "training," and "manuals."

Conclusions: The Korn Ferry assessment model is a framework that visualizes congenital elements (traits and drivers) and acquired elements (competencies and experiences), thereby uncovering latent abilities of subjects. By scrutinizing the results of this study, we aimed to establish a reference for developing an evaluation index for the emergency response skills of OHNs.

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Perceptions Of Frontline Service Providers On The Accreditation Of Occupational Health Services In South Africa

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INTRODUCTION: Globalisation and the changing nature of work require the provision of quality occupational health services (OHS) to achieve universal occupational health coverage enunciated in the sustainable development goals. This paper draws on Lipsky's theory of "street level bureaucrats" to explore the perceptions of occupational health nurse practitioners (OHNPs) on the accreditation of OHS for quality service delivery.

METHODS: Between 2014 and 2015, a mixed methods cross-sectional study was conducted among OHNPs in South Africa. A web-based survey among OHNPs included questions on OHS accreditation, while focus group discussions (FGDs) explored their narratives on OHS, accreditation and quality. Stata®14 supported the analysis of quantitative data, while thematic analysis supported the exploration of the qualitative data.

RESULTS: The majority of OHNPs (93.8%) were of the opinion that OHS should be accredited, while 73.6% said it should be a statutory requirement with clear standards that will enhance quality. However, support is conditional on phased implementation, effective governance, a national OHS policy, stakeholder commitment and resource availability. Applying Lipsky's notion of street level bureaucrats to the FGDs suggest that OHNP could either embrace or sabotage policy initiatives.

CONCLUSION: Considering the criticality of quality OHS for all workers, the perceptions of frontline OHNs should be taken into account in the design and implementation of any accreditation system to advance quality universal occupational health coverage.

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An Interview Survey of the Difficulties Experienced by Occupational Health Nurses in Japan under the COVID-19 Pandemic

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Introduction: This study aimed to explore the difficulties faced by occupational health nurses at their workplace in Japan under COVID-19.

Materials and Methods: Data were collected by semistructured interviews of 23 occupational health nurses and analyzed using Krippendorff's method. This study was approved by the institutional review board of St. Luke's International University in 2019 (19-A081).

Results and Conclusions: The data comprised two core categories: (1) "Difficulties in shifting from working at the office to working at home under COVID-19" and (2) "Difficulties in performing daily activities as occupational health nurses". Each core category has 7 specific categories for a total of 14. These 14 specific categories had 51 subcategories. Some examples of these 14 specific categories were (1) "Difficulty in supporting workers' health when working from home", (2) "Insufficient information collected by online interview", (3) "Inadequate communication when using online interview", (4) "Dilemma of unequal company support for individuals and workplace-related health support", and (5) "Having few chances to get updated with the latest support systems and knowledge for occupational health nurses". The results revealed the difficulties of occupational health nurses when working from home under COVID-19. Moreover, occupational health nurses have faced ethical issues regarding their workplace activities. These ethical issues are correlated to the above-mentioned difficulties. This suggests the importance of correspondence by both individuals and the organization to address important ethical issues.

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Support strategies to reduce psychosocial stressors in nursing students through the COVID-19 pandemic and beyond: a mixed-methods study protocol

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Introduction: Psychological distress (PD) is prevalent among university students, especially women. Nursing students from various countries have shown prevalence of PD from 26.6% to 65.3% during the COVID-19 pandemic. In Canada, most nursing students work during their studies, increasing sources of stress and, in turn, the risk of PD. This study aims to evaluate the associations between

psychosocial stressors from academic studies and PD, school-work-life conflicts (SWLC), and the intention to quit the nursing program (ITQ) among nursing students; and, subsequently, to suggest adapted support strategies reducing psychosocial stressors from nursing studies.

Material and Methods: This study relies on a mixed-method design. First, quantitative data will be collected through a survey completed by 225 nursing students from two nursing schools in Quebec, Canada. Poisson regression model will be used to evaluate whether the stressors increase the prevalence of PD, SWLC, and ITQ. A qualitative phase will involve focus groups with nursing students, teachers, and other nursing school staff to co-construct the support strategies.

Results: First, we will identify psychosocial stressors associated to PD, SWLC, and ITQ. Then, we will elaborate support strategies in response to the problems and needs previously identified.

Conclusion: The findings will provide new insights on actions to reduce psychosocial stressors from academic studies to reduce PD, SWLC and ITQ among nursing students.

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Transitioning Ipe Curriculums From Occupational Medicine To Occupational Health

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SASOHN, Executive Committee 2021, Johannesburg, South Africa

Introduction: Applying core IPE curriculum competencies in Occupational Health for certain postgraduate programs has become more apt now than ever before in developing countries as prompted by the WHO's Framework for Action on IPE and Collaborative Practice (WHO, 2010). In addition, to the momentum of acquiring internationally on-line recognized qualifications in occupational health and/or safety.

Material and Methods: In order to clarify contemporary core competencies required by practitioners in the occupational health fields of medicine, nursing, hygiene, ergonomics, psychotherapy, physical therapy, to address managing total worker health promotion programs in the workplace for the African context, a scoping review using Arksey and O'Malley's framework (2005) for relevant articles from the last 5 years through Google Scholar, Research gate and the SAQA qualifications database, was conducted.

Results & Discussion: From 1680 articles the main themes addressed shared competencies in effective communication strategies, defining the contemporary roles and responsibilities of the disciplines involved, developing structure processes promoting shared decision-making, medico-legal practice, standardizing health assessment tools, case management skills.

Conclusion: This scoping review forms the foundation to conduct phase two, the mixed-method research into gaining support from key stakeholders in such a proposed IPE curriculum.

22. OCCUPATIONAL MEDICINE

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Using Total Worker Health® Approaches to Reduce Absenteeism and Work-Related Accidents

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Introduction: Total Worker Health® (TWH) is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with the promotion of disease prevention efforts to reach worker's well-being. This study had the objective to verify if the implementation of a program characterized by the integration of health and safety in companies, with the inclusion of the concept of TWH® promoted by an occupational health service have impacted in the management of absenteeism and work-related accidents.

Material and Methods: A retrospective and paired cohort study was performed, in which the impact of the implementation of a Program with TWH® approaches was evaluated in regard to absenteeism management and the number of work-related accidents. The data were analyzed for a period of 9 months from January to September, 2017, before the inclusion TWH® program, compared with the data collected from January to September 2018, after the implementation of the TWH® program.

Results: The results showed a 39% reduction in the number of absenteeism in 2018 (absenteeism index=1,1) compared to the same period in 2017 (absenteeism index=1.8). The data revealed a reduction of the total numbers of work-related accidents at 50%, and of the days of absence from work-related accidents at 81%, after the implementation of the TWH® program.

Conclusions: It was observed that, once the occupational health and safety sectors were approached and integrated with the application of the TWH® concepts, it was possible to reduce absenteeism and the number of work-related accidents.

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Importance of reporting occupational injuries: a four year review of hospital based injury data

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Background: Reporting of occupational injuries, accidents and near misses are the corner stone to make any workplace safer. Heinrich accident pyramid illustrates the importance of reporting and safe behavior. The best value of such a reporting system is in organizations which believe in a safety culture.

Aims: To encourage staff members to properly report incidents, accidents and injuries. Review of the last four-years of occupational injuries were analyzed and reported.

Methods: A retrospective review of all accidents and injuries reported from 2017 to 2020 was performed. Each injury was reviewed by the principal investigator. The data was then de-identified; notes were then reassessed by an independent reviewer. The de-identified data was analyzed on SPSS to provide statistical analysis.

Results: There were 171 occupational injuries reported during this period. More than 50% of the injuries were related to blood and body fluid exposure (BBFE); further analysis of the 107 BBFE identified needle stick injuries to be the most frequently reported occupational injury. The second most frequently reported cause of occupational injuries were falls, trips and slips followed by crush or impact injuries. **Conclusion:** The review of occupational injuries identified blood and body fluid exposure is to be the most common injury. The hospital reported lower number of occupational injuries

per 100 beds when compared to publish occupational injuries in healthcare industry. This could be because of a number of reasons including; good preventative measures, culture safety, retractable needles, engineering control and/or under-reporting

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Non-Communicable Disease risk factors among a cohort of mine workers in Mongolia

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Objective: Prevalence of NCD is growing among working populations globally. The World Health Organization (WHO) estimates NCD are responsible for 71% of all premature deaths. Cardiovascular disease, cancers, respiratory disease and diabetes are the four most prevalent causes of death from NCD, accounting for 80% of all recorded deaths associated with NCD. Smoking (tobacco use), physical inactivity, alcohol use and diet are all known associates with an increased risk of the development of NCD and premature death. The primary aim of this study was to provide an overview of the general health of the workforce (using a confidence interval) and to determine a baseline level of NCD risk factors. Following a critical review of the data collected, the results were also compared with a 2013 Health Impact Assessment conducted on the general population of Mongolia.

Method: 1169 employees were randomly recruited to a cross sectional study. The study focused on key risk factors of hypertension, obesity, alcohol use and smoking status. These factors are known key contributors to NCD risk.

Results: Results of the study showed prevalence's of hypertension 12.9%, obesity 64.1%, alcohol users 22.1% and smokers 38.8%. The general population prevalence's are 27.5%, 56.8%, 15.5% and 24.8% respectively.

Conclusion: The results of the studies show that both of the study cohorts require lifestyle improvements to ensure long and healthy working and post working lives. With targeted intervention strategies it is predicted that there will be measureable decreases in the public health and non-communicable disease risk factors.

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Patient satisfaction at a specialised outpatient clinic for people with work-related respiratory complaints

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Introduction: From a occupational medical point of view, it is desirable to diagnose and evaluate workplace-related respiratory complaints as early as possible. Prompt initiation of appropriate protective or therapeutic measures may ease the course. To improve the established practice, we present data on patient satisfaction as an indicator for assessing process quality of a specialised case-management.

Materials and Methods: Data were collected between July and December 2020 by paper/pencil-questionnaires, containing self-developed questions on satisfaction with organisation, information, facilities, and medical examination (positive ethics vote). 86 patients

of the specialised clinic for occupational respiratory complaints (between 2012 and 2019) send back the questionnaire (46%). Measures for reliability-analysis were calculated with R. We performed Mann-Whitney-U-Test for differences in overall-satisfaction regarding sex and examined the relationship between overall-satisfaction with age and self-rated health status via Pearson correlations.

Results: All scales reached satisfactory to very good reliability (α/ω between .72 and .95). Regarding sex, we found no differences in evaluation of over-all-satisfaction ($p=.5953$). We can state significant correlations between overall-satisfaction and age with a small, negative effect ($p<.05, r=-.27$) as well as self-rated health status with a moderate, positive effect ($p<.001, r=.36$).

Conclusions: The results indicate that increasing satisfaction with the consultation should be a goal among patients at older ages. Further investigations should focus on comparability with similar research.

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Effects of abrasive dust and metal exposure among dental technicians

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Introduction: Abrasive dust and metal fumes are associated with occupational diseases among dental technicians; however, the health effect of occupational exposure remains unknown. Herein, we aim to clarify the effects of occupational exposure to substances used in dental materials on dental workers.

Material and Methods: A cross-sectional survey was conducted including 40 dental technicians and 2 clerks from four laboratories. A questionnaire was administered to collect data on subjective symptoms involving respiratory organs, years of service, dust collector use, mask use, and types of metals used. According to the biomarkers used, participants were divided into short- and long-term groups. Further, concentrations of serum indium, serum KL-6, pulmonary surfactant protein (SP)-D, and SP-A were determined. The Ethics Committee of Showa University approved this study (approval number 2994).

Results: The ventilation equipment included a local exhaust system and ceiling-mounted suction/exhaust system. Thirty-three workers (82.5%) claimed they wore masks while working. The most common subjective symptoms were sneezing, stuffy nose, and itchy skin. Approximately 80% of workers used gold and silver as dental materials. The long-term group had significantly higher SP-A concentrations and a higher number of workers with KL-6 concentrations above the reference value.

Conclusion: The finding that some subjects in the long-term group had serum KL-6 and SP-A concentrations above the reference value suggests an increased risk for interstitial pneumonia.

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Explaining the invisibility of asbestos-related diseases in Taiwan: workers' accounts and the reform of workers' compensation policy in 2021

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Purpose: Asbestos was used in large quantities in the past in Taiwan; however, few cases of occupational asbestos-related diseases (ARDs) have ever been recognized and compensated. We carried out this study to understand how patients with ARDs perceived disease causation and how they had experienced workers' compensation (WC) claims.

Methods: In-depth face-to-face interviews were conducted with 16 patients with ARDs from July 2014 to March 2017. They all had worked in industries known for high asbestos exposure.

Results: Only three patients had filed WC claims, and of them only two patients were approved. Reasons for the low compensation rate of ARDs could be divided into institutional barriers and non-institutional barriers. The former was related to the flaws of the WC system and occupational health examination system. The latter was related to the knowledge status, causal interpretation, and social situations of individual workers.

Conclusion: Despite the strong link to occupational exposure to asbestos, most ARDs were not recognized as occupational diseases in Taiwan. The Labor Occupational Accident Insurance and Protection Act, recently passed in April of 2021, has responded to the call for reform by adding two clauses to address the under-compensation problems of occupational diseases with a long latency period. The new legislation may help improve the recognition of ARDs and other occupational diseases. However, additional efforts are needed to remove non-institutional barriers hindering workers' ability to ensure their compensation rights.

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Exposure to metal in dust in dental laboratories in Japan

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Introduction: In Japan, a case of an indium-exposed worker with indium lung (interstitial pneumonia) was reported in 2017, suggesting that some workplaces have insufficient environmental management. The aim of this study was to assess the working environment of dental technicians working in dental laboratories that use indium and to clarify the actual status of occupational exposure to the metals used in dental materials.

Material and Methods: A cross-sectional survey was conducted including 40 dental technicians and 2 clerks from four laboratories (28 men and 14 women, aged 36.3 ± 11.2 years, working period of 1–43 years). Respirable dust was collected; weighed by inhalation at a rate of 2.5 L/min for 8 h, close to the respiratory range; and screened metal elements in dust by qualitative analysis with X-ray fluorescence. The Ethics Committee of Showa University approved this study (approval number 2994).

Results: The concentration of respirable dust was 0.106 ± 0.085 mg/m³, with the highest concentration being 0.242 mg/m³. In addition to indium, X-ray fluorescence analysis also detected sulfur, calcium, zinc, and zirconium. Local exhaust devices and air purifiers were installed at each worker's worktables, and the indoor air

environment was kept clean. Approximately 80% of the dental technicians used surgical masks during work.

Conclusion: These findings suggest that metal exposure is low. However, occupational exposure limits have not been set for some metal elements quantified in this study, and it is difficult to quantitatively evaluate their health effects. Therefore, further studies on this topic are needed.

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Comorbidities and Productivity Loss: A Systematic Review

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Introduction: The prevalence of chronic conditions has increased globally in the last few years; there is strong evidence suggesting that comorbidity plays an important role in productivity loss. Therefore, the need to identify the impact of the number of comorbidities on productivity loss.

Materials and Methods: A systematic review was performed, articles published from 2000 to 2018 were selected for screening. We analyzed the effect of the number of chronic conditions on productivity loss, measured by absenteeism, presenteeism, or both. The literature search was performed in English and Spanish using PubMed, Scopus, and Cochrane Library. The articles selection process was conducted according to PRISMA recommendations.

Results: 44 out of 10,101 articles were reviewed after screening, 23 were excluded for measuring comorbidities separately or not analyzing association or correlation. Association between comorbidities and productivity loss was varied, four studies reported a OR (Odds Ratio) of 1.4 or more for absenteeism in the presence of two or more comorbidities, four studies reported a range between 5.46 to 16.26 days lost per year when comorbidities are present, one study reported more days lost were found in case in comorbidities in a 28 days period. Three studies found increased presenteeism when two or more conditions were present using different work performance tools.

Conclusions: We were not able to identify two studies with the exact research methodology, nevertheless, most concluded that the more comorbidities present, more productivity loss is expected. Further studies with standardized methodology might be needed.

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SC on Reproductive Hazards in the Workplace

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Introduction: Reproductive health among pregnant women is important also during the workplace where heat/cold stress, working loads, and other physical strains may play a role in affecting their health. Negative reproductive outcomes could be avoided via many different measures in the occupational and environmental settings.

Materials and Methods: This study will utilize different academic resources and papers published in major international scientific

literature since the 2000s and will be identified through search of scientific databases using selected keywords and phrases.

Results: From our search of literatures, heat, cold, and work loading are major physical stress hazard to reproductive health of women and those expecting a child. Policy makers should take these findings into account and shall make informative decisions for these high-risk individuals to be protected.

Conclusions: Hope from our findings, we could establish proper policy and protocols to protect the reproductive health of women against various physical stress and hazards. More insight could be provided with our findings and protect the health of pregnant women in the occupational settings especially.

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Concerns regarding the quality and number of Occupational Exposure Limit Values

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Introduction: Concerns regarding the quality and number of Occupational Exposure Limit Values (OELs) have been raised. The total number of internationally available OELs has increased slowly the last decades despite the fast-increasing number of new chemicals on the market. In this study, the Norwegian OELs have been used as an example to illustrate and exemplify these challenges. The first Norwegian OELs were issued in 1978 and were mainly based on the ACGIH TLVs from the 50-ies and 60-ies.

Materials and Methods: The Norwegian 2021 OEL list was examined. These values were compared with an OEL reference index based on the strictest of the 2020 TLVs and MAK values. Review year was identified from archive documents. This study was limited to 8-hour OELs and chemicals with a CAS number. Some areas with lacking OELs were identified.

Results: The Norwegian OEL list contains 705 OELs, where 599 fitted the inclusion criteria. Of these, 137 had a revision year 2000 or later. Half of the OELs from 1978 (n=214) have not been changed and only 171 new OELs have been introduced since 1978. New methods for industrial marine production and green technologies for CO₂ capturing, improved battery technologies, and new energy carriers etc, are some areas calling for the development of new OELs.

Conclusions: The Norwegian OELs have been used as an example, to illustrate the grave state of the OEL setting work. This study shows that maintenance of existing OELs and development of new OELs are far behind expectations and the development in the society. These challenges are regarded to be universal and call for better international cooperation.

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Increased risk of infection with hepatitis A and hepatitis B virus (HAV and HBV) among staff at special schools for pupils with disabilities: results of a cross-sectional survey

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Introduction: The aim of this project was to assess occupational biological hazards with regard to the risk of HAV and HBV and the need for occupational health advice in schools for pupils with special needs.

Materials and Methods: Teachers and pedagogical staff were surveyed about activities potentially providing exposure to biological agents and their individual immune status regarding HAV and HBV by questionnaire. Descriptive analyses, group comparisons and logistic regression were performed to identify possible factors influencing the HAV and HBV immune status. The ethics committee approved.

Results: 1398 of 1535 teachers and educational staff took part (91.1%). 1381 respondents reported having close physical contact with pupils at work (98.8%). Daily contact was reported by 54.5% to 84.4% of employees, according to the school's support focus. Being scratched, bitten or spat at was reported by 66.2% up to 92.7%. Hazardous activities such as assisting with food intake to intimate care occur in all types of schools and are performed by both teachers and pedagogical staff. The vaccination rate was 57.7% for HAV and 64.3% for HBV. In regression analyses, failing to receive vaccine advice (OR 0.36) or instruction on infection prevention (OR 0.68) were found to be significant predictors of lower vaccination rates.

Conclusions: At special schools with any support focus, large parts of workforce perform activities involving biological hazards due to HAV and HBV. Occupational health care, including instruction on infection prevention and vaccination against HAV and HBV, should be offered to all employees.

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Assessment of the health status of cement production workers

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Introduction: Working conditions in the production of cement are associated with the influence of mainly industrial aerosol (cement dust, lime, gypsum).

Materials and methods: The rhinocytology of the upper respiratory tract (URT), the transport function of the ciliated epithelium (TFCE), indicators of oxidative stress, hormonal and immunological parameters were studied in 255 cement production workers.

Results: Rhinocytology showed pathological changes on the part of the URT in the form of desquamation of prismatic epithelial cells, the number of their degeneratively altered forms and metaplasia into a multilayer squamous epithelium in 38% of workers. With an increase in the length of service, the frequency of subatrophic changes in the URT reached 60.0%. A slowdown in TFCE was detected in 73% of the examined patients. With an increase in work experience over 10 years, there was a weakening of the regulatory influence of the hormonal system (a decrease in cortisol, thyroxine, adrenocorticotrophic and thyroid-stimulating hormones) in 56% of employees, the development of classical oxidative stress in 47% of employees (an increase in the content of malondialdehyde, a decrease in superoxide dismutase, catalase, myeloperoxidase), a decrease in immunological reactivity in the form of an increase in the production of IL-1b, IL-4, IL-8 and TNF- α , a decrease in the production of IL-2 and interferon- γ in 62% of employees.

Conclusions: The obtained data can be used at medical examinations for the formation of groups of dynamic observation and prevention of occupational and industrial-related diseases.

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Screening of obstructive sleep apneas hypopneas syndrome (OSAHS) among workers of a company

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Introduction: The complications of the OSAHS with socio- professional consequences make it a real problem of occupational health. The aims of this study were to screen OSAHS and its components among workers.

Method: this cross-sectional study was concerned 683 men employed in a company in Casablanca whose employer wanted to promote well-being at workplace. A questionnaire was submitted. The persons with positive Berlin test benefited of ventilatory polygraphy.

Results: The prevalence of positive Berlin test was 9.8%. This frequency was higher among people with metabolic pathologies (32.8%), neuropsychiatric (34.3%), cardiovascular (62.7%) and respiratory – ENT (77.6%). Among individuals having positive Berlin test, subjects self-declaring insomniacs were 44.8%, and those with disorders of vigilance with Epworth score > 10 were 67.2%. The prevalence of OSAHS was 5.7% in the total population (3.4% had mild OSAS, 2% moderate and 0.3% severe). This prevalence increased with age: 1.7% among 30–39 years old, 8.8% among 40–49 years old, and 11.9% among those 50 years and older. 100% of apneic patients felt tired, had snoring, were sleepiness at work, and had an Epworth score > 10.

Conclusion: OSAHS, a frequent disease with serious pathological and occupational consequences, is responsible for daytime vigilance disorders, which are the cause of increased risks of professional errors and occupational accidents. Its under-diagnosis is favored by the apparent benignity of its main symptoms. Occupational health professionals can play a key role in raising awareness and education and in early detection of this syndrome.

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Screening of the metabolic syndrome (MetS) and its main components among employees

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Background: The MetS is a major issue of occupational health. It is the result of an unhealthy dietary habits, physical inactivity and sedentary behaviors. The objective of this study was to detect the MetS, and the determine the prevalence of its main components according to socio-economic status and occupational characteristics.

Materiel and methods: This cross-sectional study involved 808 employees. of a company whose employer wanted to promote well-being at workplace. It has included a questionnaire, a clinical examination and a biological check-up. The MetS was defined according to the International Diabetes Federation criteria (2009).

Results: The prevalence of MetS was 27.5% (30.7% in women vs 25.8% in men; $p = 0.171$). Its prevalence increased with age. Up to 50 years, it was 20.2% (23.6% in women vs 18.2% in men; $p = 0.076$) and over 50 years 45.3% (56.9% in women vs 41.5% in men; $p < 0.0001$). The most common components were large waist circumference (72.2%), high blood pressure (32.4%) and low HDL-Cholesterol (31.4%). The respective prevalence of psychoactive substance consumption was slightly higher among participants with MetS, but the differences were not significant. The employees with MetS were mostly sedentary (85.6%). The prevalence of MetS was inversely correlated to the level of education and position in the company.

Conclusions: Obesity and sedentary lifestyles were the two main risk factors that predisposed to MetS. Its prevention is based on the early detection and treatment. Its healthcare includes a balanced lifestyle with hygiene and dietary measures further to regular physical activity.

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Core Competencies Required for Occupational Medicine Practice in Brazil

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Objectives: To present the core competencies required for occupational medicine in Brazil, developed by the Brazilian National Association of Occupational Medicine (ANAMT) and to describe the process and the results of this assessment in order to guide continuing medical education and board-certified occupational medicine specialists.

Methods: A Delphi study was carried out using a questionnaire based on the literature review, a previous Brazilian matrix of competencies, an expert panel review and validated by 223 Occupational Physicians (OP), members of ANAMT.

Results: An integrated approach is essential for the effective accomplishment of the competencies. A matrix includes five domains: moral judgment and professionalism; workers' comprehensive health; occupational risk assessment and health protection; occupational health, safety and environment policies, organization and management and transversal competences as legal requirements, teamwork, leadership and conflict management, communication and interpersonal relationship, knowledge management. A total of 71 specific competencies were proposed. Moral judgment or professionalism was elected an essential domain.

Conclusion: This study reinforces the importance of an integrated matrix to address Occupational Medicine (OM) education. Moral judgment or professionalism remains the biggest challenge in OM. Further and periodic reviews are required to adjust competencies to new or modified OM practices and changes in the workers' health conditions, as well providing guidance for ongoing education. These findings may be applied to other countries in Latin America.

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Occupational diseases (OD) in Morocco: Profile of expertises, limits and recommendations (About 53 expertises)

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Introduction: The procedure for declaring ODs in Morocco is slow and often linked to a conflict at work. The aim of our work is to draw up a profile of the medical expertise carried out in our service, to study the various settings and to propose recommendations.

Materials and methods: Retrospective and descriptive study including 53 requests for medical expertise received by the service between 2005 and 2020. The criteria studied are about three types:

- Patient profile
- Expertise profile
- Nature of decisions

Results: The total expertise is 53 (average 5 / year). 93.2% were an initial expertise, 65.9% came from the court of first instance and only 9% about work accidents. Causal relationship retained in 84.1% of cases. The mining sector is predominant in 30% of cases, the transport sector in 27.3%, then the textile sector in 13.6%. The seniority in the post was 23.2 years on average and the length of medical leaves is ranged from 1 to 9 years. 75% of the patients were men and the average age was 49.2 years. The recognized ODs was mainly: respiratory pathology (50%), followed by musculoskeletal disorders (27.3%). The predominant causative agent is silica dust and awkward postures.

Conclusion: The Moroccan OD reporting system is responsible for under reporting because of its contentious nature. An improvement and a simplification of the procedures could guarantee patients rights to compensation.

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Fitness for work examination in Russia. History of the issue

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Introduction: When it comes to monitoring workers' health, the generally accepted practice is medical check-ups and fitness for work examination. In Russia, the regulatory framework has been developing and improving since 1922, when the system of medical examinations began to form. In modern conditions, ensuring the maximum fitness of workers is necessary to preserve and strengthen the labor potential of the country.

Materials and Methods: 24 regulatory documents on the conduct of medical check-ups and fitness for work examinations in Russia from 1922 to the present day were analyzed.

Results: The analysis showed a consistent expansion of the workers subject to medical examinations, and improvement of the medical commissions, laboratory research, ensuring the legitimacy of examinations, the formation of an integrated approach to their implementation and a system of evidence-based assessment of the quality of medical check-ups and fitness for work examinations.

Conclusion: It is necessary to develop a unified methodological approach to the organization of medical check-ups and fitness for work examinations. Ensuring the optimal implementation of the regulatory legal acts developed in Russia can become the key to improving the quality and efficiency of such examinations. The use of international guidelines of ICF and occupational medicine can be quite promising.

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Occupational diseases among Finnish medical doctors during 2005-2018

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Introduction: Medical doctors are occupationally exposed to a variety of exposure agents that may cause an occupational disease. However, there are rather few published studies covering this topic. Material and methods: We evaluated recognized occupational diseases among Finnish medical doctors (ISCO-08 code "221") during 2005-2018 registered to Finnish Register of Occupational Diseases.

Results: In 2005-2018, 43 occupational diseases (1.7 cases/10 000 medical doctors/year in average) were recognized for medical doctors. The most common occupational disease was allergic contact dermatitis (ACD) (11 cases, 0.43 cases/10 000 medical doctors/year in average). Rubber chemicals were the most frequent exposure agents causing ACD. Scabies (8 cases), irritant contact dermatitis (ICD) (6 cases) and tuberculosis (5 cases) were also among the top four. The remaining cases included for example three occupational asthmas and one occupational rhinitis, one case of protein contact dermatitis or contact urticaria, one case of cataract and infectious occupational diseases caused by miscellaneous biological factors. There were no cases of repetitive strain injuries.

Conclusion: Allergic contact dermatitis caused by rubber chemicals was the most common occupational disease among Finnish medical doctors. It is probable, that occupational diseases among medical doctors are underdiagnosed since self-treatment is common. For the sake of occupational safety and health at the workplace and possible compensation for the victim, it is important that occupational diseases of medical doctors are also properly diagnosed and reported.

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The role of noise temporal structure in noise-induced hearing loss among manufacturing workersJia-rui Xin¹, Zhi-hao Shi², Mei-bian Zhang³¹ Hangzhou Normal University, School of Public Health, Hangzhou, China, ² Ningbo University, School of Medicine, Ningbo, China,³ Chinese Center for Disease Control and Prevention, National Institute of Occupational Health and Poison Control, Beijing, China

Introduction: To explore the role of noise temporal structure in noise-induced hearing loss (NIHL) among manufacturing workers. **Material and Methods:** A cross-sectional study was conducted on 780 Chinese workers from five manufacturing industries to collect their data, including individual noise recording, questionnaire survey, and pure tone audiometry. Kurtosis is a sensitive indicator of the temporal structure of complex noise indirectly. High-frequency noise hearing loss (HFNIHL) was defined as an average hearing threshold ≥ 30 dB at 3, 4, and 6 kHz in either ear. The contribution of kurtosis in causing noise-induced hearing loss among Chinese manufacturing workers was analyzed. This study was approved by the ethics committee of the Zhejiang Center for Disease Control and Prevention, China (the approval number: ZJCDC-T-043-R-20141211).

Results: The prevalence of HFNIHL (HFNIHL%) was 19.0%. Chi-square trend tests showed that the kurtosis of workers with HFNIHL was all greater than those without HFNIHL ($P < 0.01$). Pearson correlation analysis showed that kurtosis was positively correlated with NIPTS346 ($r^2 = 0.202$, $P < 0.01$). Logistic regression showed that kurtosis was a key factor influencing occupational NIHL (OR_{kurtosis} = 1.345, $P < 0.05$).

Conclusions: In addition to noise energy, noise temporal structure (Kurtosis) is one of the key influencing factors of NIHL. As the kurtosis increases, the more severe the hearing loss is caused to manufacturing workers.

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Cholangiocarcinoma and pleural mesothelioma: asbestos exposure as a shared risk factor? A comparison of age-standardized incidence rates in ItalyMena Gallo, Stefano Mattioli, Stefania Curti

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Introduction: Cholangiocarcinoma (CC) is the second most common primary liver malignancy. Anatomically, CC is divided into intrahepatic (ICC) and extrahepatic (ECC) forms. A possible causal association between ICC and exposure to asbestos has been hypothesized. To support this, we compared age-standardized incidence rates (ASR) of CC and malignant pleural mesothelioma (MPM) in Italy considering that asbestos is thought one of the major risk factors for MPM.

Materials and Methods: We extracted ASR of ICC, ECC and MPM reported by 36 Italian cancer registries and listed in the last report on Cancer Incidence in Five Continents of the IARC. Data

referred to 2008–2012 and covered 29 million population. We used linear regression analysis to evaluate the possible association between ASR of ICC, ECC and MPM. Analyses were stratified by sex.

Results: From 2008 to 2012 ASR per 100,000/years in men ranged: 0.4–2.2 for ICC, 0.5–1.8 for ECC, and 0.0–0.7 for MPM. In women, ASR per 100,000/years ranged: 0.2–1.0 for ICC, 0.1–1.3 for ECC, and 0.0–0.6 for MPM. At regression analysis ICC did not report an association with MPM in men (beta coefficient -0.044, 95%CI -0.980–0.892) and women (beta coefficient -0.093, 95%CI -0.670–0.485). No association was detected for ECC as well.

Conclusions: This crude analysis does not appear to support the hypothesis that CC could be associated to exposure to asbestos. This could be related to the large amount of known and suspected risk factors for CC that include common liver diseases due to genes, viruses and personal habits. Analyses adjusted for aggregated data might help disentangle this issue.

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The impact of thyroid diseases on patients' work functioning: a pilot studyIlaria Vetrani¹, Veruscka Leso¹, Luca Fontana¹, Francesca Sessa², Claudia Vetrani³, Domenico Salvatore², Ivo Iavicoli¹¹ University of Naples Federico II, Section of Occupational Medicine, Department of Public Health, Naples, Italy, ² University of Naples Federico II, Department of Public Health, Naples, Italy, ³ University of Naples Federico II, Department of Clinical Medicine and Surgery, Naples, Italy

Introduction: Thyroid diseases (TDs) can affect employment rate, absenteeism and capacity for work of patients. We investigated the TD impact on patients' work ability (WA) and possible influencing factors.

Material and Methods: TD affected workers, aged 18–70 years, referring to the Endocrinology Unit of the University of Naples Federico II, Italy, in the period May–October 2020, were enrolled together with non-affected workers as controls. Patients' personal, clinical and occupational information was collected. The Work Ability Index (WAI) was used to assess workers's perception of WA. **Results:** 70 affected workers and 71 controls completed the survey. The most frequent TDs were Hashimoto's thyroiditis (31%), Graves' disease (GD) (20%) and multinodular goiter (19%). The majority of enrolled subjects were professionals. A general good WA was reported by affected workers (61% of cases), although with a significantly lower mean score \pm standard deviation (SD) than controls (37 ± 6 vs 40 ± 5 , $p < 0.001$). GD workers had a significantly lower mean WA score \pm SD compared to the other TD patients (31 ± 1 , $p < 0.001$). Women employed in service and sale sectors had a significantly higher risk for worst WA compared to those engaged in other fields (OR 1.71, 95% CI 0.66–2.76). Suffering from a TD ($\beta -0.396$, $p < 0.001$) and the number of sick leaves ($\beta -0.583$, $p < 0.001$) was significantly associated with a reduction in WA.

Conclusions: To better understand the impact of TDs on patients' WA may support their comprehensive, interdisciplinary clinical and occupational health management, with benefits for patients' personal, social and professional life.

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Identifying social aspects in real world data to support health outcomes

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Social aspects have proved to be relevant to health outcomes, especially in OSH settings. However, there's a poor recording of social aspects in electronic health or occupational medicine records, as well as a lack of techniques to retrieve, link and analyse these databases with other sources of knowledge or evidence. This is particularly true when these data are heterogeneous, disperse and of high volume. This presentation introduces an approach to identify social aspects in health data by: (1) mining published evidence from the literature to build a computational knowledge graph of health and social factor associations, and (2) analysing how those associations may be found in claims and medical records or other sources. This work demonstrates how the proposed approach to mine and combine information from different sources could be used to generate hypotheses and inform further research on social aspects in a data-driven manner.

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Occupational Health As a Tool to Improve Workers' Health. Experience Report in Colorectal Cancer Screening in the Approach of 12,233 Professionals in the Largest Hospital Complex in Latin America

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In Brazil there are 40,000 cases of bowel cancer, with a mortality from colorectal cancer (CCR) of 18,000 people / year. CCR is one of the most common neoplasms in the world. It is most common from 50 yo. The patients present with tumors at an advanced or incurable stage. Early detection optimizes treatment. Preventive measures associated with a periodic occupational examination of the worker can expand this early diagnosis. Aim: to describe the process of carrying out preventive exams for CCR during periodical occupational medical examination (EPO) in health professionals. Descriptive study about protocol usage, adherence, and key outcomes. During the EPO, questionnaires were applied to workers at the largest hospital complex in SP, with 20,000 people, and kits were used to collect stool test samples, with a view to investigating occult blood through the fecal immunochemistry test FIT. Population \geq 50 yo. Period: March to August 2021. The positive results, were referred for colonoscopy exams and specific procedures. Results: EPO were carried out in 5 institutes with a population of 12,233 workers. 4656 (38%) were 50 yo. Of these, 1754 (38%) agreed to take the exams and 1123 (64%) of those who accepted delivered the exams. 100 (8.9%) had positive results and were referred for follow-up. Conclusion:

Through a simple, non-invasive examination performed during EPO, it was possible to identify 100 workers who needed specialized treatment. The screening techniques aim to reduce the morbidity and mortality of an analyzed population. Using these techniques during EPO contribute to an increase in early diagnosis.

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Burnout And Professional Fulfillment Among Brazilian Occupational Physicians

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Introduction: Burnout is an important problem that impairs workers' health related to chronic exposure to occupational stressors. This study aims to analyze factors associated to burnout and professional fulfillment among Brazilian physicians enrolled in occupational services.

Material and Methods: A national longitudinal study is being carried out since 2020. Baseline information was obtained between October-December/2020. Participants were 436 physicians who answered an electronic questionnaire about sociodemographic characteristics, occupational aspects, psychological symptoms, and the Professional Fulfillment Index. Multiple logistic regressions were built to analyze factors associated to outcomes.

Results: Most participants were female (57.8%), mean age 49.6 years (sd +13.8), graduated for ten or more years (59.2%), weekly working hours equal or up 40 hours (53.0%). High burnout was reported by 41.5% and was associated to graduation less than 10 years, training in occupational medicine residence, weekly working hours equal or up to 40 hours, and psychological symptoms (depression, anxiety, and stress). Low professional fulfillment was reported by 70.0% and was associated to graduation less than 10 years, working in management tasks, depressive or anxiety symptoms.

Conclusions: Mapping associated factors to burnout and professional fulfillment among physicians can help in formatting action for health promotion and disease prevention, since the occupational medical professionals are part of the comprehensive workers' healthcare system.

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Mental Health status of Garment Industry employees in South India

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Introduction: Globally, depression and anxiety cost 1 trillion US\$ per year due to loss in productivity. Inadequate workplace policies and poor management practices contribute to poor mental health. **Material and Methods** A cross sectional study was done in 19 garment factories among 726 employees who were administered the Patient Health Questionnaire-9 to screen for depression and the Hamilton Anxiety Rating Scale to screen for anxiety. Ten In-Depth Interviews were conducted to understand the factors contributing to poor mental health. All participants were provided with counselling facilities at the workplace and referral services for specialist care.

Results Most of the employees were young (Mean age 27 SD 10.1) and unmarried (58.7%). The common job designations of the employees were tailors (38.5%) and machine operators (11.9%) and average years of education was 10 years. Depression was prevalent in 17.8% and 7.2% were suffering from anxiety. Suicidal ideation was present among 11% and 9.2% had attempted suicide. Personal reasons such as poverty, broken/problem families, interpersonal relationship problems and occupational factors such prolonged working hours, musculo-skeletal pain, strict reprimanding and bullying were mentioned as risk factors.

Conclusions The prevalence of depression and anxiety among garment industry employees is similar to that of general population with most risk factors related to personal and family life. Provision of decent work in conditions of freedom and dignity and employee assistance programs will address the risk factors.

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Influence of production factors on the prevalence and severity of skin diseases in railway transport workers

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Introduction: Influence of production factors on the prevalence and course of diseases of the skin and subcutaneous tissue in railway transport workers has not yet been sufficiently studied.

Materials and methods: The materials for the hygienic study were the sanitary and hygienic characteristics of the working conditions of railway transport workers. The sample set for conducting epidemiological and statistical studies was formed on base of coupons with references for all established diagnoses of skin and subcutaneous tissue diseases for the period 2011-2020 in the polyclinic " RZhD-Medicine" in Barnaul city.

Results and conclusions: According to the sanitary and hygienic characteristics of working conditions, up to 8 harmful and dangerous factors of the working environment exceeding the maximum permissible level are influencing on railway transport workers. Aerosols, chemical, meteorological, biological, physical factors as well as severity and intensity factors of the labor process (class 3.1-3.5) lead to a significantly higher ($p = 0.002165$) dermatological morbidity in industry workers (55.4 ± 9.2 per 1000 employees) when in the adult population (50.7 ± 0.6 per 1000 adults). Despite the systematic comprehensive prevention, production factors lead to a more severe course with a greater ($p=0.010944$) number of days of disability (27.8 ± 0.83) and the number of exacerbations of chronic skin diseases in railway transport workers comparing with the rest of the adult population who are not in contact with occupational hazards (25.32 ± 1.2).

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Questions of professional suitability and rehabilitation in cancer patients

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The purpose of the study: To determine the features of the development and course of oncological pathology in railway transport workers exposed to adverse labor factors.

Materials and methods of research: We conducted a retrospective analysis of 1,340 cases of cancer among employees.

Results and discussion: The incidence of malignant neoplasms in healthcare institutions of the West Siberian Railway is 1.5-1.9 times lower than the all-Russian. A special feature is the high rate of thyroid cancer and kidney cancer. The greatest oncological morbidity was noted among machinists, assistant machinists and track fitters. Often oncological disease is accompanied by the presence of various somatic pathology in the patient. Concomitant diseases are observed in 78.2% of patients. 85.8% developed various toxic manifestations, often combined, against the background of cancer treatment. The main problem is myelotoxicity - 84.2% After the end of special treatment, the question of rehabilitation therapy to restore working capacity is raised. An individual rehabilitation program is being developed depending on the patient's condition. The group with a favorable prognosis includes patients with stage I–II tumors. Doubtful prognosis of the disease in patients with stage III of the tumor. The group of unfavorable prognosis - after ineffective treatment of stage III and with stage IV disease detected for the first time. On the basis of all criteria, the question of professional suitability is decided.

Conclusions: Timely detection and adequate treatment of the oncological process allows the patient to return to work.

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The Guidance Notes for Diagnostic Criteria and Prevention of Occupational Diseases

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Introduction: After the Governing Body of the International Labour Organization (ILO) approved the ILO list of occupational diseases (OD) in 2010, the need for an enclosed document arose to thoroughly describe diagnostic criteria and key actions for prevention for all mentioned OD.

Material and Methods: A group of internationally renowned experts, established under the ILO supervision, drafted one or more monographs for each listed OD. From late 2017 to 2021, each monograph was reviewed, original drafters and additional experts

were contacted to address specific issues, and a final comprehensive document was prepared for publishing.

Results: The final volume consists of 97 monographs, whose structure depends on the chapters of the ILO list: 1) General characteristics of the causal agent (for OD and cancers caused by exposure to agents arising from work activities) or short profile of the aetiopathogenesis (for OD by target organ system); 2) Occupational exposures; 3) Toxicological profile (for chemical agents), biological mechanisms (for physical and biological agents) or carcinogenic mechanisms (for cancers), main health effects, and diagnostic criteria (including clinical manifestations and exposure assessment criteria, i.e. history of occupational exposure, minimum duration of exposure, maximum latent period); 4) Key actions for prevention; 5) Further readings.

Conclusions: The aim of the list was to assist countries in the prevention, recording, notification and, if applicable, compensation of OD. The monographs represent a precious tool to assist physicians and OSH specialist worldwide in these sensitive processes.

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Deprivation and Early Involuntary Retirement: Area-Level Analysis across English Local Authorities – A local problem or a global phenomenon?

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Introduction: Over the last two decades there is a worldwide trend to raise the state retirement age and reduce pension benefits as Governments seek to curb expenditure. Permanently incapacitated people are facing increasing financial challenge with potentially significant impact on morbidity and mortality among most deprived. This study was designed to explore Ill Health Retirement (IHR) from a societal perspective.

Materials and Methods: A retrospective analysis of the association between deprivations with IHR rates for Local Authorities (LA) in England between 2015-18 was conducted. Deprivation status was assigned according to the proportion of Lower-Layer Super Output Areas in the most deprived 10% nationally, using data from the National Statistics Socioeconomic Classification 2015. Freedom of Information Requests were sent to all 326 LAs to obtain data on the rate of applications and approvals per 1000 active members.

Results: 131/326 (40%) LAs responded. There was a trend of greater number of applications towards most deprived LAs (range 3.89 to 1.56). The national IHR approval rate was 2.16 (range 0.16 to 8.96) with greater proportion among more affluent LAs.

Conclusions: There is an association between increasing rates of Ill Health Retirement and higher area-level deprivation. Policy should note that those in more deprived areas face a quadruple whammy; a greater risk of becoming incapacitated from public health and occupational exposures, more limited access to medical support, less opportunities for alternative work and potentially disproportionate disadvantage from stringent pension eligibility criteria.

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Medical Accessibility and Under-reporting of Occupational Diseases: Effect of Travel Distance and Travel Time

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Introduction: In Taiwan, outpatients' average travel distance (TD) is 17.68 km, while workers' TD and travel time (TT) for outpatient services are only 8.2 km and 27.6 mins. Due to relatively scarce provision of occupational outpatient service, poor medical accessibility may lead to under-reporting of occupational diseases (ODs). **Materials and Methods:** Network of Occupational Diseases and Injuries Service (NODIS), composed of 9 major reporting hospitals, is an important OD surveillance system in Taiwan. Using data from NODIS and manpower survey during 2008-2018, we calculate each town's incidence rate of ODs (IROD) and expected IROD according to workers' occupations and job titles, and each town's shortest TD and TT to nearest major reporting hospitals is estimated by Google Maps' Distance Matrix API. We then use quasi-Poisson regression model to investigate effect of TD and TT on IROD.

Results: There are 8490 cases of suspected ODs in NODIS from 2008 to 2018, and 3420 cases are confirmed as definite ODs. Adjusted by workers' occupations and job titles, as TD and TT increases by 10 km and 10 mins, IROD significantly decreases by 12.5% and 12.1% with clear dose-response relationship. Less-disabled workers who have never stopped working or lost their jobs are more impeded by long TD and TT. Generally, around 40% ODs or 200 cases/year are under-reported due to poor medical accessibility.

Conclusion: Our study shows how poor medical accessibility leads to serious under-reporting. Using this method, we can identify areas with poor medical accessibility and evaluate cost-effectiveness of providing more outpatient service.

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Recognition and compensation for occupational blood disorders in Morocco

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Introduction: In the past, etiologies of occupational blood disorders were relatively limited, but with the evolution of the chemical industry and the advent of new substances, the list continues to grow. Our work is intended for attending physicians, both general practitioners and specialists, to help them better pinpoint themselves in the process of recognizing and compensating occupational blood disorders.

Material and methods: We reviewed and analyzed all the existent legislative texts about occupational diseases and injuries. We also studied the newest version of the tables of occupational diseases to extract any information available about blood disorders.

Results: We found that only 8 causal agents incriminated in the onset of blood disorders are mentioned in the Moroccan tables of occupational diseases. Twelve diseases were mentioned with 4 malignant disorders and 8 benign ones. The review of legislative texts showed that occupational blood disorders can be recognized by one of three procedures: recognition as an occupational injury (i.g., carbon monoxide poisoning), as an occupational disease for the ones mentioned in the tables (i.g., Leukemia after benzene exposure) and as a work-related disease for all the disorders not mentioned in the tables.

Conclusion: Occupational diseases and injuries are still heavily under reported in Morocco. One of the main reasons for this is doctors' ignorance of the occupational hazards leading to these disorders but also their lack of knowledge about the right procedures that their patients should take to be compensated.

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Handcrafted weaving in Tunisia: biomechanical constraints and risk of musculoskeletal disorders

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Aims: To determine the prevalence of musculoskeletal disorders of the upper limbs (MSD-UL) and to evaluate by semi-quantitative analysis the biomechanical risk factors of MSD-UL among traditional weavers.

Methods: A semi-quantitative ergonomic study was carried out over a period of two months among traditional weavers on horizontal looms in the governorate of Monastir in Tunisia. First, the ERGONOM[®] questionnaire for TMS-UL was administered to the study population. Thirty-minute video recordings were then made in five artisanal weaving workshops during a representative period. The analysis was carried out using ERGONOM[®] software.

Results: All of the participants were male. the mean age was 61.33 ± 5.82 years. The average professional tenure in the artisanal weaving sector was 38.17 ± 11.92 years. None of the weavers interviewed reported problems with their upper limb joints in the 12 months prior to the survey. Regarding the organization of work, all craftsmen reported the freedom to have breaks during the working day as well as the possibility of working at their own pace. The majority had a lot of autonomy and was satisfied with their current job. Mutual assistance between colleagues was possible in most cases. Semi-quantitative analysis of biomechanical risk factors for shoulder MSDs revealed that the shoulders were flexed or abducted greater than 60° over 30% of the working time with a variability of 54.1%. Regarding the elbows, they were in flexion ranging from 60° to 100° for 49.17% of the working time with a significant variability of 54.8% and in extreme pronation for more than half of the working time (65.83 %)

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Understanding the Experience of Firefighter Cancer Survivorship: A Mixed Methods Approach

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Introduction: Firefighters (FF) are at increased risk of cancer compared to the general US population. Little information on FF cancer survivorship, including unmet needs and health-related quality of life (HRQoL) have been studied. This study aims to understand firefighters' experiences after being diagnosed with cancer.

Materials and Methods: We conducted interviews (n=4) and distributed surveys among 29 active and retired FF cancer survivors. Focus groups were employed to determine survivor needs. The Functional Assessment of Cancer Therapy-General (FACT-G) survey was administered to assess participants' HRQoL.

Results: The mean (\pm SD) age of participants was 53 ± 10.19 years. 90% were males and 100% white. Cancer type and stage varied, most being diagnosed within the last 5 years. Themes that emerged from the interviews included: unmet needs in managing health, well-being, navigating support systems, and accessing resources. The FACT-G scores (mean \pm SD) demonstrated lower scores in the FACT-G Emotional Well-Being (WB) domain (19.26 ± 4.67), but higher scores in the FACT-G Physical WB (23.67 ± 5.08), Social WB (23.38 ± 4.16), and Functional WB (22.6 ± 4.97) domains. The total FACT-G score (87.87 ± 12.92) was higher among participants compared to the general US population (80.1 ± 18.1).

Conclusion: Participants reported unmet needs in managing health, navigating support systems, and accessing resources. Participants reported poorer emotional well-being relative to the general population, thus signaling a need to attend to their emotional needs. Our findings will help create tools for FF cancer survivors.

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Addressing Malaria in the context of work-related illness

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Introduction: Malaria is one of the major public health problems of global importance and scientific interest around the world. In 2019, malaria was responsible for more than 400,000 deaths in sub-Saharan Africa, with an estimated 3.2 billion people around the world susceptible to infection. Malaria mainly affected people in the middle age group. This was attributed to the higher frequency of people in this age group who migrating and travelling to malaria endemic countries, mainly for occupational purposes. Infects workers in mines, agricultural settlements, logging, farming, construction of dams, highways, oil extraction, and others.

Material and Methods: The goal was to understand the approach to Malaria as a work-related illness through a systematic review of the literature. Guiding Question: What is the relationship between confirmed cases of malaria and the occupational activities of workers in endemic regions? A literature review was undertaken on published literature using the PubMed, LILACS, BIREME databases with the following descriptors: Malaria + occupational disease. Primary studies published between 2000 and 2021 in Portuguese, English and Spanish.

Results: Of the 234 studies initially found in the cited databases, a final sample of 25 studies was defined, mainly articles. Reviews purely epidemiological studies or studies related to non-professionals were excluded.

Conclusions: Socio-political factors, ecological and social determinants can define living and working conditions and, consequently, condition the incidence of malaria, its burden and the relevance in the daily lives of the most affected populations.

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Identification of Known, New and Emerging Work-Related Diseases

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Work-related exposures are preventable. Traditionally, many work-related diseases have taken a long time to be identified, prevented and then recognized as compensable. Asbestos for example is a case in point. Effective prevention is a concern for policymakers globally as it has a direct impact on productivity, compensation costs and work-related sickness absence. Despite the identification of many occupational causes of diseases identifying work-related diseases and causal factors remains a challenge. We would like to propose a symposium to provide a better understanding of systems and methods for the identification of known, new and emerging work-related diseases. Importantly, some known work-related diseases might well be new or emerging because of new work-process or new products that are made with old known hazardous substances. Then you also have diseases that are attributed to completely new exposures at work that not have been documented before. In this symposium, we will be providing examples from different systems for identifying work-related diseases, both known, new and emerging. The expected outcome of the symposium would be to enhance the collective understanding of researchers, policymakers and practitioners on how we together could identify known, new and emerging work-related diseases and prevent them in an efficient and timely manner.

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Quantification of bromide ion in biological samples using headspace gas chromatography-mass spectrometry

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Introduction: Methyl bromide, used as a pesticide and a disinfectant, was designated as an ozone-depleting substance in 1992. However, some workers are exposed to it at present because it is still used in some applications. In this study, we propose a method for quantifying bromide ions (Br⁻) in biological samples using a gas

chromatograph-mass spectrometer (GC-MS) equipped with a headspace sampler.

Material and Methods: Biological samples were mixed with dimethyl sulfate, and Br⁻ ions were detected using a GC-MS. The validity of the proposed method was evaluated based on of the guidelines provided by the US FDA. The values obtained were compared with reference values of standard samples. This study was approved by the Ethics Committee of Showa University (Approval No. 2497).

Results: The calibration curve showed good linearity in the Br⁻ concentration range of 0.1–20.0 mg/L, and the coefficient of determination (R²) was >0.999. Intra- and inter-day accuracy values were 99.3–103.1% and 97.4–101.8%, respectively. The measured and reference values were concordant. Eight urine and serum samples, with known Br⁻ concentrations were analyzed. The correlation coefficients for the urine and serum samples were 0.97 and 0.96, respectively, and the results were consistent.

Conclusions: In this study, we established a simple and rapid method for determining Br⁻ concentrations in biological samples using a GC-MS with a headspace sampler. This method can be used to monitor occupational exposure to methyl bromide and to determine Br⁻ concentrations in a wide range of biological samples.

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Re-evaluation of hazard classifications and exposure limits for lead – An example for an advanced mode of operation within the MAK commission during COVID-19 restrictions

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Introduction: The Permanent Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area of the Deutsche Forschungsgemeinschaft (MAK Commission) was founded in 1955 to evaluate hazards and exposure limits (MAK values) and to counsel the German authorities of occupational health and safety prevention. Since then, tasks, evaluation concepts, communication processes and operating structure advanced continuously. Material and Methods: Today, the structure of the commission consists of four core groups (“MAK”, “BAT”, “Air monitoring”, “Biomonitoring”), accompanied by four working groups for the assessment of specific compound groups, four working groups for specific classifications, three working groups for adverse outcome pathways and epidemiology, as well as ad-hoc working groups for current issues. The mode of operation and interworking between the working groups and the changeover to online communication processes is demonstrated using the recent evaluation of lead.

Results: In the period September 2020 - February 2021 the MAK commission performed a complete re-evaluation of lead. Coordinated by the core groups “MAK” and “BAT”, accompanied by the subgroups “Lead”, “Carcinogenesis”, “Developmental toxicology” and “Neurotoxicity”, the MAK Commission classified lead and its

inorganic compounds as category 4 carcinogens and in pregnancy risk group A and set new BAT and MAK values.

Conclusion: The extremely efficient workflow of the reevaluation of hazard classifications and exposure limits was crucially supported by the new online communication processes which was pushed by the COVID-19 restrictions.

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Biological monitoring: evidence for reductions in occupational exposure and risk

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Introduction: This work explores occupational exposure trends from biological monitoring data in Great Britain (GB). The data were collated for all biological monitoring results for lead, mercury, benzene, and hexamethylene diisocyanate exposures where there have been some regulatory drivers within the reported time period of the data searched.

Methods: Data were extracted from samples analysed by year from 1996 to the end of 2019 and discussed as 90th percentiles (P90). Results were classed by broad occupational sector where possible.

Results: In the period 1996–2019, 37474 blood lead, 11723 urinary mercury, 9188 urinary S-phenylmercapturic acid (SPMA, benzene metabolite) and 21955 urinary hexamethylene diamine (HDA, metabolite of hexamethylene diisocyanate, HDI) samples were analysed and reported. The blood lead concentrations saw the P90 reduce from 53 µg/dL (1996) to 24 µg/dL in 2019; the P90 urinary mercury levels reduced from 13.7 to 2.1 µmol/mol creatinine and the P90 urinary SPMA levels reduced from 133.7 to 1.7 µmol/mol creatinine. For HDI the P90 results reduced from 2 µmol HDA/mol creatinine in 1996–2000 to 0.7 in 2005–2010 but levels have since increased to 1.0 µmol HDA/mol creatinine (2016–2019).

Conclusions: There is strong evidence of reductions in exposure of GB workers to lead, benzene and mercury from the data presented here. The results for HDI show that whilst interventions can reduce exposures significantly, such initiatives may need to be refreshed at intervals to maintain the reductions in exposure. We have observed that exposures move between sectors over time.

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Variations and influencing factors of urinary 8-hydroxy-2'-deoxyguanosine, a biomarker of oxidative DNA damage

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Introduction: Urinary 8-hydroxy-2'-deoxyguanosine (8-OHdG), as a biomarker of oxidative DNA damage, has been widely studied in occupational health. The influence of urine collection time on the

urinary 8-OHdG levels has been discussed. The aim of this work was to assess the diurnal and day-to-day variations of urinary 8-OHdG levels.

Materials and Methods: The urine samples used to examine the diurnal variation were collected from 6 healthy participants at the time of awakening and every 2 hours, from 10:00 to 22:00. For the day-to-day variation, the urine samples were collected from 27 healthy participants at the time of awakening for 35 consecutive days. The urinary 8-OHdG levels were determined using an HPLC-ECD method and normalized by the urinary creatinine. The study was approved by the Ethics Committee of Medicine and Medical Care, University of Occupational and Environmental Health, Japan. Results and Conclusion: There were no significant differences in the diurnal urinary 8-OHdG levels. Each subject had a relatively stable 8-OHdG level. The daily 8-OHdG values fluctuated within a certain range and reflected lifestyle factors, such as stress status, sleep time, diet, etc. Urinary 8-OHdG as a biomarker of oxidative DNA damage may be useful in assessing health hazards due to occupational exposure, if the daily range of an individual's urinary 8-OHdG levels is known. For example, the baseline urinary 8-OHdG level could be obtained in a few years, even with only one measurement per year, if the 8-OHdG measurement is incorporated as part of an annual health check.

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Group iv waste management proposal for minimizing cytotoxic exposure in day hospitals. Promoting sustainability and social well-being through excellence in occupational safety and health

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Introduction: Potential cytotoxic hazards present in group IV waste in hospitals are not only harmful for the staff's health but also for the environment. Due to their extreme hazardousness, group IV containers are continuously removed from hospital facilities. As these containers require quick disposal, they are not utilised to their full capacity leading to monetary losses. A new system is proposed in this study. The system is based in low temperature containers with a photocatalytic filter that destroys volatile hazardous compounds thereby allowing the containers to be kept longer in hospitals.

Materials and methods: The study is based on group IV data collected in 2020 for a period of 5 months at one Catalan hospital. The data was classified into subdivisions and analyzed according to the criteria. The actual capacity used for each container and its costs were calculated for its comparison to the new waste management approach.

Results: Study results show that only 10% of the capacity is utilised before disposal. By installing photocatalytic filter containers, we can reduce the emission and exposure to cytotoxics as well as 17% of the plastic bag usage, and cut down 33% of the hospital's waste management costs.

Conclusions: Currently a huge amount of money and equipment is invested in a non profitable group IV waste management system. Existing containers are not fully utilised and they do not reduce the emission of hazardous materials into the hospital environment. The implementation of the new system would greatly improve the

waste management of hospitals ensuring a safe, sustainable and profitable approach.

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Serum Per- and polyfluoroalkyl substances (PFAS) concentrations among career U.S. firefighters

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Introduction: Per- and polyfluoroalkyl substances (PFAS) are persistent, man-made chemical compounds that have been linked to reproductive and immune disorders, thyroid hormone disruption, and cancer. Firefighters may be exposed to PFAS through aqueous film forming foams (AFFF) used to extinguish flammable liquid fires and through the water-resistant shell of their safety gear. We characterize serum PFAS concentrations in a sample of career firefighters and examine the association of PFAS serum concentration to firefighter job type.

Material and Methods: A cross-sectional study design was used to collect a one-time health survey and blood tube from a non-probabilistic sample of career Florida fighters. The health surveys assessed information on firefighter socio-demographic and work characteristics. The blood tube was analyzed for seven PFAS congeners (PFBS, PFHpA, PFHxS, PFOA, PFNA, PFOS, PFOSA).

Results: Among the 108 firefighters who completed the survey and provided a blood sample, 94.4% were male, 22.4% Latinx, 76.9% White, 88.9% used AFFF, with a group mean age 40.3 years \pm 10.5 standard deviation. Group geometric mean for each PFAS congeners (ng/mL): PFBS (0.11), PFHpA (0.10), PFHxS (3.66), PFOA (1.81), PFNA (0.53), PFOS (2.83), and PFOSA (0.10). Fire Investigators had the highest levels of PFOS (6.80) and PFOA (3.80) compared to other firefighter job types.

Conclusions: Across all PFAS congeners evaluated, PFHxS was highest in concentration and PFHpA was lowest, however PFAS serum concentrations varied across firefighter job type where fire investigators had the highest PFOA, PFNA, and PFOS serum levels.

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Uptake of benzene and acrolein by firefighting instructors during live fire training

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Introduction: Live fire training entails ambient exposure of firefighting instructors to volatile carcinogenic substances like acrolein or benzene. Aim of our biomonitoring study was to investigate a potential uptake of these compounds by instructors

wearing self-contained breathing apparatuses during live fire trainings.

Material and Methods: N = 6 instructors completed five 2-h-training sessions each in a wood fueled fire simulation unit and provided urine samples including two samples before and one immediately after training, as well as further samples 1, 3, 6, 9, 11 and 18 h after training. All samples were analyzed for mercapturic acids (MA) of acrolein (3-hydroxypropyl-MA, 3-HPMA) and benzene (S-phenyl-MA, SPMA) using liquid chromatography-tandem mass spectrometry (LC-MS/MS) methods.

Results: While 3-HPMA could be detected in all urine samples (range 0.16-2661 μ g/g creatinine), detection frequency for SPMA (< LOD-0.98 μ g/g crea.) was strongly dependent on sampling time with higher detection frequencies post exposure. Excretion of both metabolites peaked 3 h after exposure with median values of 421.6 μ g/g crea. (3-HPMA) and 0.22 μ g/g crea. (SPMA) followed by a decline up to the next morning.

Conclusions: When compared to the non-smoking general population, increased internal exposure to benzene and acrolein was transiently found in about one third of the instructors despite respiratory protection. Whereas in case of benzene dermal uptake from combustion fumes could explain the results, for acrolein also an endogenous formation by enhanced lipid peroxidation due to heat and/or physical stress cannot be ruled out.

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Biomonitoring of chrome-plating workers: exhaled breath condensate (EBC) and Buccal cells as non-invasive biological matrices to evaluate Cr exposure and early genotoxic-oxidative effects

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Introduction: Inhalation of Cr, particularly Cr(VI), can induce genotoxic/oxidative effects on the respiratory tract. The aim of the study was to assess in chrome-plating workers, the suitability of Buccal Micronucleus Cytome (BMcyt) assay as biomarker of cyto-genotoxicity at target organ and of Exhaled Breath Condensate (EBC) to evaluate Cr exposure and oxidative effects.

Materials and Methods: We studied 20 workers and 11 controls. Environmental total Cr and Cr VI exposure were monitored by personal air sampling and ICP-MS and urinary Cr by Electrothermal atomic absorption spectroscopy (ETAAS). By BMcyt assay we evaluated cyto-genotoxic effects in exfoliated buccal cells. In EBC we analysed total Cr level by ETAAS and H₂O₂, malondialdehyde (MDA), HNE, 8-isoprostane by LC-MS/MS or ELISA kit.

Results and Conclusions: Environmental personal Cr and Cr VI were far below TLV. Urinary Cr level was low and without significant differences between pre- and post-work shift. The mean total Cr in EBC pre and post shifts were both below the LOD (0.025 μ g/l). BMcyt assay showed an increase of genotoxic parameters vs controls with a higher % of subjects positive to MN induction. The EBC biomarkers of oxidative stress H₂O₂, MDA and HNE were significantly higher than controls without differences between beginning

and end work shift. Despite the very low Cr exposure, the EBC biomarkers of oxidative stress and BMcyt assay evidenced oxidative and genotoxic effects at target organ for chrome-plating occupational exposure suggesting the use of both not invasive and sensitive biomarkers to evaluate the early effects of exposure in metal industry.

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Occupational exposure to TiO₂ particles: biomonitoring study of workers employed in the production process to evaluate the potential genotoxic effects

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Introduction: TiO₂ particles are used in paints, plastics, papers, food, cosmetics and pharmaceuticals. In addition, nano-sized TiO₂, is used as catalyst and in semi-conductor and solar cells industries. Workers employed in TiO₂ production plants may inhale TiO₂ particles during the production process. It has been demonstrated that nano- and micro-sized TiO₂ particles produce genotoxic damage. In our previous study on workers producing TiO₂ particles we found micronucleus induction in exfoliated buccal cells. In this work we aimed to verify, in the same workers, the presence of genotoxic effects also on lymphocytes by direct/oxidative DNA damage evaluation.

Material and Methods: We studied 40 exposed workers, 18 external controls and 5 office workers. We used fpg-comet assay on lymphocytes and for each subject we calculated the mean values of tail DNA%, tail moment (TM) and tail length (TL) comet parameters and of comets %.

Results and Conclusions: We did not find significant differences in the mean values of tail DNA%, TM and TL, the only parameter that resulted statistically higher in the exposed subjects vs controls resulted comets %. Data analysed taking into account the specific task (bagging, industrial cleaning, mobile operations, maintaining, production), only comets % was higher in industrial cleaners vs controls. These findings suggest that buccal cells, representing the first target cells for inhalable exposure, are the most sensitive type of cells to evaluate TiO₂ genotoxicity in exposed workers. Whereas lymphocytes don't seem to be a target of TiO₂ inhalation during the production process of such particles.

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Autophagy involves in the mechanism of nano-alumina induced neurotoxicity

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Introduction: Although the increasing use of alumina nanoparticles (AINPs) in biological materials has attracted much attention, the

underlying mechanism remains unclear. In this study, we aimed to investigate the neurotoxicity induced by AINPs and its potential mechanism.

Material and Methods: Primarily cultured neurons were treated with AlCl₃, nano-carbon, and alumina particles at different sizes of 10µm, 50nm, and 13nm, respectively. Spautin-1 as an autophagy inhibitor was added to distinguish the underlying mechanism. Moreover, female mice were treated with AINPs at concentrations of 0, 25, 50, and 75 mg/kg for 30 days. Furthermore, zebrafish embryo-larval was treated with AINPs, and autophagy inhibitor 3-methyladenine (3MA) was added to 6 to 144 hour post-fertilization (hpf).

Results and Conclusions: AINPs could cause primarily cultured neural cells death through autophagy, and Spautin-1 rescued the AINPs treated neural cells from autophagy thus increased cell viability. In AINPs treated mice model, spatial learning and memory of the mice were impaired. TEM revealed autophagosomes in the ultra-structure images and autophagy-related proteins LC3II and Beclin1 expression was upregulated. In the zebrafish model, AINPs could lead to embryo developmental delay at 12 and 24 hpf and impaired locomotor activity. Meanwhile, autophagy-related genes expression of Beclin1, Vps34, and LC3II increased in AINPs treated zebrafish larvae and could be reversed by autophagy inhibitor 3MA. Taken together, our experiments indicated that autophagy is an independent mechanism that involves in AINPs induced neurotoxicity.

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Chemical And Carcinogenic Risk Assessment In An Used Oil Regeneration Plant During Ordinary And Turnaround Activities

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Introduction: In the regeneration of used oil, exhausted oils are regenerated to produce high performing oil bases. Aim of this work was to assess exposure to volatile organic compound (VOC), including benzene, and polycyclic aromatic hydrocarbons (PAHs), in plant and maintenance workers during normal and turnaround activities.

Materials and Methods: The evaluation was performed in two Italian plants during multiple surveys from 2017 to 2020. During normal activities, 100 workers were monitored for the whole work shift with personal air samplers; end of the shift urine samples were collected for biological monitoring. Eighteen turnaround workers were investigated with biological monitoring, collecting multiple urines before and at the end of the shift during the 2-week operations.

Results: For all jobs, during normal activities, exposure to benzene, VOC and PAHs was well below occupational limit values; personal and biological monitoring yielded a similar picture; tobacco smoking was the major source of exposure in smokers. During turnaround, 58% of end-shift samples from workers entering the distillation column for cleaning had urinary 1-hydroxypyrene higher than 2.5 µg/L, recommended ACGIH BEI; both inhalation and dermal exposure were major exposure routes. No issue for other chemicals and other jobs was observed.

Conclusions: In the regeneration of used oils, normal production activities do not pose a risk for exposure to chemicals in workers. Conversely, turnaround represents a critical operation for exposure

to PAHs; preventive actions should be adopted to reduce exposure in those involved in entering the plants.

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A Human Biomonitoring Strategy For Exposure Assessment In Occupational Settings With Unpredictable Peaks Of Solvents Exposure

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INTRODUCTION : Human biomonitoring (HBM), is an important asset to determine directly the concentrations of the substances or their metabolites in the body and to evaluate the subsequent health risks due to exposure.

MATERIALS and METHOD: We investigated workers exposed to a wide range of solvents, with unpredictable peaks of exposure, during the remediation works in a polluted old industrial site. We collected urine samples during 6 months (pre-shift at the beginning and post-shift at the end of the workweek) and analyze for methylhippuric acid, S-phenyl mercapturic acid, muconic acid, mandelic acid, phenylglyoxylic acid, hippuric acid, o-cresol and trichloroacetic acid. We performed continuous air monitoring using PIDs for solvents (because of high variability in exposure levels). We collected information about the performed tasks and PPEs.

RESULTS and CONCLUSION: Concentrations of urine metabolites were highly related with exposure. We observed substantial differences at group level when there were unexpected exposure peaks. This was more pronounced, when in combination with a new team of workers. In contrast with their colleagues, working for several months, the new team showed for instance higher concentrations of S-phenylmercapturic acid at the end of the workweek ($98.6 \pm 12.7 \mu\text{g/L}$) as compared to the beginning of the workweek ($5.0 \pm 2.1 \mu\text{g/L}$). The increased levels did not persist in the following weeks, upon proper use of PPEs. HBM is a highly relevant tool for occupational exposure and risk assessment, highlighting differences in working conditions and providing important information at individual and group level.

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Current status of Occupational Exposure Limits (OELs) for chemical substances and physical hazards recommended by the Japan Society for Occupational Health (JSOH)

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Since 1960, the Japan Society for Occupational Health (JSOH) has recommended Occupational Exposure Limits (OELs) as reference values regarding adverse health effects due to occupational exposure to chemicals and physical hazards. The OEL-Mean (OEL-M) for a mean concentration is the reference value of a substance's mean exposure concentration at or below which adverse health effects due to the substance do not appear in most workers working 8 hr/day, 40 hr/week under a moderate workload. The OEL-Ceiling (OEL-C) is a substance's maximal exposure concentration, and the OEL-Based on Biological Monitoring (OEL-B) is the value obtained by biological monitoring to prevent adverse health effects of a substance. A skin notation is provided for chemicals a significant dose of which (regarding systemic health effects or the chemical's absorption) may be absorbed through the skin at contact. Classifications of carcinogens, occupational sensitizers, and reproductive toxicants are based on the strength of the available evidence. Exposure limits to noise, vibration, thermal factors, and non-ionizing radiation describe conditions in which workers can work without health impairment. Provisional new OELs can be proposed at the annual JSOH meeting and set until the next meeting; opinions/suggestions may be accepted. The JSOH's Journal of Occupational Health and Environmental and Occupational Health Practice publishes a summary of OELs and recommendations after each meeting. As of 2021, 230 OELs and the classifications of 238 carcinogens, 65 sensitizers, and 46 reproductive toxicants have been provided.

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Occupational bladder tumors: about 31 cases

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Introduction: Bladder cancer is the second most observed occupational cancer after respiratory cancer in Tunisia. However, its recognition as an occupational disease remains far below the reported cases.

Objective: To Study the socio-professional, clinical and medico-legal characteristics of occupational bladder tumors and to assess their impact on ability to work.

Material and methods: Retrospective descriptive study of bladder cancer cases referred for professional investigation to the Department of Occupational Medicine of the Hospital Rabta, in Tunis, between 2004 and 2021.

Results: We identified 31 cases (30 males and a woman) with a mean age of 60.7 ± 12.4 years. The sectors most responsible were agriculture (36%) and building and construction (36%). Patients were mainly employed as farm workers (36%) and painters (36%), exposing to aromatic amines (58%), polycyclic aromatic hydrocarbons (19%) and arsenical pesticides (32%) without use of personal

protective equipment in 97% of cases. The majority (90%) were smokers. The time to onset of symptoms from exposure was 31.2 ± 14.2 years. The main symptoms were hematuria (55%) and urinary burns (19%). Declaration as a compensable occupational disease was only possible in 42% of cases. The etiological agents retained were aromatic amines (11 cases) and polycyclic aromatic hydrocarbons (2 cases). This pathology justified a change of workstation in 9 cases and a disability to work in 4 cases.

Conclusion: Occupational exposures are a common cause of bladder tumors after smoking. The often-delayed onset of this pathology justifies post-occupational follow-up of exposed employees.

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A new, simple, and rapid microextraction method in biological monitoring of benzene-exposed workers based on In-syringe strategy and ionic liquid

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Occupational exposure to benzene has been occurring for several years across a wide range of industries contributed to a number of adverse health effects, such as bone marrow depression, aplastic anemia, and acute myelogenous leukemia (AML). Besides, the International Agency for Research on Cancer (IARC) classified benzene as a group 1 carcinogen. Therefore, considerable attention has often been given to biomonitoring of benzene in exposed workers during routine occupational health services. *trans, trans*-muconic acid (*t,t*-MA) has been widely used as a biomarker in biological monitoring of benzene-exposed workers at a limit set of 0.5 mg/g of creatinine during routine occupational health services. In the present study, a novel microextraction technique, In-syringe Ionic Liquid-Dispersive Liquid-Liquid Microextraction (IL-DLLME), was implemented for preconcentration of *t,t*-MA followed by analytical determination by High Performance Liquid Chromatography (HPLC) with UV detection. Moreover, the important variables affecting In-syringe IL-DLLME performance including needle diameter, volume of the spiked sample, volume of the Ionic Liquid (IL), salt addition, rotation speed of centrifugation, centrifuge time, and ultrasonic time were optimized by experimental design. A good linear relationship was observed at the range of 0.032–10 $\mu\text{g mL}^{-1}$ between the peak area and the concentration levels ($R^2=0.9997$). The limit of detection and extraction recovery for *t,t*-MA were 0.011 $\mu\text{g mL}^{-1}$ and >96.2%, respectively. This method provided easy and rapid analysis of low amounts of urinary *t,t*-MA with simple equipment.

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Evaluation of dermal exposure to 5-Fluorouracil in a healthcare setting

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INTRODUCTION: Monitoring exposure to anticancer drugs represent a fundamental approach to protect healthcare personnel. In this study, we evaluated the dermal exposure to 5-Fluorouracil (5-FU) for the personnel of a hospital pharmacy and the efficiency of the cleaning procedure, by using an ultrasensitive LC-MS/MS method.

MATERIALS and METHOD: 66 samples were collected from the gloves (internal and external) and from the hands of 9 workers; 52 surfaces samples were also collected with polyester swabs, before and after the cleaning procedure, in the pharmacy department (PD) and in the outpatient nursing stations (ONS).

RESULTS and CONCLUSION: The mean concentration of 5-FU found on external gloves was 100 ± 94 pg/cm^2 (33% of samples below LOQ), while on the internal gloves it was 2 ± 1 pg/cm^2 (76% below LOQ). On the hands, only 3 samples had detectable level (0.54, 1.18 and 0.38 pg/cm^2). The surface samples collected in the PD before cleaning, showed a mean of 31 ± 19 pg/cm^2 while, after the cleaning, the mean concentrations decreased to 9 ± 7 pg/cm^2 . The highest concentrations were found on primary packing of 5-FU and on the vials (0.347 and 178 ng/cm^2). The samples collected on the ONS surfaces before the cleaning showed a median concentration of 40 ± 19 pg/cm^2 that is reduced to 29 ± 12 pg/cm^2 after cleaning the surfaces. With this study, we showed that the cleaning procedure and the gloves used are able to minimize the exposure of the personnel. Despite the very low level of 5-FU detected, the chemical was ubiquitous in the working environment, demonstrating the necessity of establishing realistic limit values.

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Altered hematological parameters in gasoline station workers due to benzene exposure

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Background: Benzene is harmful to human health and can cause leukemia, and gasoline station workers have potential health risks concerning benzene exposure. Early detection of hematological alterations is important in preventing adverse health effects. This study aimed to investigate the biomarkers of exposure and effects because of hematological alterations.

Methods: The gasoline station workers with health risks concerning benzene exposure ($n=20$) had undergone evaluation of blood and urine, collected at the end of shift work for the biological monitoring of urinary *trans, trans*-muconic acid (*tt*-MA), and hematological and biochemical parameters evaluation. The results were analysed for correlation between biological and hematological effects.

Results: There was detection of *tt*-MA in these workers with a median (min-max) of 132.92 (13.69–301.47) $\mu\text{g/g}$ creatinine. There were 50% of workers who had a blood profile that showed abnormal parameters with respect to hemoglobin (Hb), hematocrit (Hct) abnormality and a white blood cell (WBC) result which was outside the normal range. The SGOT values of the fueling workers (median=18, min-max:7–47 U/L) were significantly higher than those of the cashiers (median=9, min-max: 3–11 U/L). A significant

correlation between the biological marker, tt-MA, and the hematological and biochemical parameters, which were Hb, Hct and blood creatinine, was observed.

Conclusion: The biological exposure marker (tt-MA) had a correlation with hematological and biochemical alterations in blood, suggesting that the gasoline station workers had been affected by benzene exposure and early detection of this exposure.

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Cholinesterase Activity In Occupational Workers Exposed To Pesticides : A Case Study From Morocco

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Introduction: Pesticides constitute a real threat to human health. Cholinesterase activity can be an excellent biomarker of occupational exposure to organophosphates and carbamates.

Methods: 250 farmers were recruited in the Meknes region in Morocco. Data were collected using a detailed questionnaire including epidemiological characteristics, toxic habits, clinical data, living conditions, and protective and preventive working conditions. The determination of acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) was performed on whole blood samples using spectrophotometry. A broad toxicological screening by Gas Chromatography-Tandem Mass Spectrometry (GC-MS/MS) was performed on urine samples.

Results: 53% of farmers were women. More than 69% had basic or no education. 51% were aware of safe pesticide use guidelines but not automatically following them. 36,7% had low levels of cholinesterase activity, 10% had moderately reduced levels. The screening revealed the presence of Atrazine, Chlorpyrifos, and Malathion residues.

Conclusion: Our results suggest that exposure to a mixture of organophosphates and triazines may decrease the AChE activity and induce toxicological effects. Regular biomonitoring of these biomarkers along with awareness-raising campaigns and training of farmers on the safe use of pesticides is recommended.

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Effects of 1-bromopropane on the vibration perception thresholds of male workers

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Introduction: 1-Bromopropane (1-BP, CAS No. 106-94-5) is used as a cleaning agent in many industries and has been linked to peripheral nerve toxicity. The present study was aimed to clarify the

relationship between 1-BP exposure and peripheral nerve toxicity (PNT) in male Japanese workers.

Subjects and Methods: We first classified workers exposed to 1-BP as the direct- exposure group (n=14) and the indirect-exposure group (n=8) based on 1-BP exposure status and handling. We recruited age-matched control employees (n=31) for each exposure group. Personal exposure monitoring by a passive air sampler was conducted for each study subject during the entire work shift. The exposure groups' vibration perception thresholds at 63, 125, and 250 Hz were measured by a vibration sensation meter as a marker of PNT and compared with those of the controls.

Results: The direct- and indirect-exposure groups' geometric mean and standard deviation of 1-BP individual exposure concentrations were 0.8 (6.6) ppm and 0.2 (4.1) ppm, respectively. There was no significant difference in the vibration perception thresholds between each exposure group and its age-matched control group.

Conclusions: Direct and indirect 1-BP exposures were lower than previous reports. Our results suggest that low 1-BP exposure did not affect workers' vibration perception threshold.

24. RADIATION AND WORK

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Australian National Radiation Dose Register (ANRDR)

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Introduction: The ANRDR is a centralised database designed for the storage, maintenance and dissemination of dose records for workers occupationally exposed to ionizing radiation. In alignment with international best practice, these records should be maintained until the worker attains the age of 75, and at least 30 years after cessation of work resulting in occupational exposure. The ANRDR aims to expand to capture the radiation dose records for all occupationally exposed workers in Australia.

Methods: The ANRDR has been receiving dose data from the Australian uranium mining and milling industry since 2010. In 2018 it expanded to include coverage to some mineral sands mining and processing and Commonwealth organisations. ARPANSA has commenced engagement with all Australian dosimetry service providers to develop a path for the direct submission of records from them. Direct submissions from dosimetry service providers will cover most occupationally exposed workers in Australia.

Results: The ANRDR provides a single uniform national approach to the management of radiation dose records for workers and ensures the longevity of records for the long-term. This will ensure that records remain available to workers and analysis of data will facilitate optimisation of radiation protection programs. This presentation will review existing data and ongoing challenges.

Conclusion: This presentation will provide an analysis of the data contained in the ANRDR in the context of dose limits, and discuss the capabilities, benefits, and challenges in expanding the ANRDR to capture exposures for all occupationally exposed workers.

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The new Australian standard for protecting workers from occupational exposure to radiofrequency radiation*Ken Karipidis, Stuart Henderson, Sarah Loughran**Australian Radiation Protection and Nuclear Safety Agency, Radiation Health Services, MELBOURNE, Australia*

Introduction: Workers in various industries are often exposed to radiofrequency (RF) radiation at levels much higher than what's encountered in the every-day environment. To protect workers from the harmful effects of RF radiation, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) published a national RF exposure standard in 2002. Since then, there has been a considerable body of science further addressing the relation between RF radiation and adverse health effects.

Material and Methods: ARPANSA developed a new RF exposure standard by assessing the latest evidence on the effects of RF radiation and examining new guidelines on limiting exposure published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 2020. ARPANSA also consulted with various stakeholders including relevant industries in developing the new standard.

Results: In February 2021, ARPANSA published a new RF exposure standard to protect workers and the general public. The new Australian standard has adopted the exposure limits of the 2020 ICNIRP guidelines and it includes specific requirements for the management of risk to workers. Australia is one of the first countries in the world to harmonize with the updated ICNIRP guidance.

Conclusions: The exposure limits in the new Australian standard protect workers from all scientifically substantiated adverse health effects of RF radiation. It can be used by industry to manage risk in different settings and regulatory authorities for controlling occupational RF exposure.

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The Development of Mobile Communication System and Human Health Risks*Nina Rubtsova, Sergey Perov, Olga Belaya**FSBSI "RIOH", EMF, Moscow, Russian Federation*

The introduction of new 5G communication networks may change the current electromagnetic environment. 5G mobile networks will transmit 35% of the total traffic and can cover up to 65% of the world's population in 2024. EMF are health risk factor: under occupational, general public exposure, and by electromagnetic field (EMF) emitters' use. The problem of occupational and general public electromagnetic safety due to 5G communication systems implementation is very important. Mobile communication system development leads to frequency ranges elevation (from 450, 850-900 and 1,800-2,100 MHz at 1-3G, up to 2.6 GHz at 4G standard and up to 10-40.5 GHz at 5G standard) without enough 2-5G EMF exposure human health risks data. The development of 2-5G EMF risk problem management includes: the need to improve hygienic regulations; new methods of EMF control enhancements suitable for new frequency rangers, cellular standards, widespread radio channels, beamforming technology; as well as study of new risks (connected to new EMF sources) in order to assess and reduce the likelihood adverse effects. It is very important to carry out experimental studies directed to find the possible biological effects of

current and future mobile communication standards EMF frequency ranges. Carried out comparative study directed to assessment of 2-4G and 5G EMF chronic exposure biological effects, as well as the new base station EMF exposure assessment pilot study results allowed the prospective direction of occupational and general public electromagnetic safety directions under 5G mobile communication system development.

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A systematic review on occupational exposure to radiofrequency electromagnetic fields and risk of cancer: preliminary results from an Italian research project*Alberto Modenese¹, Giulia Bravo², Carlo Grandi³, Mauro Biffoni⁴, Fabriziomaria Gobba¹**¹ University of Modena & Reggio Emilia, Department of Biomedical, Metabolic and Neural Sciences, Modena, Italy, ² University of Udine, Department of Medicine, Udine, Italy, ³ Italian Workers' Compensation Authority (INAIL), Department of Occupational and Environmental Medicine, Epidemiology and Hygiene, Monte Porzio Catone, Italy, ⁴ Italian National Institute of Health, Department of Oncology and Molecular Medicine, Roma, Italy*

Introduction: The aim of the systematic review (SR) is to evaluate available scientific evidence from human studies on the possible associations between occupational exposure to radiofrequency (RF) electromagnetic fields (EMF) and risk of cancer.

Methods: The SR is part of the Italian research project BRIC 2018 – ID 06, supported by INAIL (PROSPERO code: CRD42020200202), and is conducted according to PRISMA statements. All the studies on workers with documented occupational exposure to RF-EMF (frequency range: 3 kHz - 300 GHz) and medical diagnosis of cancer are considered for inclusion. Original research published in English language in peer-reviewed international journals are included, with no restriction for publication period.

Results: According to a preliminary evaluation of SR results, the studies have been focused on different types of cancer, including brain tumors and various other. A major problem is that, with the exception of a few studies applying a detailed exposure assessment based on individual RF exposure data, in the large majority of the studies the evaluation of occupational RF-EMF exposure is affected by various types of bias. Moreover, in many of the job categories enrolled in the studies, a co-exposure to other occupational carcinogens is expected, potentially affecting the overall results.

Conclusions: The SR is still ongoing, but preliminary results suggest that the heterogeneity of the available studies, both considering job categories and outcomes evaluation, as well as various bias in the exposure assessment, limits the possibility of a pooled quantitative synthesis of the studies' results.

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Measurement of leisure time solar ultraviolet exposure - Further step to better understanding the mechanisms of skin cancer*Claudine Strehl¹, Marc Wittlich²**¹ Institute for Occupational Safety and Health of the German Social Accident Insurance, Ergonomics, Physical environmental factors - Unit Radiation, Sankt Augustin, Germany, ² Institute for Occupational Safety and Health of the German Social Accident Insurance, Accident Prevention: Digitalisation - Technologies, Sankt Augustin, Germany*

Introduction: The availability of detailed measurement data concerning exposure to solar ultraviolet radiation (UVR) builds the basis for designing comprehensive and tailor-made prevention concepts addressing every person from childhood up to high age. A substantial fraction of UV exposure is accumulated during leisure times. Thus, a holistic approach including occupational and leisure times is reasonable and necessary.

Material and Methods: Based on personal dosimetric measurements using the GENESIS-UV measurement system UV exposure was quantified for 14 typical leisure time activities. These activities were chosen considering statistical evaluations breaking down the average daily routine to single activities and the average time spent for them. Only activities that are substantially associated with UV exposure were selected for our measurements.

Results: Our measurements showed, that daily mean UV doses only vary slightly throughout the different outdoor activities. The determining factor for the exposure is primarily given by the duration of each activity. In combination with detailed information about the statistical average duration during the day for each of these activities a mean value for the average UV exposure during leisure time could be calculated.

Conclusions: Acquired data can build the basis for exposure registers listing UV exposure for different occupational and leisure time settings. In a modular design the construction of any exposure scenario is possible by only varying the duration for selected activities. Thus, any scenario of lifetime UVR exposure can be assessed.

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Low-dose radiation exposure and risk of pancreatic cancer among workers at nuclear power plants: a meta-analysis

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Introduction: A growing body of evidence supports the need to elucidate the association between occupational exposure to low radiation doses and cancer risks. This study aimed to investigate the association between low-dose radiation exposure and pancreatic cancer risk among workers at nuclear power plants using meta-analysis.

Materials and Methods: We searched four databases, screened eligible studies (excluding nuclear accidents), and applied random-effects models in meta-analysis and meta-regression to estimate the effects of radiation on pancreatic cancer.

Results: A total of 130,029 workers from 93 nuclear power plants in Canada, the United States, France, and Germany from four studies were included in the analysis. Our meta-regression showed that with a millisievert increment in the radiation dose, the relative risk of pancreatic cancer would be 1.02-fold (95% CI: -0.97–1.07; P=0.293). Compared with workers without occupational exposure, pooled risks of pancreatic cancer were lower in workers exposed at 1–49 mSv (RR=0.72, 95% CI: 0.36–1.43; P=0.070) and those working at workplaces potentially ≥ 100 mSv (RR=0.21, 95% CI: 0.00–11.11; P=0.080), but higher in those at 50–99 mSv (RR=1.83, 95% CI: 0.50–6.68; P=0.845).

Conclusions: Workers at nuclear power plants should be protected by protective equipment for regulatory compliance, resulting in the

lowest relative risk. Although such an association did not reach statistical significance due to the small sample size, a slightly elevated risk of pancreatic cancer among workers at 50–99 mSv warrants a need to tighten protection standards.

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Knowledge, attitudes and practices of hospital radiology staff with regard to radiation protection (RP)

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Introduction: RP is based on the application of 3 principles, namely justification, optimization and limitation, which were established by the International Commission on radiological protection. This study aimed to assess the knowledge, attitudes and practices of hospital radiology staff regarding RA.

Material and methods: This cross-sectional study, carried out in 2021 in Morocco, involved 192 HCWs exposed to the risk of irradiation (156 radiology technicians, 32 radiologists and 4 service staff) with occupational seniority > 1 year and working full time. The self-administered questionnaire recommended by UNSCEAR included socio-demographic and occupational parameters and items relating to knowledge, attitudes and practices on RP.

Results: The fundamentals of RP were unknown by 29.2% and its objectives by 59.6%. Only 24.5% were satisfied with the information on the risk of exposure. 57.8% reported that their RP status was not up to date and 71.9% did not benefit from specific medical follow-up by the occupational physician. The design of the premises did not meet RP standards for 39.6%. The RP regulations mentioning the authorized dose limits were not displayed, as was the service plan specifying the traffic areas with the location of sources and the intervention plan in the event of accidental exposure to radios. Personal dosimetry was non-existent for 20.8%. 63% informed the patient of the risks of ionizing radiation when it seemed necessary to them.

Conclusions: Limited knowledge and faulty attitudes and practices towards radiation exposure require national supervision of RP of HCWs. On-the-job training is necessary.

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Equivalent Dose and Use of Radiological Protection in Orthopaedic Surgeons of a Specialized Medical Unit

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OBJECTIVE: The objective was to evaluate the equivalent dose (ED) and the use of radiological protection (RP) in orthopedic surgeons (OS) of a highly specialized medical unit in the State of Mexico.

METHODS: Quantitative, transversal, prospective and analytical study; which evaluated a non-probabilistic sample for the convenience of 29 CO in training and base. Twenty-nine personal dosimeters were used to evaluate ED for 12 months, Inlight reader, demographic, labor questionnaire, RP knowledge and surgery data. The statistical analysis included descriptive and inferential statistics: Student's t test ($p < 0.05$).

RESULTS: OS in training presented an average of SD of 3.17 ± 0.90 mSv; 7.88 ± 6.38 surgeries and 2.02 ± 2.23 minutes of exposure and the base OS 2.77 ± 1.74 ; 20.85 ± 12.31 and 3.48 ± 2.16 respectively, finding significant differences in the number of surgeries between both groups ($p < 0.05$); spine surgeries were more frequent ($n = 177$), there are significant differences in exposure time (ET) in spinal surgeries between both groups ($p < 0.05$). 62% ($n = 18$) of the participants never received PR training and 76% ($n = 22$) did not know the annual dose limit to ionizing radiation.

CONCLUSIONS: The ED is < 5 mSv. Compliance with PR measures is low. There is a misinformation in PR. There are no significant differences in the ED and exposure time (ET) between the groups studied. There are significant differences in the number of surgeries between both groups and the ET during spinal surgeries.

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Thyroid parameters variations in healthcare workers and students exposed to low-dose ionizing radiations

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Background: Ionizing Radiations (IR) are an important occupational risk factor for the potential damage that can cause to workers' health and for their presence in numerous professional settings. Thyroid gland is one of the most sensitive organs to damage and an important target of IR, leading to functional and organic diseases. The aim of this study is to assess the variations in thyroid hormones, in a population of HCW exposed to low-dose IR.

Methods: 121 individuals of the teaching hospital Umberto I in Rome exposed to IR (78 HCW, 17 Residents and 26 Students Radiology Technicians) were observed assessing serum levels of different thyroid function parameters as free triiodothyronine, free thyroxine and thyroid stimulating hormone at T1, T2 and DeltaT. Age, gender, history of thyroid diseases, BMI and smoke were analyzed as possible influencing factors using linear and multiple logistic regression analysis.

Results: Analyzing TSH, fT3 and fT4 serum levels, in two different measurements (T1 and T2) and considering Delta between them, adjusting for different confounding factors, data showed no variation of TSH levels related to occupational exposure, an increase of fT3 hormone values ($\beta = 0.896$) in HCW and residents, and a decrease of fT4 in HCW ($\beta = -1.095$).

Conclusion: Low dose IR influences levels of free thyroid hormones, with no variation in TSH, which could result in a functional or organic disease. So, a continuous surveillance through a periodic

check of all the thyroid hormones for an overall view of each HCW is recommended.

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Occupational exposure to solar UV radiation: methods and first results of a multi-disciplinary expert assessment within the EPHOR project

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Introduction: Solar radiation exposure is a relevant risk factor in many occupational activities and a widespread occupational carcinogen. A proper quantitative assessment of ultra violet (UV) exposure levels in different occupations is among the main issues for an adequate risk evaluation and prevention.

Material and Methods: Within the "Exposome Project for Health and Occupational Research" (EPHOR), three expert groups, i.e. for Northern, Central and Southern Europe, including 10 individual assessors, independently evaluated the probability and duration of daytime outdoor work between April and September for all occupations of the International Standard Classification of Occupations 88 (ISCO-88). The assessment is a multi-step process, in order to reach final European expert scores for the three regions. All 390 ISCO-88 occupations have been rated by the assessors, within four categories of a) 0; > 0 to < 25 ; ≥ 25 to < 50 ; $\geq 50\%$ and b) 0; > 0 to 2; > 2 to 4; > 4 hours respectively for probability and duration of current outdoor work.

Results: The results of the first round of assessment of the three groups have shown good agreement between assessors for the low and high categories and ranged between 0.48 and 0.64 both with respect to probability and duration. The overall interrater agreements ranged between 0.43 and 0.48 across the three European regions.

Conclusion: This effort will finally aim at building a quantitative job exposure matrix (JEM) for a detailed evaluation of occupational solar UV radiation exposure in different occupations, that will also include personal UV measurements.

25. RESPIRATORY DISORDERS

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Inflammation features and phenotype of occupational chronic obstructive pulmonary disease attributed to industrial aerosol containing nanoparticles

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Introduction: The impact of incidental nanoparticles (NPs) on biomechanism and phenotype of occupational COPD is not studied enough. The objective was to establish monocyte profile and phenotype of COPD due to aerosols containing NPs.

Material and Methods: It was an observational study recruited occupational COPD patients (GOLD criteria, n=50) exposed to industrial aerosols containing NPs. Comparison group – smokers with COPD (n=50). Controls – 50 healthy people. NPs at workplaces air were measured by inductively coupled plasma atomic emission spectrometry and by scanning electron microscopy. Groups were matched by age and gender. Monocyte subsets were detected by flow cytometry. Spirometry, body plethysmography, lung diffusing capacity (DLco) were done.

Results: Occupational COPD subjects were exposed to metal NPs (n=26) and silica NPs (n=24) with mass concentration 5 – 625 ng/l. In COPD patients exposed to metal NPs CD14+CD16- monocytes were predominant (96.4%±2.3%) and had highest expression of CCR5 (35.3%±1.5%). In exposed to silica NPs the highest rate of CD14DimCD16+ monocytes (20.1%±1.2%) with highest expression of CCR2 (29.4%±0.9%) were seen. In univariate linear regression analysis mass concentration of metal NPs was associated with classical monocytes (B=1.5), CCR5 (B=1.3), DLco (B=-1.2), forced expiratory volume in one second (FEV1) (B=-0.8), functional residual capacity (B=1.5), sputum eosinophil count (B=1.2), of silica nanoparticles – with non-classical monocytes, CCR2, DLco (B=-1.6) and FEV1 (B=-0.8).

Conclusions: Exposure of incidental NPs is associated with monocyte profile and COPD phenotype.

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“Work-related Respiratory Symptoms and associated factors among Cement Factory Workers in Rupandehi district, Nepal”

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Introduction: Cement factory workers are exposed to cement dust at workplace. It leads to a greater prevalence of chronic respiratory signs and symptoms. The objectives of this study is to identify the prevalence of Work-related respiratory symptoms, its association with various risk factors, and to assess the outcomes like hospitalization and sickness absenteeism.

Method: Cross-sectional study was conducted in Argakhanchi Cement factory among 190 workers with minimum work experience of 1 year. Census method was used for data collection. To assess the respiratory symptoms, sputum samples were collected; smears prepared by pick and smear method, and later stained by Leishman and pap stain. Smears devoid of alveolar macrophages were considered unsatisfactory for evaluation.

Result: The mean age of respondents with standard deviation was 35.56±11.45 years. The prevalence of Work-related respiratory symptoms was 31.6% with chronic cough (18.9%) being the most common. Skin (24.2%) and eye (21.6%) problems were the most common health problems. Age, no. of years worked, working in the raw materials department, burner and clinker department and cleaning department were the significant risk factors. On cytological analysis of the sputum sample, a mild inflammatory cell noticed in 71.6%, moderate inflammation in 23.7%, and dense inflammation in 4.2%. Fungal spores were seen in 3.7%, fungal pseudohyphae in 0.5%, and bacterial colonies in 27% of the sputum samples.

Conclusion: Pre-employment and periodic medical examination, frequent work shift, training on occupational health and safety is recommended to reduce respiratory symptoms.

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Sleep apnea syndrome screening in occupational medicine using a sensor

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Introduction: To date, there are certified external medical devices that analyze sleep during the night, at home. These sensors are much less restrictive than spending a night in the hospital. The aim of our study was to assess the feasibility and the interest of using a sleep sensor in subjects monitored in occupational medicine for sleep apnea syndrome (SAS) screening.

Materials and methods: We conducted a cross-sectional study on the prevalence of SAS using the Sunrise® sensor. The project was carried out in a Seveso company of 470 workers where the Labor Prevention and Protection Committee (management and unions) agreed. Thirty-nine volunteer subjects, having no SAS state known, selected by the occupational physician during the annual medical examination based on symptoms (Epworth score, snoring, apnea, poor quality of sleep, daytime sleepiness or drowsiness) and/or comorbidity factors (arterial hypertension, overweight, smoking, diabetes) received a sensor for a test night. The sample is mainly composed of men, and more than half of the subjects are working shift work.

Results: According to Respiratory Disturbance Index, 25 (64 %) and 11 (28 %) subjects had respectively ≥ 5 and ≥ 15 events per hour.

Three subjects had less than 5 events per hour. Fourteen subjects (36 %) had positional sleep apnea. Sleep hygiene was discussed, and 36 workers (92 %) were referred for myofunctional therapy. Conclusion: Home sleep sensors can be useful for screening SAS in all employees. This screening could be systematic during the periodic medical examination. We are the first Occupational medicine service to use this sensor in Belgium.

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Screening and prevalence of chronic obstructive pulmonary disease and its comorbidities amongst handicraft tanners

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Introduction: tanners are known for their heavy tobacco and cannabis smoking, and their occupational exposures to high levels of vapors, gases, dusts, and fumes. The aim of the study was to screen and to evaluate the prevalence of chronic obstructive pulmonary disease, and its comorbidities.

Material and methods: This cross-sectional study took place in tanneries of Marrakesh and Fez, and involved representative sample of 723 handicraftsmen tanners. The methods included a standardized questionnaire, a clinical examination, a spirometry, and biological measures. The questionnaire was composed of three sections: sociodemographic and occupational characteristics, toxic habits, and health status.

Results: The prevalence of tobacco smoking (current smokers + former smokers) was 56.4%. The prevalence of symptoms of tracheobronchial irritation was 21.1% for cough, 17.5% for sputum 15.3% for dyspnea and 10.2% for chest wheezing. The frequency of persistent rhinitis was 26.8%, asthma 9.3%, chronic bronchitis 14.1% and COPD 11.2% (14.2% for current and former smokers versus 7.3% for never smokers). The prevalence of COPD was reaching 29.3% among those who smoked more than 10 pack-years and 42.4% among those who smoked more than 20 pack-years. The prevalence was 37.2% among subjects over 40 years old who had smoked more than 10 pack-years. 69.3% of people with COPD had one or more chronic comorbidities: 67.6% musculoskeletal, 49.2% cardiovascular, 29.7% neuropsychiatric, 61.2 % digestive and 34.6% metabolic disorders. Conclusion: The artisanal tanners were at high risk of COPD. Prevention and early detection are necessary.

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Respiratory signs of workers in a wheat flour mill in Abidjan in 2020

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Introduction: The respiratory tract is the site of a multitude of environmental attacks that can induce or be at the origin of relatively serious or disabling pathologies.

Objective: To study the respiratory signs of workers exposed to wheat flour dust in a flour mill.

Material and methods: using a guided questionnaire inspired by the British Medical Research Council (BMRC) model, we conducted a descriptive and analytical cross-sectional study of respiratory diseases among workers in a flour mill specializing in wheat processing

Results: The workers were generally male (77.8%), with an average age of 38 years and a professional seniority of more than 5 years (82.5%). PM 2.5 particle concentrations ranged from 15 to 104 µg/m³. PM 10 concentrations ranged from 91 to 853 µg/m³. The dustiest areas were the conditioning room and the bagging areas with respectively 3407 µg/m³, 1846.2 µg/m³ and 1397.5 µg/m³. Clinically, the main respiratory manifestations presented by workers were rhinorrhea (84.1%) and nasal obstruction (60.3%). These respiratory manifestations generally occurred after inhalation of dust (35%) and fumes or gases (25.4%). In addition, the occurrence of dyspnea during brisk walking was found in 28.6% of cases. The spirometry performed revealed a restrictive syndrome in 7.9% of the millers and an obstructive syndrome in 1.6%. The onset of respiratory manifestations was significantly observed in suckers (p = 0.00). Also, there was a statistically significant association between the nature of respiratory protection and the spirometry abnormality (p = 0.019).

Conclusion: A high proportion of suckers presented respirat

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Study of Respiratory Manifestations Among Workers of Joinery Cabinets in Conakry-Guinea in 2019

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Introduction: In order to determine the level of dust in the workshops and to identify the respiratory manifestations encountered in the wood workers, this study was conducted.

Method: Over a period of 2 months, we carried out a descriptive and analytical cross-sectional study of respiratory diseases incurred by woodworkers in carpentry workshops, on the site called Dabondy (Conakry-Guinea). The questionnaire based on the British Medical Research Council (BMRC) version 1986 model for respiratory symptoms was used to collect data. Then we carried out spirometry to the study workers and measured the dust in the working environment of the workshops.

Results: All of the 273 workers were male with a mean age of 28.9 ± 9.4 years. The majority were carpenters / cabinetmakers (76.92%) and 54.95% had more than 10 years of professional experience. The measurements showed that the working

atmosphere of 83.3% (10) workshops was polluted. The main respiratory manifestations presented by the workers were sputum (41.75%), dyspnea (37.36%) and nasal obstruction (30.76%). These respiratory signs were generally (67%) exacerbated during working days and their improvement during rest days. The spirometry was abnormal in 72 (26.4%) workers. A statistically significant link was found between spirometry disorders and the favoring workstation ($P=0.001$), professional length ($P=0.000$) and the level of dust ($P=0.000$).

Conclusion: Woodworking in the informal economy exposes workers to high levels of wood dust concentrations. The present study revealed a significant preponderance of respiratory signs in this population with disturbance of the spirometry

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A cross-sectional study on Correlation of Clinical COPD Questionnaire (CCQ) With BODE Index in stable patients of Chronic Obstructive Pulmonary Disease (COPD)

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Introduction: COPD is the fourth leading cause of death in the world. The Global initiative for Chronic Obstructive Lung Disease (GOLD) staging and BODE (body mass index, airflow obstruction, dyspnea and exercise capacity) index are well known to access severity. Clinical COPD Questionnaire (CCQ), a questionnaire categorized into three domains (symptoms, functional and mental state) was developed to measure health status of COPD patients. Little is known about the relationship between CCQ score and BODE index.

Material and Methods: Objective was to determination correlation between CCQ and BODE index. GOLD staging was done based on post-bronchodilator FEV₁, CCQ and BODE score were calculated in 40 COPD patients. Data were analyzed using Spearman rank correlation test at 5% significance level.

Results: Out of 40 stable COPD patients 34 were males, 6 females. Average age was 57.8 ± 7.1 years. Among the study group 29 (72.5%), 6 (15%) and 5 (12.5%) patients were smokers, non-smokers and ex-smokers respectively. 16 (40%) patients had $BMI \geq 21$ and 24 (60%) were with $BMI < 21$. Average distance walked in 6 minutes was 360 meter, 322.5 ± 65.6 meter, 306 ± 69.2 meter and 290 ± 63.6 meter in GOLD stage 1, 2, 3 and 4 respectively. BODE index scores were 0, 2.9, 4.2 and 5.9 in stage 1, 2, 3, 4 of GOLD stages. BODE index scores showed statistically significant positive correlation with GOLD stages ($r_s = 0.774$, $p < 0.000$) and with CCQ-F ($r_s = 0.505$, $p = 0.001$).

Conclusions: CCQ-F (Functional) score had significant correlation with BODE index and GOLD stages. So CCQ-F could be satisfactorily used to assess the severity of COPD.

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Asbestos Exposure in Asbestos-Related Pleural Diseases

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Introduction: The development of several pleural diseases, such as pleural plaques and malignant mesothelioma (MM) is known to be associated with occupational asbestos exposure. This study investigated asbestos exposure in subjects with pleural plaques and MM, and MM risk compared to asbestos exposed subjects with no asbestos-related disease (controls) and subjects with pleural plaques.

Material and Methods: The study included 388 subjects with pleural plaques, 89 subjects with MM and 175 healthy controls, all occupationally exposed to asbestos. Using a semiquantitative method, asbestos exposure was categorized into three groups: low, medium and high. The statistical analysis included descriptive and logistic regression analysis.

Results: Asbestos exposure was low in 71.6% of subjects with pleural plaques, 48.3% of subjects with MM and 76.6% of controls; medium in 10.6% of subjects with pleural plaques, 27.0% subjects with MM and 7.4% of controls; high in 17.8% of subjects with pleural plaques, 24.7% of subjects with MM and 16.0% of controls. The difference between groups was statistically significant ($p < 0.001$). Medium and high asbestos exposure was associated with an increased MM risk compared to control group (OR=3.50; 95% CI=2.03–6.02) and group with pleural plaques (OR=2.70; 95% CI=1.69–4.33).

Conclusion: Subjects with high or medium asbestos exposure had a higher risk for developing MM, compared to the pleural plaques or the control group. However, almost half of the subjects with MM were exposed to low asbestos levels.

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Characterisation of Firefighter Lung Function Trajectories in the South Australian Metropolitan Fire Service Respiratory Function Measurement and Surveillance Study (RFMS-SAMFS)

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INTRODUCTION: Firefighters are routinely exposed to hazards that can negatively impact lung health. However, it is still unclear if there is an accelerated decline in firefighter lung function due to repeated exposures and insults. This study uses spirometry data collected between 2007 and 2019 during the RFMS-SAMFS to identify groups with differing lung function trajectories.

METHODS: Included in this analysis were 618 firefighters who performed spirometry on 2 or more occasions. Forced Expiratory Volume in 1 second (FEV₁), and Forced Vital Capacity (FVC) and FEV₁/FVC ratio were converted to z-scores (z), and Group-Based Trajectory Modelling (GBTM) was used to identify distinct trajectories of these lung function measures.

RESULTS: Firefighter baseline FEV_{1z} and FVCz were higher than average with a mean (range) of 0.48 (-2.35 – 3.18) and 0.90 (-1.5 – 4.69), respectively, whilst FEV₁/FVCz was below the 50th centile (-0.69 (-3.27 – 2.07)). Our preliminary GBTM revealed 3 distinct trajectories for each of FEV_{1z}, FVCz and FEV₁/FVCz. FEV_{1z} remained stable over time, with the three groups being consistently low, average or high. FVCz trajectories showed an increasing trend with average, high and very high groupings. These trajectories were reversed for the FEV₁/FVCz with declining average, low or very low groups identified.

CONCLUSION: Firefighters in this cohort show increasing FVCz trajectories over time, that together with stable FEV1z trajectories, resulted in declining FEV1/FVCz trajectories. Further analysis is planned to determine the demographic, lifestyle and occupational characteristics of the different trajectory groups.

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Reactive Airways Dysfunction Syndrome: A Review of a Less Known Yet Severe Occupational Disease

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Introduction: Reactive airways dysfunction syndrome (RADS) is an important occupational disease following acute inhalational injury. Since other respiratory disorders may arise from acute inhalational injury, it is necessary to recognize the specific criteria for RADS diagnosis and its multiple causative agents. Occupational Health Services (OHS) play a major role in RADS prevention across multiple industries. **Material and Methods:** A literature review was conducted using the MeSH terms "Respiratory Tract Diseases AND Occupational Diseases". Only articles published in English from January 2019 to July 2021 were included (n=1790). Titles and abstracts were screened, and topic related articles were selected (n=28).

Results and Conclusions: After careful reading, the most relevant articles were included in this review (n=10). RADS can be considered an irritant-induced subtype of asthma and is distinguished from true occupational asthma by several criteria. Its prognosis is variable, since clinical remission may occur in the first months or it may evolve to an irreversible condition. Multiple agents are responsible for RADS, being the commonest chlorine, toluene diisocyanate and paint fume. The diagnosis is often retrospective, late and challenging. The prevention of RADS cases can be achieved by reducing the use of irritant agents in the workplace, measuring workplace air pollution, minimizing workers exposure, ensuring adequate ventilation, securing susceptible locations with alarm systems and implementing periodic educational programs.

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Review of 10-year epidemiological findings on the health effects of toner handling workers

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An epidemiological study with appropriate exposure assessment was needed to evaluate the health effect of toner at the workplace. We conducted a 10-year observational study at multiple business sites to examine the occurrence of health disorders including respiratory disorders in toner particle manufacturing workers. We surveyed 6 companies and the reports were published. The total number of subjects was 3127 at the start of the survey, 2399 at the end of the survey, and a follow-up rate of 76.7%. The following items were

implemented once a year for toner handling workers (exposure group) and non-toner handling workers (control group) who were under 50 years old at the start of the survey. Blood and urine tests, respiratory function tests, chest X-ray tests, questionnaire surveys, and chest CT examinations were performed at each node. As a result, no effect on blood test and respiratory function test was observed. Imaging tests such as chest radiographs and chest CT showed no significantly higher findings in the toner worker group. During the 10-year observation period, lung cancer development was seen in 6 of the total, but no significant correlation with toner handling was found. No onset of granulomatous interstitial pneumonia. The prevalence of bronchial asthma was lower in the exposed group. In conclusion, a multifaceted assessment of the results of the 10-year continuous survey found no obvious adverse health effects on toner handlers.

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Respiratory health hazards in agriculture - assessment by job exposure matrices

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Introduction. Job exposure matrices (JEMs) are widely used in occupational epidemiology, particularly when environmental monitoring data are scanty. **Objective.** To assess the common respiratory disorders and estimate the long term exposure of agricultural workers based on JEMs.

Methods. Our study evaluated the impact of occupational exposure on asthma and COPD development among 87 crop and 83 dairy farmers, compared to 80 office controls. Evaluation included completion of questionnaire on chronic respiratory symptoms, spirometry, and assessment of occupational exposure by JEMs.

Results. Asthma was registered in 8% of crop and 7.2% of dairy farmers, and in 5% controls. Occupational allergic asthma was registered in 2.3% of crop and 1.2% of dairy farmers, while the frequency of work-aggravated asthma was 5.7% and 6.1%, respectively. The COPD prevalence was non-significantly higher in exposed (6.9% in crop and 8.4% in dairy farmers) compared to controls (3.8%). According to JEMs, asthma and COPD in crop farmers are significantly related to high intensity of exposure to dust, gases, fumes and vapors on a regular basis, while among dairy farmers they are significantly related to high intensity of dust exposure on a regular basis, as well as high intensity of exposure to gases, fumes and vapors both on sporadic and regular basis.

Conclusion. Occupational exposure to respiratory hazards in agriculture may cause adverse respiratory health effects, related to duration, characteristics, and intensity of exposure. JEMs seems promising for farming settings, particularly where data on ambient monitoring are unavailable or incomplete.

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Surveillance of Work-Related Occupational Respiratory Disease (SWORD): Three decades of data on occupational respiratory disease in the UK

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Introduction: The Surveillance of Work-Related Occupational Respiratory Disease (SWORD) surveillance programme was set up in 1989 in the UK. Since then the programme has continuously collected reports from physicians on patients with a work-related respiratory disease (WRRD). This paper provides an overview of the data collected over the last 31 years.

Methods: Participating physicians (chest physicians and initially also occupational physicians) reported cases of WRRD including details on diagnosis, suspected causal agent(s), occupation and sector.

Results: In total, 28,634 case reports have been submitted to SWORD, covering 29,535 diagnoses, including non-malignant pleural disease (n=8,958), asthma (7,011), mesothelioma (4,747) and pneumoconiosis (3,276). Asbestos was the most often reported exposure (27%), with construction the most frequently reported sector (27%). Carpenters and joiners was the biggest occupational group since the year 2000 (8%); before that elementary storage occupations was the largest reported occupation (5%). The incidence of occupational respiratory disease has declined over time. However, an increase in the incidence of occupational asthma was observed in recent years.

Conclusions: During the last 30+ years, a wealth of data has been collected within the SWORD programme on occupational respiratory disease in the UK. Continued health surveillance of the working population is important to determine efficacy of policies to reduce occupational disease, as well as a mechanism for early recognition of new occupational health risks.

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Occupational asthma due to exposure to anti-set-off powder (pea-starch)

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Introduction: A common cause of occupational asthma is exposure to vegetal proteins. We present a possible case of occupational asthma to a vegetal starch, used as an anti-set-off powder in printing.

Methods: We used all available information of the medical file of the patient. The patient explicitly authorized us to publish his case.

Results: A 47-year-old male printer was referred for suspected occupational asthma. He worked his entire professional career as a printer in a Belgian printing company. Since August 2019 a new printing press was installed. The patient experienced respiratory symptoms with a runny nose, dyspnea and wheezing and eye

irritation and tearing. There was a temporal relation with the exposure to the new anti-set-off powder and was even better after the adjustment of the spray nozzles of anti-set-off powder by the printer supplier with less pollution of the work environment. Specific IgE test to pea was elevated; screening to other possible (extra-) professional exposed allergens was negative. His total serum IgE was elevated (306 kU/L), blood eosinophil count was normal (0.23 x 10⁹; 3.2%). Spirometry showed normal volumes and an elevated exhaled nitric oxide (FENO 35.50 ppb at flow of 50 ml/sec). Histamine provocation test showed a mild bronchial hyper-reactivity (PC20=7.404 mg/ml). Serial peak expiratory flow recordings performed were suggestive of occupational asthma (OASYS-score=3.50). We did not perform skin prick testing. **Conclusion:** This is the first case demonstrating the possible role of pea starch exposure in the development of occupational asthma.

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Exposure to nickel oxide nanoparticles alters the microbial composition and induces inflammation changes in rat lung

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Background: nickel oxide nanoparticles (NiO NPs) exposure knows that the rat lung can cause inflammatory responses. Unlike the gut microbiome, the role of the lung microbiome and the inflammatory response to inhaled nanoparticles are largely unexplored. We studied the influence of nickel oxide nanoparticles on the lung microbiome and inflammatory responses in rats.

Methods: Thirty female wistar rats were randomly divided into controls, low dose and high dose exposure groups. NiO NPs were intratracheally instilled at various concentrations (50, 150 cm²/rat) and the lung inflammation and microbiome was evaluated after a 1 day and 4 weeks exposure. Cytological, biochemical and pro-inflammatory cytokine analysis including lung microbiome were measured in bronchoalveolar lavage fluid. The microbial composition of the lung was assessed 16S rRNA gene sequencing.

Results: NiO NPs caused neutrophilic and lymphocytic inflammatory response in rat lung. Although there was an alteration in microbiome composition, there were no significant differences between microbiota of control and NiO NPs groups in the alpha diversity and beta diversity analysis. We found Burkholderiales are more significantly occupying order in the NiO NPs groups than the controls from LEfSe analysis.

Conclusion: We demonstrated that NiO NPs exposure can alter the microbial composition and induce inflammation changes in the rat lung. Dysbiosis in lung microbiome is thought to be associated with lung inflammation and disease, but the directionality of causation is still uncertain. We suggested possibility that order Burkholderiales may play an important role in rats.

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Association of genetic markers with the development of asbestosis

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Introduction: Currently chrysotile asbestos is widely used in various industries, which determines the relevance of research aimed at the prevention of asbestos-related diseases. It is promising to determine the role of specific genes in the genetic predisposition to the disease.

Material and Methods: There were examined employees of JSC "Uralasbest" with an established diagnosis of asbestosis (n=94) and without lung diseases (n=200), dust exposure doses were calculated taking into account the percentage of time spent at the workplace during the shift for the entire time of work. SNPs IL1b (rs16944), IL4 (rs2243250), IL6 (rs1800795), TNF α (rs1800629), SOD2 (rs4880), GSTP1 (rs1610011), CAT (rs1001179) was detected. The research has been approved by the ethics committee of IRIOH. Data were analysed using Statistica.

Results: SNPs of the IL1b gene (OR=2.457, 95% CI=1.232-4.899) and the SOD2 gene (OR=1.705, 95% CI=1.055-2.756) were associated with the development of asbestosis. SNP of the IL4 gene was associated with asbestosis at lower values of dust exposure doses (OR=2.185, 95% CI=1.057-4.514). Associations of the IL4 and IL6 genes polymorphism with a more severe course of asbestosis, of the GSTP1 gene polymorphism with pleural lesions in asbestosis were established ($p < 0.05$).

Conclusions: Genetic polymorphism of cytokines and antioxidant enzymes, which are directly involved in the pathogenetic mechanisms of asbestosis, contribute to the formation of a genetic predisposition to the development and severe course of asbestosis. Determination of these SNPs can be used to identify risk groups of asbestosis among workers.

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Preventing the global dust storm: key insights from regulating silica in a connected age

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Introduction: In 2015, WorkSafe Victoria received its first worker's compensation claims for silicosis in a stonemason which has since risen rapidly. The alarming re-emergence of this preventable disease began with the importation of engineered stone which was not matched by sufficient knowledge of its hazards and risk. This was exacerbated by the popularity of this product in the rapidly growing residential construction industry. Equally, the premature declaration of victory against silicosis and lack of international surveillance meant that its re-emergence was not detected until too late.

Material and Methods: Initial activities focused on understanding the scale of the issue. WorkSafe Victoria funded a free health assessment program for current and past stonemason's which diagnosed 169 workers with Silicosis. WorkSafe Victoria commissioned air monitoring at 20 stonemason workplaces and 270 stonemason workplaces were visited and 318 silica-related notices were issued for noncompliance with OHS legislation and regulations.

Results: This initial information informed WorkSafe Victoria to undertake further activities across the entire spectrum of the issue from the supply of engineered stone to medical professionals involved in diagnosing Silicosis in workers. Key achievements by

WorkSafe Victoria have been the partnership with The Alfred for the first dedicated public hospital occupational respiratory clinic and the proposal of Crystalline Silica Regulations including a licensing scheme for engineered stone.

Conclusions: Overcoming this challenge has required an innovative approach in occupational disease prevention,

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Respiratory symptoms of workers in small roastery: Implementation of surveillance system

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Introduction: Flavors such as diacetyl are known to damage the lungs. Concerns have been raised about other types of flavors or coffee roasting workers, but evidence and experience are still lacking.

Materials and Methods: A 30-year-old male worker was referred to an occupational health clinic through the surveillance center for occupational poisoning prevention. He has been working in a small coffee roastery. Chief complaint was cough for a year. We found four other male workers with similar symptoms such as cough, chest tightness, sore throat or irritation, in different coffee roastery. Diagnostic tests were performed, including chest X-rays, chest high-resolution computed tomography (HRCT) and pulmonary function tests. We also conducted a survey of the workplace.

Results: All five workers were young male (range of age, 29 to 38). Their coffee roasting experience ranged from 11 months to 8 years. Common symptoms included cough, irritations of the nose and throat and chest tightness.

They were exposed to dust from coffee beans and packing materials and various volatile organic compounds while roasting coffee beans. There were no specific findings on chest HRCT and pulmonary function tests, but symptoms were much relieved after installing the local ventilators.

Conclusions: Workers may be exposed to various kinds of hazardous materials while roasting coffee beans. These substances may cause respiratory damage, but their health effects are not well known. It is important to establish occupational health surveillance system for early detection and prevention of occupational diseases.

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The Correlation between Occupational Pesticide Exposure with The Incidence of COPD and Chronic Bronchitis: a Systematic Review and Meta-Analysis

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Introduction: Chronic Obstructive Pulmonary Disease (COPD) is being one of the leading types of respiratory disease that being still increasing and expected to become the third leading cause of death by 2030. Approximately 74% of COPD type is chronic bronchitis. Pesticides have been showing to become important risk factors for COPD and chronic bronchitis among farmers.

Method: This study was reported based on PRISMA. A literature search was conducted using PubMed, Cochrane Library, scopus, and ScienceDirect. Odds Ratio (OR) with 95% CI were used to determine the odds of pesticide exposure with the case of COPD or chronic bronchitis and control. Random and Fixed effect Model was used based on heterogeneity.

Result: A total of 1410 studies was identified from all databases. We included 12 studies in qualitative synthesis and 10 studies were eligible for meta-analysis. The incidence of COPD was significantly higher in terms of insecticide exposure [OR=1.43(1.01,2.01), p=0.0008, I2=82%]. However there were no significant difference between the incidence of COPD for unspecified pesticide [OR=1.81(1.16,2.83), p=0.81, I2=0%] and herbicide exposure [OR=2.37(1.44,3.91), p=0.37, I2=0%]. Moreover there were no significant differences for chronic bronchitis due to insecticide [OR=1.17(1.06,1.28), p=0.72, I2=0%], unspecified pesticide [1.56(1.10,2.19), p=0.18, I2=41%], herbicide [0.94(0.83, 1.07), p=0.16, I2=40%].

Conclusion: This meta-analysis provided evidence that insecticide exposure was associated with COPD, but not herbicide and unspecified pesticide. Whereas there were no associations between chronic bronchitis and pesticide.

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Outbreak of silicosis in workers producing silica-based artificial kerbstones

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Introduction. An outbreak of silicosis occurred in a plant producing novel applications of silica-based composites despite periodic health surveillance.

Materials and methods: Five workers were referred to our clinic for occupational disease. Using past spirometry data from periodic health surveillance, we calculated individual yearly declines in FEV1 and FVC using robust multivariable linear regressions with adjustment for smoking cessation. Respirable quartz was measured in the workplace.

Results. The five men (38 to 59 years) had been employed for 8 to 30 years at a Belgian company where about ten workers made silica-

based artificial kerbstones for hygienic wall protection. All were former smokers. We diagnosed enlarged mediastinal/hilar lymph nodes without radiological lung involvement in one worker, simple silicosis in two workers (one also with emphysema), and progressive massive fibrosis in two workers. Annual spirometries—but no chest X-rays—had been performed since 8 to 10 years prior to diagnosis. The four men with silicosis proved to have undergone too rapid declines in FEV1 (between 98 and 221 mL/year) and FVC (17 to 220 mL/year). High respirable quartz concentrations (>0.1 mg/m³) were measured, especially during dry finishing of the cured kerbstones (1.080 mg/m³). No personal respiratory protection was used.

Conclusions: The outbreak shows that the hazards of artificial stone production/processing reach beyond the kitchen/bathroom countertop industry. Increasing awareness, improving prevention and establishing workers' health surveillance programs—or improving the quality of existing programs—are crucial.

26. RURAL HEALTH: AGRICULTURE, PESTICIDES AND ORGANIC DUSTS

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Promoting OSH of aquatic agricultural workers through ergonomic design of a floating device

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Introduction: Throughout the various phases of the aquatic cultivation process, farmers remain immersed (up to waist or neck) for 5-6 hours/ day inside stagnant unhygienic water resulting in various health hazards. Farmers encounter major challenges when carrying out agricultural tasks (harvesting or weeds cleaning) in the waterbody with high depth. Small boats don't fulfill their purpose in many instances as it hinders task requirements and leads to awkward postures. They preferably make their arrangement of floating structure which always suffers from maintenance and safety issues. As the frugal design adopted by them is not robust and long-lasting, they need to prepare a new one every season. Hence, the present research aimed to design and develop a floating device to facilitate aquatic agricultural activities and reduce the concerned farmers' drudgery.

Material and Methods: Following a detailed field survey, the most feasible design concept was finalized through a participatory design approach, and the prototype was validated with field trials involving the farmers (n=15). The complete experimental design was performed according to the Helsinki protocol and endorsed by the institute's human ethics committee.

Results and Conclusions: User-centered design with the feasibility of local manufacturability/ maintenance was given due importance along with human factors. The developed prototype was evaluated in terms of usability, user compatibility, stability during floating, affordability, and sustainability. The designed floating device was rated high by the targeted users indicating the acceptance of the innovative des

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Mitigating the Hazards of Air Pollution on the Health of Rural Workers – Initiatives in India

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Introduction: Air pollution and exposure to dust is leading to adverse health effects in rural workers resulting in increased morbidity and mortality. Exposure to agricultural and organic dust, toxic fume, gases, chemicals in fertilizer and pesticide cause respiratory issues. Working in confined space and green house, exhaust from generator and tractor and smoke from solid fuels affect their health. Stubble burning in harvest season also leads to toxic environmental air pollution.

Materials and Methods: Innovative solutions to combat air pollution in rural areas are initiated in India. Stubble burning after harvest is banned and straw baler and chopper machineries are provided to farmers. The crop residue collected after harvest is used for manufacturing card board and particle board for making cartons. Other useful initiatives are, installation of Bio Gas Units for fermenting harvest residue to generate compressed natural gas and Bio Refinery which converts agricultural waste into ethanol. Bio decomposer solution spray is used to dissolve the stubble to convert it into compost for manure. Drones are being introduced for spraying pesticides. Awareness programs on pesticide toxicity, dust exposure and maintenance of farm machinery and tractor are given importance. Usage of personal protective equipment when handling pesticide and in dusty environment is emphasized.

Results and Conclusion: Renewable energy with clean fuel technology and wise management of crop residue with innovative solutions have resulted in mitigating air pollution. This will reduce respiratory diseases of workers in agricultural sector and rural industries.

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Role of Extension Agents in Addressing Farm Stress in Colorado

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Introduction: Farmers and ranchers are known to experience high levels of stress related to weather, labor costs and shortages, financial concerns, international trade issues, and government regulations. These stressors can lead to higher risk of suicide and have been exacerbated by the COVID-19 pandemic which has influenced supply chains. Extension Agents have been viewed as trusted members of the community and as essential in supporting farmers and ranchers and connecting them with resources. The purpose of this study was to interview Extension Agents in rural counties in Colorado focusing on their perceptions about farm stress and suicide risk, the perspectives and needs of Extension agents to address these concerns, and the communities' readiness to engage in prevention efforts.

Materials and Methods: Qualitative interviews were conducted among 5 Extension Agents in 5 counties in rural Colorado. Interviews were conducted using Zoom between March, 2020–September, 2020. Analysis was done using content analysis on the interview response data followed by a general inductive approach to identify themes.

Results: Extension Agents believe prevention efforts are headed in the right direction, but stigma around seeking treatment prevents community members, and especially farmers and ranchers, from engaging with mental health resources.

Conclusion: Implications for Extension Agents and rural community prevention efforts include increasing mental health literacy within the community to reduce stigma and tailoring resources that address rural communities' unreliable cell service.

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Child farm-related injuries - the unique challenges of the farming workspace

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Introduction: Globally, agriculture is one of the most dangerous industries. In Australia, the agricultural industry experiences the highest fatality rate per number of workers. The blurred division between the farm as a workplace and home results in children being engaged with the agricultural industry. Australian fatal and non-fatal child farm injury rates have been consistent over the last 20 years. This study investigated if behaviours, attitudes and lifestyles on farms influence the risk of child farm-related injury.

Material and Method: A modified Delphi process developed two surveys—one for children (5–14 years) and their parents—measuring children's exposure to farm hazards, risk-taking behaviours, attitudes to farm safety and experience of farm-related injury. Surveys were distributed in regional/rural Victoria.

Results: The developed surveys can be used in varying geographic regions to understand common behaviours occurring on family farms. Results identify the activities children frequently engage with on Victorian farms and describe children and parents' attitudes and knowledge of farm safety.

Conclusion: Employers are required to provide safe workplaces. Children are exposed to and involved in the agricultural industry; often families rely on children for labour. However, current regulations do not protect them. To date, child farm injury data has been interpreted without an understanding of the behaviours on family farms. Developing a greater understanding of common exposures, behaviours and attitudes is required to inform the development of culturally appropriate child farm injury prevention strategies.

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Toxicity of pesticide active ingredients compared to their product formulations

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Introduction: Farmers are exposed to complex chemical mixtures; however, the approval of pesticide products is still mostly limited to

testing the toxicity of individual ingredients ignoring possible interactions. The objective of the study was to systematically review the literature of in vitro and in vivo studies that compare the toxicity of pesticide product formulations and their declared active ingredients.

Material and Methods: PubMed and Scopus were searched using the following terms: “pesticide”, “formulation”, “commercial product”, “commercial pesticide” and “health”. After screening by predefined inclusion and exclusion criteria, quality and reliability assessment was conducted by the ToxRTool. Two investigators independently screened the identified publications and extracted results from eligible studies.

Results: Our search yielded 36 studies, including 23 that investigated herbicides, 15 insecticides, and 4 fungicides. 24 studies reported increased toxicity of the product formulations versus their active ingredients, which in most cases was attributed to the presence of adjuvants. Ten studies compared glyphosate and glyphosate-based herbicides, and six of them concluded that Roundup, the dominant product formulation of glyphosate, is more toxic than glyphosate alone.

Conclusions: The results demonstrate that ignoring the possible risks of interaction between the active and other ingredients of commercial pesticide product formulations might result in the misinterpretation of their toxicological profile. We recommend that all product formulations should be fully assessed during the authorization process.

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Opportunities presented through the use of social media and social media influencers in Strategic Farm Safety Communication Campaigns

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Introduction: This study assessed whether social media could be utilised to target and influence younger farmers to encourage behavioural change and lower incidences of accidents in the sector. **Materials and Methods:** Working students in the sector (n=309) were invited to an anonymous online survey composed of 32 attitudinal behavioural questions across four themes: attitude towards farm OSH; influence of social media and influencers on farm OSH; most popular media formats; and most preferred media apps to utilise in an Agri OSH campaign.

Results: 107 students participated. 56% considered OSH important on their farms, with 16% having previously been personally affected by a farm accident. 78% were motivated by an agricultural social media influencer while 74% reflect on their own practice after seeing unsafe farm behaviour on social media. Snapchat (35%), Tik Tok (33%), Facebook (25%) and Instagram (16%) were found to be the most popular apps used by participants. 67% stated agricultural social media influencer videos as being the most effective in communicating farm OSH risk. 54% of participants found OSH videos uploaded by other social media users as being most effective way to change behaviour as opposed to 61% and 47% respectively, who stated official written guidance and photos were least effective. 59% agreed that social media is an effective tool in communicating farm OSH messages to young farmers.

Conclusion: Social media / influencers present an opportunity for collaboration with agricultural stakeholders who have an interest

in OSH to encourage behavioural change within a wider strategic farm safety campaign.

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Knowledge, attitudes and practices of farmers on the use of pesticides

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Introduction: The intensive and uncontrolled use of pesticides in Morocco generates health and environmental problems. The objective of this study was to assess the knowledge, attitudes and practices of farmers on their use.

Material and methods: This cross-sectional epidemiological study conducted in 2021 in the Ifrane region involved 153 male farmers aged > 18 years. Data were collected using a pretested and structured questionnaire via face to-face interviews. The questionnaire included socio-demographic and professional parameters and items relating to knowledge, attitudes and practices.

Results: The mean age was 48 ± 12 years, 21.5% were illiterate, 73.3% had small farms of less than 5 hectares. Market gardening and arboriculture were the most common. 93% considered that pesticides presented a health and environmental hazard. 79.7% were not aware of the existence of safety data sheets and 82.2% did not know the meaning of the pictograms. For 97.4% efficiency was decisive in the purchase of the pesticide. They were used by all farmers for therapeutic purposes. 45.1% consistently followed the operating instructions and 72.5% did not wear protective equipment.

Conclusions: The study exposed the existence of pesticide exposure, the low safe use of pesticide and the low use of personal protection equipment. Limited knowledge and faulty attitudes and practices require national supervision of farmers, their awareness of environmental and health problems, and financial aid to the most disadvantaged. These findings appeal for the development of effective public health strategies to improve farmers' awareness.

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Knowledge, Attitudes and Practices of Agricultural Workers Exposed to Bumblebee- Pollinator Stings

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Introduction: Occupational allergies to bumblebee–pollinator stings are rare but can be serious or even fatal. The objective of this study was to assess the prevalence of allergic reactions to bumblebee venom, to assess the level of knowledge, the attitudes and practices of exposed agricultural workers and finally to propose measures of prevention using appropriate communication and education.

Material and methods: this cross-sectional epidemiological study, carried out in 2018 in a cherry tomato production unit in the south of Morocco, involved 192 people exposed to the risk of bumblebee stings, aged over 20 years with a seniority > 1 year and working fulltime. The study tool is a questionnaire comprising socio-demographic, professional and clinical data on bumblebee bites and items relating to the knowledge, attitudes and practices of agricultural workers.

Results: The prevalence of a history of ENT allergy was 4.7%, skin 4.2%, respiratory 3.1% and ocular 1%. 67.2% of people stung by bumblebees had presented a reaction: local (54.7%), regional (10.4%) and general (2.6%). Only people who had a general reaction informed the occupational physician and one person received a specialist consultation for allergology. Knowledge about bumblebees was insufficient. Attitudes and practices were often inappropriate. No one had received training in the use of the emergency kit. **Conclusions:** The occupational health physician must conduct training campaigns on this risk. The prevention approach needs a cooperative spirit. It will be more accepted and applied if all workers and their representatives are involved in its elaboration.

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Assessment of knowledge, attitudes and practices regarding rabies and dog bites in agricultural settings

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Introduction: In Morocco, rabies remains difficult to control with an average of 20 deaths per year. The dog is the main vector. The objective was to assess knowledge, attitudes and practices regarding rabies in agricultural settings.

Material and methods: This cross-sectional survey was carried out with 452 agricultural professionals who consulted at the anti-rabies center of Ksar El Kébir. The survey support is a questionnaire inspired by that of the Rabmed Control project.

Results: The participation rate was 86.5%. The average age was 30.4 ± 10.2 years, 58.9% were illiterate and 70% were agricultural workers. 21% had been bitten by a dog in the past. 99.5% knew that rabies is an animal disease but only 17.4% a zoonosis. 94.4% said friends were their main source of information. 99.5% considered that the dog was the main vector of rabies. 88% did not know rabies was fatal. 96.7% did not know that the vaccine was the only means of protection. 97.7% mentioned immediate washing of the wound with soap and water and 97.1% knew that a medical consultation was necessary. The choice to notify the veterinary services in front of a rabid stray dog was 45%. Stray dogs were rated as pests by 92.8%. 98.7% believed that dogs not vaccinated against rabies were

potentially dangerous. 95.1% considered that the vaccination of dogs is an obligation of the owners and 98.7% declared themselves in favor of the vaccination of their own dogs.

Conclusions: Limited knowledge and faulty attitudes and practices call for the development of effective public health strategies to improve farmers' awareness of rabies.

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Co-designing the translation of research into practice to support mentally healthy workplaces in agricultural industries

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Introduction: Australian agriculture is vulnerable to an ageing and decreasing workforce, increasing technological demands, global markets, climate change and uncertainty. This poses challenges for work demand/control, workplace support, change management, role clarity/conflict, workplace relationships and environmental conditions—ultimately increasing psychological distress and suicide risk. The Primary Producer Knowledge Network (PPKN) aims to develop practical strategies to prevent work-related mental health risks in agriculture.

Method: PPKN engaged in a detailed co-design process with farmers and industry stakeholders—including stakeholder interviews, online development and feedback workshops, and pilot testing, and delivered online due to COVID19 restrictions. Co-design was informed by mental health research, evidence-based co-design strategies for working with vulnerable consumers, and identified work-related risks to health, wellbeing and safety.

Results: 9 recommendations were derived via co-design—guiding development of an interactive web platform, roadshow, and complementary resources to meet varying digital access/expertise. Ongoing solution-focused topic development—an iterative process with experts and primary producers—reflects varied needs of industry groups and age cohorts, and drives change in the design/management of work systems.

Conclusions: PPKN addresses work-related risk factors via an approach that is relevant, meaningful and empowering for the agriculture workforce. Co-design outcomes, challenges and recommendations are applicable across occupational groups where mental health and safety are of con

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Comparison between historical and current pesticide use in California, changing modes of action (MOA)

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Introduction: Setting priorities for public health concern based on pesticide use data based on active ingredient (AI) mode of action (MOA)

Methods: Comparing historical (1974) and current (2016) pesticide use reporting (PUR) data

Results: 124 insecticides and fumigants accounted for 25,913,580 kg (70.2%) of the total 36,921,209 kg of AIs applied. AIs with multi-site activity (insecticide-fumigants, inorganic sulfur, arsenic salts, and others) accounted for 42.3% of total insecticide use. Mechanical asphyxiants (dusts and oils) accounted for 35.0%, ChE inhibitors for 14.6%, GABA gated chloride channel antagonists (cyclodiene organochlorines) for 4.70%; mitochondrial enzyme inhibitors for 1.3%; sodium channel modulators (DDT-like organochlorines, pyrethrins, pyrethroids for 1.3%, and desiccant AIs for 0.7%. Based upon 2016 kgs reported to the PURsystem, the most important MOAs included multi-site activity compounds (46.8%); mechanical asphyxiants (44.5%), post-synaptic ChE receptor agonists (2.9%), ChE inhibitors (2.0%) and insect behavior modifiers (0.51 %). New MOAs with low application rates ranked high in terms of the % of treated acres: neonicotinoid post-synaptic ChE receptor agonists (7.7%), ecdysone receptor agonists (2.8%), tetrionic acid lipid synthesis inhibitors (3.3%), and ryanodine receptor modulators (2.3%). A review of illness outbreaks showed large number of episodes associated with multi-site activity and ChE-inhibitor AIs and few with more selective MOAs (typified by ryanodine receptor AIs). Conclusion: Selective MOAs show promise in limiting secondary effects of pesticides

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The health risk posed by occupational solar ultraviolet radiation exposure to outdoor farm workers on a farm in the Limpopo Province of South Africa

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INTRODUCTION: Various factors determines the health risk associated with exposure to solar ultraviolet radiation (UVR) while working outside. Genetic factors include the protection provided against UVR linked health effects by skin colour or melanin content. Behavioural factors such as photoprotective measure use, including wearing a hat or sunglasses, determines how much of the ambient solar UVR a worker is exposed to on different areas of the body. MATERIALS AND METHODS: Outdoor workers on a macadamia nut and avocado farm in the Limpopo Province, South Africa participated in this study. The objective colour of sun protected skin was classified using colorimetric methods. The personal solar UVR exposure of participants on the farm was measured using polysulfone dosimetry during autumn, spring and summer. The farm workers' use of photoprotective measures while working in the sun was determined through questionnaires.

RESULTS: The skin colour of most participants was classified as Fitzpatrick skin phototype V. More than 80% of solar UVR levels measured on body areas of workers exceeded the recommended exposure limit. Thirty percent of participants wore broad brimmed hats while 20% wore sunglasses while working.

CONCLUSIONS: The outdoor farm workers had increased genetic protection against cutaneous health effects linked to solar UVR. However, their personal solar UVR exposure was high enough to potentially lead to ocular diseases such as cataracts during autumn,

spring and summer. This together with the relatively low use of ocular photoprotective measures indicates that the health of these workers are at risk.

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A Case Study on the Investigation and Management of an Outbreak of Leptospirosis in Fruit Pickers

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INTRODUCTION: An outbreak of leptospirosis was detected in a cohort of fruit pickers working on a regional berry farm. The farm owner sought occupational physician and public health physician input to investigate potential sources of the outbreak and suggest control measures.

MATERIALS AND METHODS: In conjunction with the involvement of a local public health unit (who performed an initial epidemiological assessment), two occupational medicine physicians attended the berry farm to review the work environment and processes. Potential exposure sources and routes were identified, and workplace controls were suggested.

RESULTS: 50 confirmed, 19 probable, and 15 possible cases were identified in the investigation. Worksite assessment of the farm identified that rodents were present and able to access multiple levels of the berry plants due to trellises used to support the plants. Many of the berry plants had fine spikes or spines sufficient to result in small abrasions or breaks in unprotected skin. Many workers were noted not to wear long-sleeved shirts or gloves.

CONCLUSIONS: A plausible route of transmission was identified from rodent urine on berry plants, which had spikes that could cause small breaks in unprotected skin on the arms of workers picking from the plants. Recommendations regarding rodent control, hygiene, and protective clothing were made. An education program was developed for the workers and local general practitioners. The case study highlights the relevance of zoonoses in agriculture and role of occupational physicians and public health physicians in outbreak investigation and management.

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Occupational airborne mycotoxins exposure of French farmers

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Introduction: Farmers may be occupationally exposed to various airborne pollutants, including mycotoxins which could lead to adverse health effects like cancer. However, agricultural exposure to mycotoxins is largely unknown. We assessed individual airborne exposure to mycotoxins for farmers involved in harvesting of various crops (wheat-barley, haymaking, peas) or in cattle growing. Material and methods: Farmers were monitored in one geographic area (Normandy, north-western France), between 2017 and 2021. A CIP10[®] personal sampler with inhalable fraction head and polyurethane foam was used. A trained technician followed the identified tasks and filled in a standardized observation grid. A multimycotoxins UHPLC/MS-MS method enabled the

quantification of 32 mycotoxins (aflatoxins, fumonisins, ochratoxins, trichotecens) with LOQ ranging from 1 to 45 ng/m³ (90-min sampling).

Results: More than 140 samples were obtained: 65 for cattle breeders, and 82 from crop harvesters. Only 5 samples (3.5%) were above the LOQ: 3 positive for deoxynivalenol (DON) in cattle breeding (feeding, mulching, milking) ; 1 positive for DON during harvester cleaning (11%); 1 positive for aflatoxin B1 during tractor driving (11%) and none during the 64 observations of combines driving.

Conclusions: We reported a scarce presence of airborne mycotoxins during cattle breeding and various crops harvesting. However, the duration of each task was short which increased the LOQ. Most of the tasks were realized with tractors equipped with air-conditioned cabin but some exposure could occur in cattle growers or in specific short task like cleaning the harvester.

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The Differences Neonates Mortality Rate and Characteristic of Birth on Rural and Urban Region in Agricultural Area, Jember, Indonesia

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Background: The neonatal mortality rate is main health status indicators and Sustainable Development Goals(SDGs)'s target. In 2017, Jember is the highest neonatal mortality rate in East Java Province. Jember is an area which 40% of the residents work in agriculture. The influence of rural-urban disparities on neonatal death in Jember is poorly understood. In this study, we describe a neonatal mortality rate and the differences characteristics of birth on rural and urban region in Jember.

Method: This research was a cross-sectional study. We analyzed neonatal deaths in the data from the surveillance System of East Java Province in 2017. We compared characteristics of birth in rural or urban mothers during 2017. Rural-urban classifications were determined based on the residence registry system of Indonesia. Chi-square tests were used to compare the difference characteristics of birth.

Result: The neonatal mortality rate in rural region is 55.7%. Asphyxia, low birth weight (LBW), congenital malformation and infection is top causes of death which each causes death rate is higher in rural area. The differences characteristics of birth in rural has more stillbirth cases (p= 0.013), while there is no differences among LBW, preterm, congenital malformation and medical care in both region (p>0.05).

Conclusion: Neonates in rural had higher mortality rate than urban and asphyxia is the main causes in both region. There is difference characteristic about stillbirth cases that is possible caused by poor of antenatal care in rural region. Further studies and strategies are necessary to improve neonates health status in rural region.

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Evaluation of occupational exposure to pesticides and Oxidative stress : A case study from Morocco

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Introduction: In Morocco, given the lack of education and the presence of a counterfeit market, pesticides constitute a major problem to be addressed by occupational and environmental health. Falling under the PaPOE study (Parental Pesticides and Offspring Epigenome), our contribution aims to investigate the level of exposure of farmers in Morocco and comprehensively examine whether multi-residue exposure to commonly used pesticides could induce oxidative stress.

Methods: We launched a cross-sectional study assessing the occupational exposure among 300 farmworkers in Meknes-El Hajeb region, known for its high agricultural activity. Urine and Blood were collected among farmworkers during their working hours between April and July 2021, considered as a high exposure season. The oxidative stress status has been evaluated by assessing levels of total glutathione(TG), oxidized glutathione(GSSG), and 8-oxo-7,8-dihydro-2'-deoxyguanosine(8-oxodG).

Results: 52% of the respondents were females working on the field. Farmers reported a high detection frequency of atrazine, chlorpyrifos and glyphosate. Pesticides concentrations varied significantly with the use of PPEs, the source of food and drinking water. A positive correlation was found between pesticide exposure and 8-oxodG levels (p < 0.001) while a negative association is reported with TG and GSSG.

Conclusion: Our study provided more evidence on factors associated with urinary pesticides concentrations, and the impact of this exposure on the oxidative stress profile, especially in an occupational setting within a developing country.

27. SHIFTWORK AND WORKING TIME

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Sleep habits and excessive daytime sleepiness frequency in shift work watchers from a security agency in Piura, Peru

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Introduction: The objective of this study was to determine the sleep habits and the frequency of excessive daytime sleepiness in shift-work watchers from an agency in Piura.

Material and methods: It was an observational, descriptive, cross-sectional study on watchers at a security agency in Piura. The instruments used were: Data collection sheet, Sleep Hygiene Index, and Epworth Sleepiness Scale.

Results: 362 watchers were included at this study. All of them were male, 71% were younger than 40, and 45% were single. 45% were overweight and 30% were obese. 34% worked under the “A” system (6 day shifts, 1 day off-4 night shifts-1 day off) and 59.6% worked under the “B” system (4 day shifts-1 day off-4 night shifts-1 day off). 81% worked 12 hours per day and 19% worked 8 hours per day. 58% had other jobs during their free time and the most frequent was driving a mototaxi. 43% slept between 5 to 7 hours per day and 28% less than 5 hours per day. 39% had excessive daytime sleepiness. 55% presented poor sleep hygiene. The OR was calculated comparing the presence or absence of excessive daytime sleepiness of the rotation system A versus system B, and it was 0.1543, with a 95% confidence interval [0.0947; 0.2514].

Conclusions: Most of the watchers were young, overweight and obese single men who had a second job, worked 12 hours per day, and more frequently were under the B rotation system. Most of the security guards slept less than 7 hours per day. Being part of the B system and working 12 hours per day were associated with sleeping less than 7 hours per day, poor sleep hygiene, and excessive daytime sleepiness.

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Night-shift work and psychiatric treatment. A follow-up study among employees in Denmark

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Introduction: We aimed at testing the hypotheses that night-shift work is associated with an increased incidence of 1) redeemed prescriptions for psychotropic medicine, and 2) psychiatric hospital treatment due to mood, anxiety or stress-related disease. We, moreover, aimed to test 3) if the effect of night-shift work on the rates of antidepressants differs from the effects on the rates of anxiolytics, and 4) whether the association between night-shift work and psychotropic medicine is affected by long working hours. Methods: Full-time employees who participated in the Danish Labor Force Survey sometime in the period 2000–2013 (N=131 321) were followed for up to five years in national registers for redeemed prescriptions and psychiatric hospital treatment. The analyses were controlled for sex, age, weekly working hours, calendar time of the interview and socioeconomic status.

Results: We detected 15,826 cases of psychotropic drug use in 521,976 person-years at risk (PYRS), and 1480 cases of hospitalization in 636,673 PYRS. The RR for psychotropic drugs was estimated to be 1.09 (99% CI 1.02-1.16) for night-shift work versus no night-shift work. The corresponding RR for psychiatric hospital treatment was 1.11 (95% CI 0.95 - 1.29). Hypotheses 3 and 4 were not confirmed. In supplementary analyses, we found some indication of a dose-response association between night-shift work and incident use of psychotropic drugs.

Conclusion: Night-shift work as it appears in the general working population in Denmark is not an important predictor of mental ill health. But dose-response associations should be explored further.

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Long commuting time and depressive symptoms among South Korean workers

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COVID-19 has changed the way we live and made the future come faster. Although changes such as work from home are changing how we commute, studies on the association between commuting time and mental health are lacking. We used the Korean Working Condition Survey, a nationally representative cross-sectional survey. A total of 23,415 waged workers in 20-59 years of age were selected. It was investigated that the association between commuting time and depressive symptoms which were measured by the World Health Organisation- Five Well-Being Index (WHO-5). Compared with the shortest commuting time (< 30 min), those who spent 60 min or longer commuting had a significantly higher odd ratio (OR) for depressive symptoms (1.16; 95% CI: 1.04, 1.29). Among males, workers aged 40–49, in the lowest income quartile, unmarried, not having children, having white-collar jobs, working standard hours groups, and without shiftwork showed a significant association between long commuting time and increased depressive symptoms. Among females, workers aged 20–29, in the lowest income quartile, having 2 or more children, and shiftwork showed higher ORs for the association between long commuting time and depressive symptoms. In our study, long commuting time was associated with increased depressive symptoms measured by the WHO-5 well-being index. In the future, it is not expected that changes in commuting will equally and simultaneously be applied to workers with various socio-economical statuses. Our study implies that an approach to mental health according to the characteristics is necessary.

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Effects on health owing to night shift work in hospital: an update on metabolic diseases

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Introduction. Night shift work produce an alteration of circadian rhythms with possible interference in melatonin levels and hormonal balance. Experimental surveys on volunteers showed that an alteration of circadian rhythms could bring to a compromission of beta-cells and their responsivity to glucose. These data suggest to consider night work as a possible risk factor for the onset of metabolic diseases.

Materials and methods. A review of recent scientific publications was carried out, it was used scopus and pubmed databases using as keywords: night shift, workers, diabetes, metabolic disease.

Results and conclusions. Epidemiological studies highlighted, in nurses, higher risk for metabolic problems in night shift subjects. In particular for the type 2- diabetes, in 10915 nurses, with a follow up of 22 years, emerged a risk factor of OR= 1.31, 95% CI 1.19-1.44 and in case of seniority in employment >5 years OR=2.30 (95%, CI 1.88-2.83). Other authors on 19873 subjects, and a follow up of 15 years, found a OR= 1.58, 95% CI 1.25-1.99. Instead, regarding the metabolic syndrome, emerged a risk indice of OR= 1.72, 95% CI 1.10-2.70 on 2090 workers. Similarly the risk for dyslipidemia was equal to OR=1.53, 95% CI 1.05-2.24 in 5813 subjects with a 3 years follow up. These results came from robust studies, with large samples, years of follow up sometimes really numerous and all data indicate increased risk. These consideration call for higher attention to the sphere of metabolic disease, linked with night shift work, by the occupational physician during the periodic health surveillance.

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Factors related to health status and stress level among the shift workers in convenient stores: a case study in Samut Prakan province, Thailand

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According to the recognition of adverse health effects of shiftwork, the objectives of this research were to determine the health status and the relevant factors associated to stress level among the shift workers in convenient stores. The subjects were 87 full-time workers in Bangchalong District, Samut Prakan province, Thailand. The developed questionnaires were applied in data collection. The results presented that all subjects were non-chronic diseases persons. In terms of health behaviors, 92 percent did not perform physical exercise, 81.1 percent did not consume meals at the same time, 71.3 percent had sleeping period 6-8 hours per day, and 8.2 percent did not intake meals which composed of 5 groups of nutrients, respectively. Moreover, the significant factors related to stress level were including education ($p = 0.023$), type of shift work ($p < 0.001$), job description ($p = 0.006$). Additionally, types of shiftwork were related to stress level ($p < 0.0001$) and there revealed that 3 shift works per day presented low stress level, the other groups presented in high and severe stress level. In terms of job description, the workers who performed improper work which were not suitable to their ability, lack of job skill, and had to do urgent task were in high level of stress. Therefore, the suggestions are including the organization should 1) setup training courses for increasing job skills and health promotion, 2) provide the relaxing activities for stress reduction, and 3) arrange the appropriated shiftwork for their employees. For further study, the other health effects related to the variation of hormone should be determined.

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Working times in Germany: Representative results from the BAuA-Working Time Survey

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Introduction: In a changing world of work, aspects of working times reflect changes and trends of work and private lives. Working times play a key role for employees' health and well-being. Thus, the Federal Institute for Occupational Safety and Health (BAuA) initiated the biennial BAuA-Working Time Survey (WTS) in 2015 to describe working time realities in Germany as well as to investigate relationships of working time, health and well-being of employees.

Material and Methods: The BAuA-WTS includes various aspects of working time arrangements, but also other working conditions as well as health and job satisfaction in a Computer Assisted Telephone Interview (CATI). There are special modules on key topics in each wave. The fourth wave of the panel study will be finished by the end of 2021 and deals with the Corona pandemic.

Results: We give an overview on working time duration and overtime, shiftwork and weekend work, working time control, variability of working time, on-call work and permanent availability. The results show that several working time demands are quite common in Germany, such as weekend work and working overtime.

Conclusions: The BAuA-WTS constitutes a long term project with the aim to provide representative, reliable and longitudinal data on working time and its consequences for German employees. Actual challenges of working time organizations are - next to globalization and digitization - the socio-ecological transformation and the Corona pandemic. The BAuA-WTS is tracking these changes to ignite discussions about healthy working time organization in the scientific and political debate.

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The association between nurses' shift patterns and burnout. Does work time control play a role? Results from a nation-wide cross-sectional survey

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Introduction: The negative role that long shifts of 12 hours or longer play in the development of burnout has been established by large studies. Nurses face demanding workplace stressors, including high workloads, and limited autonomy, all of which place them at higher risk of burnout. However, recent studies found that work time control improves healthcare staff wellbeing. This study explores whether variation in nurses' work time control moderates the negative effects of long shifts.

Material and Methods: A survey with questions about current shift patterns; demographics; preferences and views around shift patterns; degree of work time control; and the Burnout Assessment Tool (BAT) was developed jointly with nurses and ward managers, and piloted tested with nurses. The survey was launched online for 3 months. After cleaning and describing data, we will run moderation analysis according to Baron&Kenny (1986) using the R package "moderation".

Results: In total, 881 nurses filled in the survey. Preliminary data analyses show that 58% of nurses work shifts of 12 hrs or longer, and 11% work the traditional 8-h shifts. Nonetheless, only 34% of nurses would ideally work 12-h shifts if they had a choice. The correlation coefficient between worked and preferred shift length is 0.42. 62% of nurses reported having no work time control at all

when choosing their shift length. The average burnout score was 2.7, indicating that nurses are at risk of burnout. Conclusions: Our initial findings indicate that nurses are not working their preferred shift patterns, and they have little or no choice when it comes to choosing shift length.

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Munich Chronotype Questionnaire as a Tool for Determining Chronotype and Social Jet-lag among the Working Population: Translation and Validation of the Slovenian Variant

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Introduction: The Munich Chronotype Questionnaire (MCTQ) assesses actual sleep-wake timing on work and work-free days. The MCTQ-derived chronotype is therefore a biological construct in comparison to the other widely used tools like the Morningness Eveningness Questionnaire (MEQ), which is based on a psychological construct (subjective self-assessment). Our study aimed to translate and validate the Slovenian variant of the MCTQ.

Materials and Methods: We modified the original version of the MCTQ by using a translation back-translation approach to the Slovenian language including an examination of its semantic validity. Convergent construct validity was assessed by comparing the MEQ and MCTQ (n = 338). Pearson's correlation coefficient (r) was used as an indicator of the correlation (i.e. validity) between individual MCTQ parameters and MEQ score. Reliability was demonstrated by stability over 14-days using test-retest method (n = 178). **Results:** MCTQ parameters were significantly correlated with the MEQ score (r ≥ 0.601 – 760). Test-retest reliability was ≥ 0.75 for all MCTQ parameters.

Conclusions: Our research confirmed the validity and reliability of the Slovenian translation of the MCTQ in the working population between 18 and 65 years of age, who do not work regular night shifts. Assessing an individual's chronotype can be implemented to optimize working schedules. Moreover, assessments of social jet-lag can provide a quantitative marker of circadian misalignment that can be used during preventative health campaigns to identify people at risk of developing certain diseases.

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Night shift work and risk of aggressive prostate cancer in the Norwegian Offshore Petroleum Workers (NOPW) Cohort

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Introduction: A higher rate of prostate cancer in industrialized societies has spurred research into its association with night shift work. Positive associations are observed in studies of long-term and rotating night shift work exposure. Using the nationwide

Norwegian Offshore Petroleum Workers cohort, we aimed to study the association between extreme night shift work schedules and aggressive prostate cancer.

Materials and Methods: Among 25 347 males who worked offshore 1965–1998, we established a study population of 299 aggressive prostate cancer cases and 2056 non-cases. Work history was measured as years of day, night or rollover shift. Weighted Cox regression was used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for aggressive prostate cancer risk, adjusted for education and year of first employment. Person-years were generated from start of follow-up (01.07.1999) to the date of first prostate cancer diagnosis, emigration, death or end of follow-up (31.12.2019).

Results: Comparing cases to non-cases, median duration of rollover shift work was 1.2 years (12%) higher while median duration of day work was 2 years (20%) lower. Compared to day work only, an increased risk (HR 1.54, CI 1.04–2.28) was found in persons exposed to ≥16 years of rollover shift work. Compared to day work only, an increased risk was also indicated for ever exposure to any shift work (HR 1.25, CI 0.96–1.63) and rollover shift work only (HR 1.26, CI 0.94–1.69).

Conclusions: Long-term exposure to extreme rollover shift work increases the risk of aggressive prostate cancer in offshore petroleum workers.

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Work-Related Quality of Life (WRQoL) among garment factory employees in South India: A cross-sectional study

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Introduction: The garment industry in India is one of the largest in the world with more than 45 million people directly employed. While excessive working hours and a culture of disrespect affect the work-related quality of life (WRQoL), regular income and social security are the attractions for the employees.

Aim: To assess the WRQoL of the employees working in garment factories in South India.

Methodology: A study was done among 571 employees across 15 garment factories. They were selected randomly and proportionally allocated to have an equal representation of employees based on common demographics. A questionnaire for basic demographic and work details along with WRQoL scale was administered.

Results: Among the 571 employees, 51.45% were males; 13% were migrants. Mean age was 30.2 years (SD: 9.2). Majority of them were tailors (39.9%), followed by operators and checking employees. Average experience was 3 years with maximum experience up to 40 years and the median income was US\$ 110 per month. Overall, 81.1% had high WRQoL, 13.58% average and 5.32% low. Of the domains of WRQoL, among those with high WRQoL, home-work interface (82.2%) and working conditions (85.04%) scored higher than control at work (54.85%), general wellbeing (60.74%), and job and career satisfaction (66.88%).

Conclusion: Though the overall WRQoL is high, it masks the lacunae in the individual domains. Factors like control at work need to be addressed and means of ensuring job and career satisfaction should be prioritized by the employers. When individual domains improve, general wellbeing and perceptions of the work environment will improve.

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Personalised lifestyle intervention for shiftworkers with Type 2 Diabetes: a feasibility study and process evaluation

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Introduction: Shift workers are at an enhanced risk for several health conditions associated with work disability, including Type 2 diabetes (T2D). Empirical evidence suggests a positive effect of lifestyle interventions on T2D. We conducted a feasibility study and process evaluation to investigate if lifestyle interventions are promising in occupational health care for shift workers.

Materials and methods: Sixteen employees from an industrial company (>8000 employees) in the Netherlands participated in the study. The intervention consisted of a 13-week program with a personalized diet and exercise plan. Participants were mentored by an occupational physician, a physical therapist and a dietician. Data was collected with logbooks and pre- and post-interviews, questionnaires and medical examination. We used the RE-AIM model to analyse the data.

Results: Participants reported feeling more healthy and in charge of their condition. Glucose-levels were improving in several participants. Participants and professionals agreed that the program should have a follow-up to adopt sustainable lifestyle changes. Participants reported mixed satisfaction with facilitation of the program by the employer. Recommendations for alternative scheduling and more flexibility were made.

Conclusions: This study shows that implementing a lifestyle intervention in shift work is feasible. It also offers new insights into the mechanisms that play a role in managing T2D in employees in shift work.

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Eveningness in shift-workers: Longer overall sleep duration and higher subjective fatigue

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Introduction: Occupational Health seeks to promote physical, mental and social well-being of workers. Rotating shift work is a challenge for people, and its association with chronic fatigue, short, and poor-quality sleep has major negative health consequences. However, adverse effects can be modulated by individual characteristics, such as, chronotype, estimated by the timing of sleep on free days. Our main objective was to assess whether the working shift influence in workers' sleep varies with the reported chronotype.

Material and Methods: 104 workers affected by a 8-hour three-shift rotation system (morning, night, afternoon) completed a reduced version of the Munich Chronotype Questionnaire for shift-workers and the Fatigue Severity Scale.

Results and Conclusions: It was found that chronotype modulates the effect of shift type on the sleep duration. Increasing

eveningness was associated with longer main sleep duration during series of night and afternoon shifts (night: $r=0.48$, $p<0.001$; afternoon: $r=0.51$, $p<0.001$), but negatively associated with chronotype during series of morning shift ($r=-0.48$, $p<0.001$). The strategies to compensate for sleep debt were more used by workers with later chronotypes, resulting in a longer overall sleep duration ($r=0.48$, $p<0.001$). However, subjective fatigue was positively associated with chronotype ($r=0.24$, $p=0.024$), while no significant interaction was found between fatigue and overall sleep duration ($r=0.10$, $p=0.36$). These novel results will allow an individualized intervention by Occupational Health in the search for the prevention of chronic diseases associated with rotating shifts.

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Ageing Differences in Shiftworkers Depend on Working Conditions

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Introduction: Unfavourable working conditions are the risk factor of accelerated ageing.

Material and Methods: Biological ageing was studied in 59 telephonists (30-55 y.o., women), 62 truck drivers (28-65 y.o., men), 67 surgeons (23-74 y.o., men) and 31 miners (32-58 y.o., men).

Results: Shiftworkers were ahead of their peers at the aging rate of 0.7 (telephonists), 0.6 (drivers), 8.5 (surgeons) and 17 (miners) years, indicating average population (telephonists, drivers), accelerated (surgeons) and sharply accelerated (miners) ageing rates. Hypertension was found in 27%, 49%, 38% and 45% of people in the observed groups correspondingly. Kerdo's vegetative index was: -2, -11, -13 and -7 - correspondingly, indicating pronounced vagotonia tendency in surgeons and drivers. Predominantly broken type of bloodcirculation selfregulation was found (in 94-100% of shiftworkers). Bloodcirculation effectiveness was average in telephonists, below average - in drivers, at the boundary of average and below average - in surgeons and miners.

Conclusions: Miners and surgeons who performed harmful work with high physical strain and/or nervous-emotional tension under regular night work manifested sharply accelerated and accelerated pace of biological ageing along with low circulatory scores, forming the contingent of a threat to health. Truck drivers working long hours under continuous nervous-emotional tension showed the worst bloodcirculation scores. Revealed both broken type of bloodcirculation selfregulation and vagotonia tendency are prognostically unfavourable signs regarding cardiovascular pathology development in shiftworkers.

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Occupational stress and Burnout among shift health-care workers at a Portuguese Hospital

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Introduction: Occupational stress and burnout are a global epidemic. Health-care workers (HCW) in a hospital setting are especially at risk. Shift work, particularly night shifts, has been found to disrupt endogenous circadian rhythms and can cause a wide range of adverse health effects.

Methods: A cross-sectional study in a Portuguese health unit, conducted during 2019. The evaluation protocol included a sociodemographic and professional questionnaire, and the following instruments of psychological assessment, both validated for the Portuguese language: Stress Questionnaire for Health Professionals (SQHP) and Shirom-Melamed Burnout Measure (SMBM).

Results: The study included 372 shift HCW: 76,2% were female, with a mean age of 44.78 ($\pm 9,85$) years old. The most represented professionals were: 57,1% nurses, 19,8% physicians and 13,6% healthcare assistants. In the sample, 70% do night shifts and of these 43% do more than 5 nights/month. A high or very high occupational stress rate was observed in 58,6% shift HCW. The overall prevalence of burnout in the sample was 20.1%. Analysing the burnout dimensions, it was observed that 42.1% of the HCW were in a condition of physical fatigue, 33.3% in cognitive fatigue and 10.3% in emotional exhaustion. HCW who work more than 5 night shifts/month present significantly higher levels of burnout ($p=0,038$). A statistically significant association between occupational stress and burnout levels was established ($p<0.001$).

Conclusions: These data revealed high levels of occupational stress and burnout, regardless of the type of professional or work schedule and present alarming results.

28. SMALL-SCALE ENTERPRISES AND THE INFORMAL SECTOR **554**

Online gig informal workers: New precarities for their safety and health

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Introduction: The new forms of work imply new dynamics in which the risks and dangers inherent to work influence the health and safety conditions of workers; In this new scenario, informal work communities are integrated into collaborative economies organized through digital applications, which makes this a novel topic for exploration and knowledge.

Materials and methods: It is a qualitative-quantitative approach of non-experimental design and exploratory cross-sectional scope with snowball sampling, using observation based on Technical Standard NTC4114 and analyzing the data collected as prescribed in Technical Guide GTC45.

Results: The risk factors and dangers associated with the activity are identified, seeking to better understand the interactions and possibilities of development of occupational diseases or accidents at work due to the aforementioned risk factors that occur in the exercise of their activities.

Conclusions: The different implications of the forms of work in collaborative economies mediated by digital applications are discussed, where informality and precariousness in the application of control measures and job security systems are precarious or non-existent.

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Strategy for Occupational Health and Safety Regulatory Compliance of Operators of Small Event Centers in Lagos, Nigeria

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Introduction: Crowds, or large concentrations of people, occur frequently in modern society. Usually these large gatherings of people should occur without serious problems if well managed. Community halls/open spaces with temporary and demountable structures such as marquees, stages and seating that can accommodate between 100 up to about 500 guests is regarded as Small Event Centers (SEC) in Nigeria. They provide an important focal point for local residents and are used to host a wide range of events and activities both indoor and outdoor. Unfortunately, management of Occupational Health and Safety (OHS) related issues in SECs is a challenge; most of the SEC owners lack requisite knowledge on OHS which always led to injuries and deaths of guests whenever there are mishaps.

Materials and Methods: The Lagos State Safety Commission in conjunction with its accredited OHS professionals decided to conduct three (3) day OHS awareness training for the operators of these centers at no cost to them. 1000 operators participated in the phase one of the project in 2019. The topics of the training include risk assessment, crowd management and evacuation, fire hazards, trip or equipment hazards, traffic management and facilities inspection etc to selected operators.

Results and Conclusions: Participants' evaluation forms indicated that the OHS knowledge; attitude and behavior scores of the participants were increased. The innovation of this approach is that this is the first attempt, to propose an OHS model for regulation specific for SECs in Nigeria.

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Preventive health measures in small and medium-sized enterprises in the Netherlands - A mixed methods study of barriers and drivers of implementation

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Introduction: The workplace is an ideal environment for promoting workers' health. Nevertheless, preventive health measures are insufficiently implemented, especially in small and medium-sized enterprises (SMEs) with up to 250 employees. The aim of this study is to investigate the barriers and drivers for their implementation from the perspective of company representatives in SMEs.

Materials/Methods: An online survey was completed by 79 SME employers and other company representatives (e.g. HR professionals and occupational health and safety officers) in the cleaning, care, construction and transport sector. In addition, semi-structured interviews were conducted with 18 company representatives. The interview transcripts were analyzed using a category-based content analysis. The categories were formed in a combined deductive-inductive procedure.

Results/Conclusions: Preliminary results show that the focus of prevention efforts by SMEs is on improving working conditions and complying with legally required occupational health measures, while lifestyle measures are rarely implemented. The main barriers to implementation are lack of resources (finances, time, knowledge) and perceived incompatibility of available measures with conventional working practices. In addition, implementation was found to be driven by clear prioritization by the employer and a working climate in which workers are encouraged and empowered to participate in shaping the implementation process. Our findings can serve as a guide for developing successful strategies for implementing preventive health measures in SMEs.

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Perceptions of prefabricated roof truss installers in Thai SME enterprises related to the causes of accidents and risks associated with working at height

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Introduction: Small and Medium Enterprises (SMEs) with fewer than 50 employees are those that install prefabricated roofing (Galvanized steel roof trusses). Due to outdoor activities or working at a height, enterprises are always at risk of occupational injuries and fatalities.

Material and Methods: To examine the perception of the causes of accidents and risks of Thai SMEs who install prefabricated roofs. A cross-sectional study was conducted in four regions of Thailand. The survey participants were identified using multi-stage cluster sampling. A total of 392 SMEs were surveyed using a questionnaire to collect information. We used both descriptive and inferential statistics.

Results: Perceptions of accident causes and the risks of working at a height, as the vast majority believe that if laws are followed, accidents will occur as a result of acceptable limitations. 74.20 percent strongly believe that employees lack skills and knowledge in the workplace. 4.80 percent, on the other hand, agreed that safety officers should be unavailable for work. Depending on the position, different activities have varying perspectives on accidents.

Conclusions: Accidents were perceived to be caused mostly by the recklessness of workers installing prefabricated roof trusses. The portion caused by the nature of the job, the working environment, and the work itself have a secondary effect, which can be used to prepare for accident prevention in the subsequent order.

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Travel risk management: an eye on micro and small scale enterprises

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Introduction: Professional travel presents companies with major challenges in terms of travel risk management (TRM). Unlike many large companies, small-scale companies (SSE) often have fewer resources in this regard. In cooperation with the German scientific societies for occupational medicine and safety engineering, an online tool was developed to support companies in TRM.

Methods: From January 2020 and May 2021 companies completed our online checklist (max. path length: 80 questions). In this evaluation, we focus on the information provided by SSE on industry affiliation, type of work assignment and destination country, level of knowledge, and sensitivity regarding risk assessment.

Results: A total of 3488 people participated (answering at least one question). 517 of 1702 (30%) were managers or consultants of SSE (< 50 employees). About a quarter belong to critical infrastructure. Tasks in the country of assignment were mainly installation activities (36%) followed by office activities (21%) and inspection of facilities (19%). 146 of 218 (67%) reported that a risk assessment had never been conducted in the country of assignment. 102 of 214 (48%) reported that occupational health care was available. 148 of 198 (75%) reported knowledge of sanitary conditions in the country of assignment.

Conclusion: TRM is relevant for SSE. The data point to existing deficits concerning risk assessment in the country of assignment and occupational health aspects. Checklists and job aids are accepted and contribute to raising awareness and optimizing travel preparations. Continuous review and adaptation of the checklist are recommended.

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Small+Safe+Well: A small business Total Worker Health intervention

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Introduction: Strategies are needed for improving small business workforce Total Worker Health (TWH). While there is evidence that worksite wellness and safety programs improve workforce health risks, research demonstrates that small employers face many barriers to effectively implementing these programs. The purpose of our study was to evaluate an intervention that helped small businesses develop and implement TWH policies and programs via assessment, advising, and senior TWH leadership development.

Methods: In our study, we randomly assigned businesses to receive one of two intervention doses: (low, n=23) assessment and advising or (high, n=13) assessment and advising plus senior management leadership training. Our hypothesis was that businesses in the high dose would report greater changes in TWH policies and programs than businesses in the low dose from baseline to 1-year later. Additionally, employees working for businesses in the high dose would report greater changes in safety and health leadership, climates, motivation, behavior, and well-being from baseline to 1-year. **Results:** At baseline, businesses in both groups did not differ on any of our outcomes of interest. From baseline to 1-year later, businesses in both the low and high doses exhibited similar changes in all outcomes of interest, which fails to support our hypothesis.

Conclusions: Program evaluation data from our leadership training indicated that some components of our intervention were not implemented as planned. Also, about half of the leaders faced stress

(54%) and time pressure barriers (43%), which may have limited intervention effectiveness.

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Occupational Health of young workers in the Brick Industry in Nepal

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Introduction: Thousands of young adults are reported to be employed in Nepal's brick industry. Considering the increased demand for bricks to support the current rate of urbanization, this figure appears to be increasing. Lack of adequate data on the health of young workers in Nepal lead to the conception of this study. The study's main objective was to analyze the health of young workers in Nepal's brick industry and to generate evidence to support child labor regulation reform in Nepal.

Material and Methods: The study was conducted in Bhaktapur District and Sarlahi District of Nepal. Multi-stage stratified sampling technique was used to calculate the sample size required for the study. A total of 198 young workers were selected from Bhaktapur and Sarlahi Districts. Similarly, 107 non-working young adults were selected as the control group.

Results: Young workers in the brick kilns were nearly twice as likely to be sick compared to the control young adults. Work-related injuries and infections were common illnesses. Similarly, diseases resulting from poor physical circumstances and nutritional deficiency problems, were common among them. The young workers' main physical health issues were musculoskeletal, respiratory, dermatological, and auditory. The psychological evaluation revealed high levels of stress, low self-esteem, and deteriorated social interactions.

Conclusions: In the studied industry basic occupational health and safety measures are virtually absent. This, combined with a poor physical environment, work conditions and psychosocial pressures produced a high incidence of work-related disorders in those workers.

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The state of OSH in Small Scale Enterprises of Bulawayo: The case of OK Mart SMEs

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Background: According to a survey by Zimstat in 2015, 94.5% of the 6.3 million people defined as employed are working in the informal economy. As most are not registered with any authority, it makes it difficult for them to access services including OSH. OK Mart SMEs are a group of businesses housed under one roof. These businesses include printing and stationery, welding, tailoring, chemical manufacture, electronics repair, upholstery, aluminum, and steel fabrication.

Objective: To assess the state of OSH and strengthen OSH provision in SME.

Method: The intervention had a 3-phase approach which used the participation of the workers. A needs assessment was conducted

with the beneficiaries, trade unions, local authority, and government departments to get information about the OSH challenges they faced and the solutions which could be implemented. A HIRA was conducted in their workstations to identify hazards. Interventions were then implemented accordingly.

Findings: The workers highlighted inadequate workspace in the shops, poor workstation design, poor ventilation, and heat, poor waste management techniques, emergency preparedness was very poor, poor lighting, inadequate sanitary facilities, inadequate COVID 19 prevention measures, no social protection available and no access to OSH services.

Conclusion: The interventions implemented focused mainly on 3 issues namely redesign of the workstation to deal with OSH issues (heat, ventilation, improve shop size, sanitary facilities), conducting of OSH training for the workers and provision of COVID 19 prevention measures i.e., face masks, sanitisers, and infrared thermometer

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The second Italian cross-sectional survey on Occupational Health and Safety: the study on workers and employers

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Introduction: In 2014, INAIL (Italian Workers' Compensation Authority) developed the first cross-sectional study for the implementation of a periodical survey to investigate workers and employers perception of occupational safety and health (OSH) risks. In 2019, the second edition was aimed to analyze the quality of working conditions and highlight the key aspects for an effective OSH management in Italian production system composed by 98% of micro and small enterprises.

Materials and Methods: This study was conducted through two targeted questionnaires that included new items related to the changes in the world of work, such as job insecurity, work-life balance, and technological development. CATI interviews were conducted with a representative sample of 8,000 workers and 1,000 employers, stratified by socio-demographic and occupational variables.

Results: In our sample 56.6% of workers and 61.8% of employers operate in micro and small enterprises. The main results show that in micro and small enterprises job insecurity is more perceived than in larger companies while technological innovations are less developed. Most of respondents from micro enterprises stated that work never interferes with family life, otherwise the workers of medium and large enterprises have more concerns for work-life balance.

Conclusions: This survey represents a relevant study in Italy in terms of sample dimension and representativeness of the national production system. It may open the way towards the development of a permanent system taking into considerations changes in the world of work and focused on differences perceived by company size.

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The Profile of OHS Amongst Informal Traders in GWERU- A Case of Zimbabwe

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Introduction: Access to Occupational Health and Safety (OHS) services in the informal sector in Africa remains grossly constrained. OHS services amongst informal traders are almost non-existent. Informal traders constitute an important part of the population whose activities affect most people. They are involved in selling food stuffs. However due to poor OHS legislative frameworks and poor enforcement by local authorities, most informal traders are left without any form of OHS services. This poses a threat to the health of the public.

Methods: The researcher reviewed the OHS practices of informal traders in Gweru. This was undertaken through a walk-through assessment and conducting informal interviews to find out the OHS arrangements and knowledge of basic concepts of OHS of informal traders at the market place in Gweru.

Results: The informal traders were found to have no form of OHS services in place. It was clear that most traders had no idea what constitutes risk management and other basic OHS principles. They lacked knowledge on hazard identification and risk assessments. They had no access to running water and ablution facilities. Overcrowding and poor hygienic practices was prevalent amongst the informal traders.

Discussion: It is very evident the informal traders in Gweru have significant ignorance as regards OHS. The lack of running water and ablution facilities and poor OHS regulatory framework constitutes a major problem in the working space. This constitutes a risky working environment that can promote outbreaks of infections. Government recommended to put regulatory framework to protect traders and public.

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Occupational Health for Informal Workers: A Review of Approaches to Care

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Introduction: 85% of workers in the world do not have access to health and safety services at work. In the informal sector, there are few programs that provide monitoring and evaluation of the working conditions and health of this population.

Materials and methods: a literature search was conducted using the Arksey and O'malley framework. The search was carried out in four databases and gray literature to identify studies on basic occupational health services for informal workers. the title and abstract review was developed by two researchers using a predetermined format.

Results: The search identified 21 articles published from 1992 to 2020. The programs identified point to impacts in small settings not dependent on national public policies. They have a response approach to work accidents and occupational diseases. Funding for the programs is low and in some cases due to political interests.

Workers' participation is limited in solving their health problems. In many cases, care is provided in primary health care settings, in which health workers have difficulty recognizing the relationship between work and health.

Conclusions: Occupational health services for workers in the informal sector are still limited. It is necessary to develop national and international policies that allow the development of strategies for basic occupational health services with universal coverage. it is necessary to involve workers in solving their work-related health problems.

29. THERMAL FACTORS

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A Study of Heat Stress Index level measurement to manage heat related illnesses at large petrochemical industry

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Aim and Objective: The main aim of this study was to assess heat index level during workers working under direct sunlight at construction of petrochemical site using OSHA heat index level and suggest administrative control to reduce heat related illnesses.

Material & Methods: To measure heat stress level at construction site, we have used OSHA heat index level guidelines. Heat index is a single value that combines both air temperature and relative humidity indicates level of heat in °C or F. Heat index values are divided into four bands with four risk level. Heat stress index level studies were conducted between April, May and June 2020. WBGT (Wet Bulb Globe Temperature) meter was used to measure heat index level. Total 164 measurements were taken in three months' time with 4 times in a day to check level of heat in March to May 2020.

Results: Heat index level was mostly fall into "Extreme Caution Zone & Danger Zone" in afternoon time between 12:00 hrs. to 16:00 hrs. where measured heat index level was between 32-53°C as per OSHA guidelines. Month wise comparison, In March total 12 samples were collected includes comparison 10 samples fall into Extreme Caution Zone & 1 sample fall into Danger Zone. In April total 100 samples were collected includes comparison 63 samples fall into Extreme Caution Zone & 37 sample fall into Danger Zone. **Conclusion:** Heat index method presents an important tool to assess the level of heat in environment and protect the construction of petroleum workers from heat-related illnesses.

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Heart rate increase from rest as an early sign of heat-related illness risk in construction workers: A cross-sectional study

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Background : Heat-related illness (HRI) is a common occupational injury, particularly among construction workers. Therefore, methods need to be developed to predict and minimize HRI risk. This study aimed to investigate whether differences in heart rate (HR) can be used to predict HRI risk.

Methods: We surveyed 79 construction workers from May 1 to October 30, 2020, and recorded their physiological data during their working hours for a period of 3,163 person-time. The resting HR was defined as the lowest reading taken within the first hour of wearing the sensor, and HRI risk was determined using the following formula: $180 - (0.65 \times \text{age})$. The rate of increase in HR from rest was calculated using the following formula: $(\text{maximum HR} - \text{resting HR}) / \text{resting HR}$.

Results: HRI risk was observed at 368 person-time (11.6%). After analyzing the receiver operating characteristics curve, the cut-off value was 132.9%, with a sensitivity of 75.5% and specificity of 85.0%.

Conclusions: Our results showed that the difference in HR is a good indicator for predicting HRI risk. Furthermore, continuous physiological monitoring using a wearable sensor can aid in detecting early signs of HRI risk.

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Indoor thermal environment and heat strain in laundries during Finnish summer

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Introduction: Climate change causes air temperature rise in Finland. The average temperature was 3–4°C above the long-term average in July 2021. Hot outdoor temperature increases indoor temperature especially in workplaces where heat radiative machines are required, such as in laundries. The purpose of this study was to survey the environment conditions at two laundries (small and large-scale) in three summers and to assess the heat strain and recovery of the laundry workers.

Material and Methods: Air temperature and relative humidity data were collected at two laundries located to Southern and Northern Finland during summers 2019–2021. Fourteen male and female laundry workers volunteered for the heat strain assessment during their normal workdays. Their core and skin temperatures and heart rate were measured, and subjective sensations were recorded. Ambient temperature varied from 23 to 36°C at the workplaces during the heat strain assessment.

Results: The indoor temperature at the small laundry rose above 28°C, which is the criterium for hot work in Finnish occupations, when the air temperature rose above 23°C for several consecutive days. Core temperature was 37.5–38°C and skin temperature at the most 36°C. Additional rest pauses were required due to the hot work environment.

Conclusions: A cumulative increment in indoor temperatures was observed during the heat waves. Heat strain of the workers was generally moderate. Cooler recreation room or personal cooling gears are needed to provide a sufficient recovery period from the heat strain.

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Heat exposure is perceived as a problem by Finnish indoor workers during summer

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Introduction: Climate change increases outdoor air temperature and may also cause an increment to the room temperature of indoor workplaces in Finland. The purpose of this study was to investigate the extent of heat problem in two Finnish laundries and a hospital.

Material and methods: Interviews (2–8 participants) were conducted in all the three organizations. Anonymously answered questionnaire study was delivered for the workers. Altogether 128 answers were obtained.

Results: Indoor temperature was reported to rise in all the organizations during summer and above the criterium of hot work (28°C) in laundries. 86% of the respondents felt the heat exposure as a problem, one fifth reported that hot working environment has a negative effect on health. Heat strain was experienced especially near heat radiative machines, in hot and moist conditions (shower rooms) and in tasks that required wearing PPE. 60% of the respondents reported the need for better air conditioning. Redesigning of work clothing was hoped in several answers.

Conclusions: Summertime heat problem was recognized by all the organizations. Worker's health status affects the level of perceived heat strain. To secure working ability in hot indoor occupations attention should be made to the technical building systems in addition to work clothing, intermissions of work, and individual actions of the worker (e.g. hydration).

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High solar radiation exposure reduces self-regulated work intensity in the heat

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Introduction: The present study examined the effects of variations in solar radiation exposure on self-regulated work intensity and thermoregulatory responses in the heat.

Methods: Ten male participants completed 45-min cycling exercise in hot outdoor environments (31±1°C ambient temperature, 52±8% relative humidity) at a freely chosen resistance and pedal cadence at a fixed rating of perceived exertion (RPE) on the Borg 6–20 scale of 13 (somewhat hard). Participants were blinded to resistance, pedal cadence, distance and elapsed time and exercised at three sunlight exposure conditions: clear sky (mean±SD: 1072±91 W·m⁻²; HIGH); thin cloud (592±32 W·m⁻²; MID); and thick cloud (306±52 W·m⁻²; LOW). Rectal and skin (chest, upper arm, thigh and calf) temperatures, heart rate, skin blood flow and blood pressure were recorded at rest and during exercise.

Results: Power output (HIGH 96±22 W; MID 103±20 W; LOW 108±20 W; p<0.001) and resistance (p<0.01) were lower in HIGH than MID and LOW. Pedal cadence was lower as solar radiation increases and was different between all trials (p<0.001). Body heat gain from the sun was greater and thermal sensation was higher with increasing solar radiation and all variables were different between all trials (p<0.01). Weighted mean skin temperature was higher in HIGH than MID and LOW (p<0.01), but rectal temperature was similar between trials (p=0.485).

Conclusions: We conclude that self-regulated work intensity in the heat at a fixed RPE of somewhat hard is reduced with increasing solar radiation because of greater thermoregulatory strain, perceived thermal stress and body heat gain from the sun.

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Risk of Heat-Related Mortality, Accident, and Injury among Korean WorkersWanhyung Lee*Gachon University Gil medical center, Occupational and environmental medicine, Ichoen, Republic Of Korea*

Introduction: Only few studies have shown that heat waves can cause both death and accident focused on workers. The present study investigated the association between heat exposure and the likelihood of hospitalization and death, and further identified the risk of heat-related death according to types of heat and dose-response modeling with heat threshold.

Methods: Workers were selected from the Korean National Health Insurance Service-National Sample Cohort 2002–2015, and regional data measured by the Korea Meteorological Administration were used for information on weather. The relationship between hospitalization attributable to disease and weather variables was analyzed by applying a generalized additional model. Using the Akaike Information Criterion, we selected a model that presents the optimal threshold.

Results: Maximum daily temperature (MaxT) was associated with an increased risk of death and outdoor mortality. The association between death outdoors and MaxT had a threshold of 31.2°C with a day zero lag effect. History of medical facility visits due to the health effects of heat waves was pronounced in certain injury, poisoning, and other consequences of external causes (S,T).

Conclusions: The study demonstrates that heat exposure is a risk factor for death, injuries, and accidents among workers. The finding that heat exposure affects workers' health has future implications for decision makers and researchers.

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Global warming and high temperature increase the risk of stillbirth in the third trimesterHsiao-Yu Yang¹, Jason Kai Wei Lee²*¹ National Taiwan University, Institute of Environmental and Occupational Health Sciences, Taipei, Chinese Taipei, ² National University of Singapore, Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, Singapore, Singapore*

Introduction: Evidence on adverse effects of temperature on stillbirth in Asian countries is lacking. The objective of this study was to assess the impact of temperature on the stillbirth rate.

Material and Methods: We collected monthly temperature and stillbirth in Taiwan from 2009 to 2018. We performed a time-series analysis to predict the risks of stillbirth and explored the associations between temperature and stillbirth with a distributed lag nonlinear model. We calculated the number of stillbirths attributable to hot and cold temperatures, which corresponded to the optimal temperature with the lowest stillbirth rate.

Results and Conclusions: We analyzed 22,769 stillbirths that occurred between 2009 and 2018. The mean stillbirth rate was 1.13±0.14%. The relative risks of stillbirth due to exposure to cold (<20°C), mild heat (22–25°C), moderate heat (25–29°C), and extreme heat (>29°C) were 1.08 (95% CI 1.02, 1.14), 1.10 (95% CI 1.04, 1.17), 1.15 (95% CI 1.09, 1.22), and 1.18 (95% CI 1.11, 1.25), respectively. Hot temperature exposure was responsible for a higher attributable fraction of stillbirths (8.34%, 95% CI 0.05, 0.11) than cold

temperature exposure (1.89%, 95% CI 0.01, 0.03). Pregnant women in the third trimester were most susceptible to the effects of extreme temperatures. The greatest cumulative effect of extremely hot temperature was found in the 97.5th percentile of temperature (29.8°C) relative to the optimal temperature (21°C) at lag 0–3 months, with a cumulative relative risk of 2.49 (95% CI: 1.24, 5.03). We recommend effective interventions to prevent the reproductive hazards caused by climate change.

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Investigation of heat stroke risk factor in the workplace by large-scale web surveySatoru Ueno^{1,2}, Naomi Hisanaga³, Shibata Nobuyuki^{1,2}*¹ National Institute of Occupational safety and Health, Japan, ² Work Environment Research Group, Kawasaki, Japan, ³ Aichi Gakusen University, Department of food Science and Nutrition, Okazaki, Japan*

Introduction: Many risk factors are listed for the development of heat stroke in the workplace, but there is little evidence. The purpose of this study is to clarify risk factors of heat stroke.

Material and Methods: We conducted a large-scale web survey on work-related heat stroke. Blue-collar workers (security, primary industry, production process, transportation/ mechanical operation, construction/ mining, cleaning) accounted for 46%, white-collar workers (administration, professionals, office worker) 26%, and others (commercial and service) 28%. The questions were experience of heat exposure and heat stroke during work, working hours, working environment, lifestyle, family status, health conditions etc. After cross-tabulating the number of people who had heat exposure and heat stroke for each question, chi-square test was performed. Logistic regression analysis was also performed with the experience of heat stroke on the job as the objective variable and the questions with significant differences in the chi-square test as the explanatory variables.

Results: For blue-collar workers, age, smoking, sleepiness during work, chronic disease, taking medicine, lack of exercise, health conditions, job category, heat stroke experience of relatives, weekly working days, drinking freely, breaking freely, time to toilet, urine color, labor burden, satisfaction with heat stroke measures were significant for heat stroke onset by chi-square test. For logistic regression, similar results were obtained.

Conclusions: The results of this study provide useful information on measures against heat stroke in the workplace.

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A seasonal trend of ambulance transport from workplaces in Aichi prefecture, JapanTomohiro Umemura¹, Akihiko Narisada², Rei Wakayama¹, Reiko Hori¹, Masahiro Matsunaga¹, Eiji Shibata³, Kohta Suzuki¹*¹ Aichi Medical University, Department of Health and Psychosocial Medicine, Nagakute, Japan, ² Aichi Medical University, Institute for Occupational Health Science, Nagakute, Japan, ³ Yokkaichi Nursing and Medical Care University, Department of Nursing, Yokkaichi, Japan*

Introduction: In Japan, survey of industrial accidents conducted by Ministry of Health, Labour and Welfare is used to analyze a trend of accidents occurred in workplaces. However, the survey includes

only accidents that caused an absence of work for 4 days or more. It does not correctly show a trend of industrial accidents because accidents that did not cause an absence of work for 4 days or more are not included. In this study, we focused on ambulance transport record as more real data and analyzed the seasonal trend. Material and

Methods: Data of ambulance transport record from 2015 to 2019 in Aichi prefecture was used for analysis of the seasonal trend. Aichi is localized in the center of Japan and has a population of 7.5 million. As many big corporations exist, Aichi is a major prefecture in Japan. Cases classified into TRANSPORT FROM WORKPLACE in the database were sorted by month. As for 5 months (May to September), it was checked whether there was a correlation between the number of cases and the mean of daily maximum temperature (mMT) in each month. The correlation between the number of cases and the mean of daily Wet Bulb Globe Temperature (mWBGT) was checked too.

Results and Conclusions: The number of cases tended to rise in summer. The number of cases was positively correlated to both mMT ($r=0.79$) and mWBGT ($r=0.71$). Thus, heatstroke may account for a large part of the cases. However, it remains speculative because a detailed name of injury and disease was not clarified in the database. This is a study limitation. In conclusion, prevention from heatstroke is important in Japanese workplaces in summer.

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Comparison of WBGT values directly measured and those estimated from data at the nearest AMeDAS point

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Introduction: The measurement of WBGT has become increasingly important recently to properly evaluate the risk of heat stroke at work. However, in many workplaces, the thermal indices available are limited to temperature and relative humidity. It is assumed ambient WBGT may be estimated from the data of AMeDAS (Automated Meteorological Data Acquisition System) in Japan. Therefore, we tried to understand the difference and its characteristics between the thermal indices directly measured at workplace and those recorded at the nearest AMeDAS point.

Material and Methods: From May to September 2021, we measured WBGT, temperature, and globe temperature using WBGT measuring devices at 6 factories in 4 different regions in Japan. At each factory, four measurement points, indoor/sunny, indoor/shade, outdoor/sunny, and outdoor/shade, were selected. The measurement was continued for a week and repeated four times. Ambient thermal data at the nearest AMeDAS point was obtained from the websites of Ministry of the Environment and Japan Meteorological Agency.

Results and Conclusions: Under outdoor/sunny condition, the thermal values directly measured were almost the same as the values at the nearest AMeDAS point regardless of the ground conditions in general. However, the measurement point aside of nearby building, the values directly measured often become higher in the afternoon than those at AMeDAS point, probably due to the radiant heat from the building. Under indoor conditions, the measured values also tended to become higher at night than those at AMeDAS point, probably because the roof of the building deterred the radiative cool

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Protecting Workers from Extreme Heat: Lessons Learned from California's Heat Standard

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INTRODUCTION: Heat can, and does, kill workers. And yet, this is entirely preventable. Solutions that protect workers from heat already exist and several countries have mandatory policies to ensure employers provide workers with heat-relieving measures. The United States has no federal heat standard, but three states have instituted policies to protect workers in their state.

MATERIAL AND METHODS: In this study we analyzed publicly accessible data on California occupational heat-related injuries, illnesses, fatalities, and enforcement citations over the last 15 years. We performed descriptive statistics such as frequency, percentage (%), mean (M), and standard deviations for our variables of interest using R.

RESULTS AND CONCLUSIONS: Our final analyses contained over 480 heat-related workplace catastrophic and fatal events from 2005 to 2019. Additionally, using data on heat inspections and violations, we analyzed over 16,000 heat-related workplace citations and inspections from 2005 to 2021. Our top findings were: agriculture sector leads in serious heat incidents and standard violations, most heat stress violations are triggered by unprogrammed inspections, and lack of training leads in the number of citations issued. Together both datasets provide a compelling look into what is working and not working with California's heat stress standard. As we learn from old standards and create new ones it is paramount to remember that one death or illness from heat is one too many – we have the tools to prevent them. The more far-reaching and detailed standards are the better protections they offer for workers who suffer in the heat.

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Risk of Heatstroke in Marine Firefighting

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Introduction: Firefighters are exposed to eminent risk of heatstroke in their ordinal activities; however, it is very difficult to evaluate the risk of wearing fireproof clothing in a flame-induced thermal environment. We had an experience of evaluating their risk including the measurement of core temperature during a firefighter training.

Material and Methods: The rectal temperature and heart rate of 4 male firefighting instructors (29.8 ± 2.5 years old) were continuously measured throughout a marine firefighter training for 2 days in September, 2020. Ambient temperature, humidity, wind velocity, globe temperature, and WBGT were also monitored nearby. Their naked body weights were scaled before and after the training to estimate the amount of sweating. Ratings of perceived exertion (RPE) and Trail Making Test (TMT) were also checked repeatedly.

Results: WBGT was 22–34°C on day 1 and 25–32°C on day 2, and the duration above 31°C was longer on day 1. The rectal temperature of 2 and 1 instructors exceeded 38°C on day 1 and on day 2, respectively. The elevated rectal temperature did not decrease soon after the end of firefighting activities but continued while they wore fireproof clothing. In addition, even after taking off the clothing, rectal temperature remained high for about 10 minutes. Nevertheless, all TMT results were within the normal range.

Conclusions: The rectal temperature of firefighters may exceed 38°C and it continues for a while after they take off fireproof clothing.

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Heat risk in hospital kitchen by measuring WBGT

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Introduction: Food hygiene management based on HACCP has become performed in Japanese food service facilities. For washing and disinfection, a lot of hot water is often covered to kitchen countertops and utensils. The served meals are preserved in a wagon equipped with a warmer called as catering wagon. Thus, the workers in a kitchen are exposed to a hot and humid environment. In this study, we aimed to evaluate the heat stress of the workers by measuring WBGT in a hospital kitchen.

Methods: We measured WBGT in a kitchen and in a cafeteria, every 2–5 consecutive days (24 hours, every minute) in each measuring point, from June to September in 2021. We also measured the radiative temperature on the surface of heated equipment and the direction of airflow. We compared the WBGT by the existence of a heat source and of personal cooling devices including local air conditioner.

Results: In the area around the heat sources such as ovens, WBGT tended to increase and exceed 30 degrees Celsius during the peak hours of cooking, even in the air-conditioned kitchen. Airflow measurement revealed that the cooled air did not necessarily reach to the body surface of workers. In the area where spot coolers and ventilators were close to each other, stagnation of airflow was observed.

Conclusions: We observed the high WBGT spots even in the air-conditioned kitchen. One of its reasons was not only the presence of heat sources but also the stagnation of airflow of spot coolers and ventilators. It may be necessary to isolate heat sources and secure sufficient airflow around the hot spots to reduce the heat risk of workers.

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Helmet-type measuring device for estimating the amount of sweating in a hot environment

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Introduction: Prediction of the amount of sweating in a hot environment leads to early prediction of the onset of heat stroke. However, it is difficult to continuously measure the amount of sweating at

workplaces. Recently, a helmet-type device has been developed by a coauthor to estimate the amount of sweating by monitoring the water vapor in the helmet. In this study, we evaluated the accuracy of the device while it is used in extremely hot environment.

Material and Methods: Twelve healthy participants wore thermal sensors and the device and exercised by bicycle ergometer for 30 minutes at about WBGT 31 C (temperature 40 or 35 C, relative humidity 35 or 60%). We measured naked body weight, body core temperature, and heart rate and estimated the amount of sweat by measuring the change of body weight. The amount of sweat was also monitored by the sweat meter placed on the forearm.

Results: The amount of whole-body sweating per minute estimated from the measured data by the helmet-type device increased linearly during exercise. On the other hand, the value measured by the sweat meter increased rapidly within 10 minutes after the start of exercise and increased gradually. The values measured by both devices did not coincide. The amount of whole-body sweat estimated by the helmet-type device exceeded more than 300 g from the actual amount of change in body weight.

Discussion: It is estimated that the helmet-type device may not accurately predict the amount of whole-body sweat when the proportion of ineffective sweating increased. The equation of estimation must be revised for its use in hot and humid environment.

30. TOXICOLOGY OF METALS

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Global Occurrence of Adverse Effects from Human Metal exposures

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Introduction: Historically, many cases of occupational metal poisoning occurred. Environmental metal exposures may also cause diseases. We examined the present occurrence of adverse health effects from human metal exposures in a worldwide perspective.

Materials and Methods: 130 medical doctors and scientists made extensive literature searches and evaluated information concerning exposure and health effects of 38 specific metals and their compounds. In addition, they reviewed 30 other topics of importance for the evaluations.

Results and Discussion: The Handbook on the Toxicology of Metals, 5th Ed, 2022 presents the compiled information and the evaluations. In high-income countries, cases of a new occupational disease “Indium lung” have recently occurred; while classical poisoning by arsenic, lead, cadmium and mercury are rare. In contrast, such poisoning frequently occurs in artisanal small scale mining in low and lower middle-income countries. Published estimates state that 1 – 2 million disease adjusted life years (DALYs) are lost due to mercury poisoning under these circumstances. Poisoning cases due to arsenic, lead, and cadmium also occurs. These poisoning cases are in addition to one million illnesses, 56 000 deaths and more than 9 million DALYs estimated to occur globally due to exposure to foodborne exposure to arsenic, methylmercury, lead and cadmium. Other reports have estimated several hundred thousand deaths and many millions of DALYs from zinc and iron deficiency. There is

need for intensified efforts in risk assessment and preventive action.

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Genetic markers for assessment of individual sensitivity to lead exposure

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Introduction: Lead and its compounds are widely used in various industries. Numerous studies indicate differential susceptibility to lead exposure, which is based on the genetic polymorphism of proteins involved in the absorption of lead and capable of potentiating the toxic effect of the metal.

Material and Methods: 102 workers of a lead battery recycling industry were examined; air lead concentration was from 0.05 to 0.3-0.5 mg/m³. Blood lead level (BLL) was determined by the atomic absorption spectrometry, δ -ALA in urine - by the reaction of pyrolysis with acetylacetone. SNPs HFE (rs1799945), VDR (rs10735810), SOD2 (rs4880), GSTP1 (rs1695) were detected. The research has been approved by the ethics committee of IRIOH. Data were analysed using Statistica.

Results: SNP of the HFE gene was associated with higher δ -ALA levels ($p < 0.01$) and increased number of erythrocytes with basophilic granularity ($p < 0.05$). VDR gene polymorphism was associated with increased BLL ($p < 0.01$) and with changes in hematological markers: correlations ($p < 0.05$) with HGB, MCV, MCH, RDW, indicating a higher risk of anemia. SNPs of GSTP1 (OR=12.750, 95% CI=2.156-75.405) and SOD2 (OR=8.472, 95% CI=2.507-28.631) increased the risk of basophilic granularity of erythrocytes due to potentiation of the lead toxic effects.

Conclusions: Individual sensitivity to lead exposure is associated with genetically determined metabolic processes that characterize the mechanisms of lead accumulation (HFE, VDR) and protection against oxidative stress (GSTP1, SOD2). Determination of these SNPs can be used to identify risk groups of chronic lead poisoning among workers.

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Assessing intrinsic exposures to toxic heavy metals in a cohort of adult women in an urban metropolitan city in India

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Introduction: Trace metals exposures are linked to high risk of cardiovascular & neurological disorders. Biomonitoring using non-invasive tissues (hair & nails) can be instrumental in quantifying intrinsic exposures to toxic & carcinogenic metals. This study aims to examine metals in scalp hair & toenails from adult females from Mumbai, India & determine their key influencing factors.

Materials and Method: Hair & nails samples (N=115) were collected from consenting females (21-61 years) from three different neighborhoods in Mumbai. Using ICP-MS, toxic metals such as V, Cr, Ni, Cd, Pb, As, Sr, Sb, & Co were quantified and a structured questionnaire was used to collect information on demography & health parameters, GIS to determine traffic variables, & one-way ANOVA with Tukey-Kramer analysis to ascertain significant differences between variables.

Results and conclusion: Pb ($18.5 \pm 8.8 \mu\text{g/g}$), Cr ($24.9 \pm 17.6 \mu\text{g/g}$), & Sr ($27.4 \pm 4.08 \mu\text{g/g}$) dominated in both tissues. Lower levels were observed for As, V, Cd & Ni. Higher carcinogenic metal concentrations were found in traffic-dense & industrial areas (58.6% & 41.0% resp.), compared to the residential location, suggesting a significant spatial effect on metal levels. Positive correlations were observed for Co, V, As, Mn, & Cu ($r > 0.7$, $p < 0.05$), indicating contribution from similar sources. No significant differences observed for metal levels when compared across age groups ($p > 0.05$), however, significant differences were observed for V, Cr, and Cu in hair with BMI ($p < 0.05$). Further investigation delineating the influence of occupation & indoor/outdoor sources is underway.

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Standard beryllium lymphocyte proliferation test vs CFSE assay to detect beryllium sensitization, a comparative pilot study in dental technicians

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Introduction: Beryllium blood lymphocyte proliferation test (BeLPT) is the gold standard to assess beryllium sensitization (BeS) in exposed workers and in patient with suspected berylliosis. However, standard BeLPT requires radioactive tritiated thymidine; therefore alternative non-radioactive cell proliferations assays, such as carboxyfluorescein succinimidyl ester (CSFE), has been proposed to replace tritiated thymidine. Dental technicians can be exposed to beryllium during casting, cutting, grinding, polishing, and finishing of dental alloys. The aim of this study is to compare the agreement of tritiated thymidine BeLPT and CSFE assay to detect BeS in a cohort of exposed dental technicians.

Material and methods: Nineteen healthy dental technicians with an ascertained exposure to dental alloys containing beryllium underwent to whole blood sampling. CD4⁺ T lymphocytes from blood samples were stimulated with 10, 50 and 100 \cdot M of BeSO₄ to perform standard BeLPT and CSFE assays. A stimulation index > 2 was considered positive.

Results: One of the nineteen dental technicians showed both BeLPT and CSFE assay positive at 50 μM , while the other workers did not exhibit a significant lymphocyte proliferation after in vitro exposure to beryllium. The worker with a positive BeLPT and CSFE assay did not differ in exposure history and symptoms from the other workers.

Conclusion: In this pilot study CSFE assay shows a good agreement with BeLPT. The relatively high rate of BeS in this small group of healthy workers highlights the role of Beryllium as sensitizer and the importance of BeLPT screening to detect workers at risk of berylliosis

31. UNEMPLOYMENT, JOB INSECURITY AND HEALTH

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The Cost of the Covid-19 Pandemic on the Quality of Life of Vulnerable Workers: The Case of the Philippines

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Introduction: This paper looks at the impact of the Covid-19 pandemic to vulnerable groups such as informal workers, those engaged in non-standard forms of employment, and women workers.

Material and Methods: Key informants were interviewed and available online materials were used.

Results: The pandemic has resulted to a significant increase in unemployment. The uncertainty, instability, and insecurity is high particularly those in non-standard forms of employment, and informal workers. This situation has led to low morale and self-esteem, high stress and anxiety. Women's vulnerability during the pandemic is multi-dimensional. Denial of access to health services is experienced. As frontline health workers, there is no PPE fit for their ergonomic requirements and are more likely to get infected from the virus than men. They also bear the burden of psychological effects of increased patients' death, physical burnout, and long shifts. Those who need to isolate themselves from their families, the feeling of guilt is overwhelming as they are torn between their productive and reproductive roles. Second shift is also a concern for women on work from home arrangement. Their time to rest and sleep are disrupted. For working women living in poverty, the endless anxiety of finding ways to make both ends meet, lack of basic services at home, and cramped spaces make the situation harder to bear. Stress and depression are increasing.

Conclusion: The effects of the Covid-19 pandemic are not the same for all workers. It is the vulnerable workers who find it increasingly more difficult to cushion its adverse impact on their quality of life.

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Predictors for time until return to work and duration of sickness absence in unemployed workers with psychological problems; a secondary data-analysis of two trials and one cohort study

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Introduction: Mental disorders are highly prevalent among unemployed workers, often leading to long-term sickness absence and working disability. Return to work is more challenging for unemployed workers, because their access to occupational health care is limited. The aim of the current study is to identify predictors for time until return to work and duration of sickness absence in unemployed workers with psychological problems.

Materials and Methods: A secondary analysis of two Dutch trials and a cohort study among sick-listed unemployed workers with psychological problems (N=681) was conducted. Several baseline variables were evaluated regarding their predictive value on time until return to work and duration of sickness absence during 12

months follow-up. Uni- and multivariable Cox-regression analyses were performed.

Results: Age above 50 years, long-term unemployment before sick-leave and severe psychological symptoms were predictive ($p < 0.05$) for a prolonged time until sustainable return to work. Female gender, long-term unemployment before sick-leave and severe psychological symptoms were predictive ($p < 0.05$) for a longer duration of sickness absence. Remarkably, self-efficacy did not act as predictor in both analyses.

Conclusions: Knowledge about predictors for return to work and duration of sickness absence is important for the recognition of unemployed workers with psychological problems at risk for long-term sickness absence. The results of this study assist occupational health professionals to improve occupational support and arrange targeted intervention.

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Low Wage, Public-Facing Workers and the Decision to Take Sick Leave During COVID-19

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Introduction: During the COVID-19 pandemic, low-wage workers faced high exposure risk as they continued to work in essential public-facing jobs such as grocery store clerks and gas station attendants. In a context where these types of jobs were usually precarious and had no paid sick leave, we explored how low-wage workers navigated decision-making around when to take sick leave.

Material: From September 2021 to April 2022, in-depth, semi-structured interviews were conducted in Ontario and Quebec (Canada) with 72 low-wage and public-facing workers, managers of these kinds of workers, and key informants with insight into legal and policy issues related to low-wage workers.

Methods: Interviews were transcribed verbatim and coded in NVivo. Analysis followed constant comparative methods as well as situational analysis.

Results: Public-facing, low-wage workers and managers described psychosocial pressures of COVID-19-related customer aggression. In a context of economic insecurity, participants described a focus on "pleasing the customer", "not rocking the boat" and a reluctance to take sick leave when experiencing COVID-19 symptoms for fear of loss of income and loss of future work shifts.

Conclusions: Workers who worked while ill weighed risks of COVID-19 against risks of loss of income (need for food, paying the rent) and decided that working while ill was least problematic. This is a problem for society as poor worker protections put the public at risk.

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Workplace Violence in Workers with Multi-Party Employment Arrangements: Results from a Korean National Representative Survey

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Background: Despite a growing number of investigations exploring the health problems in precarious workers, there is still a paucity of studies investigating workplace violence in workers with multi-party employment arrangements (WMPEA). This study was aimed at comparing the prevalence of workplace violence between non-WMPEA and WMPEA.

Methods: The 5th Korean Working Conditions Survey data was used. The study subjects were employees aged 20-74, with 26,239 non-WMPEA and 1,556 WMPEA. WMPEA included temporary agency workers and workers providing outsourced services. Workplace violence including verbal abuse, unwanted sexual attention, threats, and humiliating behaviors were used as outcome variables. The odds ratios of risk of workplace violence were calculated using multiple logistic regression.

Results: The age-standardized prevalence of workplace violence was significantly higher among WMPEA. After adjusting all covariates, the risk of workplace violence among WMPEA was still significant (OR 1.80, 95% CI 1.5-2.2) compared to non-WMPEA. The odds ratio of workplace violence among female WMPEA was 1.99 (95% CI 1.53-2.59), which is higher than that of male WMPEA (OR 1.52, 95% CI 1.18-1.96).

Conclusion: We found that WMPEA were exposed to higher risk of workplace violence. Discrimination against WMPEA in the working environment and management policy need to be corrected. It is also necessary to identify the risk factors of workplace violence in WMPEA and to make efforts to prevent violence.

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Psychological Well-Being and Mental Health in Migrant Job-Seekers with Disabilities

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Introduction: Migrant workers seeking employment in a host country often face a variety of stressors that affect their mental health. Studies have shown that depression, insomnia and fear are more likely reported in migrant workers during Sars-Cov-19 pandemic and lockdown process. Therefore, this study aims to evaluate the effectiveness of a 10-week job-coaching programme for migrant job-seekers with disabilities related to their psychological well-being or mental health.

Materials and Methods: A single-group pre-test and post-test research design type was used. The preliminary baseline results included 21 migrant job seekers with disabilities. The following reliable, validated and internationally accepted scales were used: Short Form Survey Instrument, WHO Well-Being Index (WHO-5), and Patient Health Questionnaire for Depression and Anxiety (PHQ-9).

Results: The mean age of the participants was 49 ± 9. The participants were unemployed for an average of 2.5 ± 0.8 years and lived in Belgium for a total of 17.9 ± 6.5 years. The majority of the participants experienced language barrier problems (85.7%); 57.1% of the participants had worked as cleaners in the past. A statistically significant negative and high correlation was found between WHO-

5 quality of life scores and PHQ-9 depression scores ($p < 0.01$; $r = 0.715$).

Conclusion: In the baseline measurements, migrant job seekers had moderate depression levels and negative quality of life and well-being. We now will investigate whether psychological health problems of migrant job seekers will increase during the Sars-Cov-19 pandemic period.

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Uber drivers perception about their work and health conditions in the context of covid-19 in Brazil

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Introduction: Work mediated by platforms such as Uber sells an illusory idea of “entrepreneurship” to mischaracterize labor relations, without losing control over drivers. In the covid-19 pandemic, Uber drivers had to handle with additional costs to adopt protective measures in order to avoid risks of contamination by SARS-Cov-2.

Methods: Quantitative cross-sectional study based on a convenience sample with Uber drivers. The research instrument was developed by the researchers, with contributions from representatives of associations and unions.

Results: 104 drivers participated in the study, 50% referred working-hours equal or above 11 daily hours, and 24% worked seven days a week. In the pandemic, 79% reported a reduction in working hours, 96% had a decreased income and 17% presented symptoms compatible with covid-19.

Conclusions: Poor working conditions were aggravated during the pandemic that highlighted the vulnerability of the application-mediated work model. These drivers are exposed to unsafe work conditions, with no guarantees by the hiring company, and also assume all costs and risks of their professional practice. This study gave voice to these drivers and, thus, it can contribute to propose improvements of their working conditions.

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Living to not die : living and working conditions of app workers

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Introduction: In the last decades, the world of work has undergone profound transformations. In a neoliberal scenario, of productive restructuring and increasing structural unemployment, there is an environment conducive to the deepening of social precariousness and work. The “uberization” is a maximum expression of precariousness and work. Through the denial of employment link, these professionals find themselves without access to labor rights and social protection.

Material and Methods: Setting up an in-depth qualitative study of an exploratory nature, 15 interviews were carried out, with six car drivers and nine motorcycle delivery drivers. A questionnaire of 18 items was applied that contemplated the sociodemographic profile, as well as ten questions that sought to cover themes such as working conditions, mental health, and perspectives for the future.

Results: After being recorded and transcribed, the content analysis were synthesized in the five thematic matrix: life and work, which was divided into five categories of analysis: Wear and Suffering, Gender, Management Mode, Defense and Resistance Strategies and Future. These professionals want at the end of a working day only to be alive, which brings us to the question: what is the future of a society that reduces people's aspiration to mere survival?

Conclusion: The subjects' speeches reveal experiences of domination and wear, under conditions such as; intense working hours, risk of accidents and fear, pointing to a discouraging future that requires work alternatives based on decent work.

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Receipt of social welfare after long periods of work disability and cessation of workers' compensation benefits: a data linkage study in New South Wales, Australia

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Introduction: Australian workers' compensation systems fund income support, treatment and rehabilitation for injuries or diseases incurred in the course of employment. We sought to determine the nature of transitions to the Australian social welfare system when compensation stops after long periods of work disability. Specifically, we examined transitions following legislative reform imposing a 260-week limit on compensation in the Australian state of New South Wales (NSW) during 2017.

Material and Methods: Workers' compensation data in NSW was linked with data from the Australian social welfare system covering the period 1 January 2012 to 30 June 2019. Populations included: (1) injured-workers exposed to a 260-week compensation limit (N=2,761), (2) a control group of injured workers not exposed to a 260-week limit (N=3,890), and (3) a community comparator group (N=10,114). Outcomes describe transitions to social welfare 1 year after workers' compensation benefits stop.

Results: Receipt of social welfare was common after workers compensation, 60% of injured workers in the exposed group received social welfare such as unemployment (41%) or disability (19%) payments. Regression models identified that transitions to social welfare commonly aligned with eligibility rules.

Conclusions: Legislative reform in NSW led to many people with long term work disability transitioning to social welfare payments. Transitions to social welfare were also more common for injured workers compared to a community comparator. Dedicated supports are encouraged to assist timely transitions to social welfare after workers' compensation stops.

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The campaign of the Royal Australasian College of Physicians (RACP) promoting the health benefits of good work

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Introduction: There is a direct relationship between health and work with negative consequences of long-term work absence and unemployment. The Australasian Faculty of Occupational & Environmental Medicine (AFOEM) of the RACP initiated a campaign in 2010 to promote the health benefits of work.

Material and Methods: A position paper 'Realising the Health Benefits of Work' was officially launched in 2010. The Australian and New Zealand Consensus Statements on the Health Benefits of Work were launched in Wellington in 2011. Companion position statements, 'What is Good Work', 'Improving Workforce Health and Workplace Productivity' were released in 2013 and 'Employment, Poverty and Health' in 2019. Organisations have been encouraged to commit to the principles by signing agreement to the RACP Consensus Statement. A steering group of stakeholders was formed in 2015 to coordinate and share information among Signatory organisations and distribute a newsletter twice yearly. In 2015, the campaign was renamed the 'Health Benefits of Good Work' (HBGW).

Results: There are now around 190,000 websites (excluding the RACP) promoting HBGW, and over 300 organisations are Signatories to the Consensus Statement. A webpage was established on the RACP website as a repository for resources on HBGW. The campaign has been actively supported by all subsequent presidents of AFOEM. Regular forums have been held in capital cities and webinars held regularly during the COVID-19 pandemic.

Conclusions: The campaign has gained wide acceptance and is positively changing cultures especially in actively promoting return to work following injury or disability.

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Socio-Professional Factors and Serious Suicide Attempt (SSA): A Case-Control Study

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Background: SSA is defined as a suicidal act that requires either hospitalization for more than 24 hours in a specialized unit, or surgery under anesthesia, or prescription of major medications. Suicide attempt with major lethal means leading to hospitalization for more than 24 hours is also considered SSA. As some occupations have been identified at increased risk of completed suicide, we

hypothesized that some socio-professional factors may also act as SSA risk factors.

Methods: We used the data from the French-speaking Swiss program for monitoring self-harm. Patients with SSA were considered as cases, the others as controls. The association between SSA and socio-professional factors was assessed by univariate and multi-variable logistic regression models.

Results: We included 320 cases and 1468 controls. The unknown occupational status, high skill level at work, interruption of activity because of job loss or dismissal, problematic socioeconomic situation and occupation as physical, mathematical and engineering science professionals were associated with SSA. In this group architects, engineers and related professionals were the most at risk sub-group. College, university and higher education teaching professionals, Finance and sales associate professionals, and Metal moulders, welders, sheet-metal workers, structural-metal preparers, and related trades workers had also an increased risk of SSA, but of borderline statistical significance. The adjustment for confounders had a little effect on the odds ratios.

Conclusion: Patients who make a SSA appear to have a partially different occupational profile than controls.

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Consequences of quantitative demands on presenteeism and absenteeism: The role of job insecurity as dual effects moderator

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This study advances the limited research on quantitative demands and presenteeism (vs absenteeism) by investigating how perceived quantitative and qualitative job insecurity act as an additive condition on presenteeism (vs absenteeism). We included a measure of job insecurity since the previous study has neglected to enhance the relationships between demands and work outcomes. We observed the quantitative demands as a cause in a multi-occupational cross-sectional study for the dual effects (i.e. quantitative job insecurity, qualitative job insecurity) moderators process model. A total of 690 employees responded to this self-report survey, which comprises Malaysian multi-occupation private sectors, from the second week of February until the second week of June 2021 (4 months). Quantitative demands predicted presenteeism and absenteeism. This study showed that, besides job demands, perceived job insecurity plays a vital role in better understanding higher levels of quantitative demands. Keywords: quantitative demands, job insecurity, presenteeism, multi-occupational, dual effects moderator

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Framing a 'Decent Work Policy' for the United States: a public health perspective

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Background: The ILO defines decent work and promotes country-specific Decent Work Agendas to provide economic security, self-esteem and social connectedness. While the COVID-19 pandemic has highlighted stark inequalities in the U.S. workforce that contributed to significant disparities in health outcomes, the scope of the problem is now apparent. To date, however, there is limited evidence of efforts to implement the ILO's Decent Work Agenda within the US. The aim of this study was to explore the concept of decent work in the U.S. and to identify facilitators and barriers to developing a decent work policy agenda.

Methods: An environmental scan, including 1) a scoping review of gray and research literature on US and non-US publications related to decent work and 2) semi-structured key informant interviews with representatives from government, labor unions, small and large employers, business associations, workers, non-governmental organizations engaged in workforce development, public health, occupational health and policy. Probing and open-ended questions attempted to understand stakeholder perspectives on gaps and opportunities for a decent work policy agenda in the US, and document the facilitators and barriers to implementation. A memoing process and thematic analysis were used to identify recurring themes related to the research questions and a cross walk of common and divergent themes from the literature and interviews.

Results: Less than a third of the 25 key informants interviewed were aware of the ILO's Decent Work Agenda. Many preferred 'good work' or 'dignified work' instead of 'decent work'. Similar to ILO's

32. VIBRATION AND NOISE

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Effect of Whole-Body Vibration Along Three Axes on Cognitive Performance: A Preliminary Analysis

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Background: The effects of Whole-Body Vibration (WBV) have been studied in seated or standing posture, mainly considering a sinusoidal vibration along the vertical direction.

Objective: We studied the effects of WBV on cognitive performance of standing subject exposed to vertical (Z), medio-lateral (X) and sagittal (Y) sinusoidal vibration.

Method: Seven subjects were asked to perform five sessions of a psychomotor vigilance task (PVT). Participants performed the PVT without vibration (session 1), with vibration along X, Y or Z axes in random order (sessions 2-4) and again without vibration. The stimulus consisted of a harmonic motion at 1.25 Hz, with amplitude of 0,5 m/s² RMS; each session lasted 5 minutes.

Findings: Reaction times (RTs) were compared among the five sessions. RT mean and SD were compute: prior and after vibration exposure RTs were similar (225±76 ms and 229±90 ms), thus excluding fatigue effect during the experiment. RTs along X, Y and Z increased to 234, 237 and 239 ms. An increasing SD trend

was observed as well (65, 74 and 92 ms in the X, Y and Z directions)

Conclusion: No statistically relevant effects were observed, but the preliminary analysis suggests that vibration tends to increase the RTs during PVT. Further analyses are required to evidence the effect of vibration amplitude and frequency.

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Muscular Fatigue as an Effect of Muscular Synchronization in Hand-Arm Vibration Exposure

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Introduction: muscular synchronization on mechanical vibration frequency has been established for hand-arm (HA). Since different muscular fibres triggers at different proper frequency, those that are nearer to the external frequency are more liable to be triggered and, so, to fatigue. In literature is reported that frequencies around 33 Hz are more efficient to provoke the tonic vibration reflex (TVR). Moreover, the HA transmissibility of vibration is tuned by mechanical coupling, that is the muscular stiffness. This paper investigates muscular fatigue indicators in HA vibration at 33 Hz while several force levels are exerted.

Material and Methods: Different coupling forces are used while eliciting HA vibration exposure at a fixed frequency of 33 Hz, while forearm surface EMG is acquired. Force and acceleration are measured. Median Decay Frequency (MDF) was estimated from EMG signal as index of fatigue. Ten young males were enrolled as subjects (Age 28.3±7.1 y; Mass 76.3±4.3 kg; Height 1.73±0.05 m). Results: 30 second of EMG were recorded both with vibration ON (VibON) and OFF (VibOFF) and an exerted force ranging between 20–60 % of the maximal. Signals recorded in VibON were filtered to remove the TVR contribution on EMG. At 40% and 60% of the maximum force, at the end of the task, MDF values were different (52±2.8 Hz in VibON, 61±4.0 Hz in VibOFF, $p < 0.05$ at 40%; 48±3.3 Hz in VibON, 55±3.7 Hz in VibOFF, $p < 0.05$ at 60%).

Conclusion: At 40% and 60% of the maximum force, the decay was higher in VibON than VibOFF. So, it can be assumed that force levels higher than 40% are necessary to induce an evident muscular fatigability with

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Eardrum reflectance in healthy subjects exposed to noise and/or hand-arm vibration

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Introduction. Epidemiological and experimental studies show synergistic effects of the exposure to noise (N) and vibration (V) on the hearing threshold shift through mechanisms still under study.

This experiment shows a pilot analysis of N and hand-arm V (HAV) synergistic effects on human hearing functionality by means of the measurement of the eardrum reflectance (R).

Materials and Methods. Three healthy volunteers were exposed to 3 conditions: N - white noise in the right ear canal; V - HAV in the right forearm direction; NV - N and V simultaneously. Each condition has 5 sessions, each of 3 min exposure and subsequent measurement of acoustic pressure frequency-response in the ear canal. Measurements were also carried out as recovery period after 5 sessions. From the Thevenin equivalent parameters of the ear probe previously measured, input ear impedance and R were computed. Differences (D) were computed between during/post- and pre- exposure in R, averaged on subjects and in the frequency range 1500–2500 Hz. This study was approved by an Internal Ethical Committee.

Results. The mean pre-exposure R is about 0.5. In N condition R increases with the exposure session and $D < 0.3$. In V and NV conditions, the increase of R is similar with $D < 0.1$. R tends to pre-exposure values with some residual effects in the recovery.

Conclusions. An increase of R occurs during the exposure conditions highlighting the activation of the stapelial reflex, which protects the inner ear. However, in NV condition the raise is lower than the one in N condition. This could provide evidence of an increased risk for the exposure to V combined with N.

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A comprehensive diagnostics of neurosensory disorders in hand-arm vibration syndrome (HAVS)

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Introduction: The impact of vibration leads to damage to the nerve endings and receptors of the distal extremities at the point of exposure to the stimulus, and subsequently to the peripheral nerve fibers themselves. Therefore the earliest and most frequent manifestation of HAVS is limb polyneuropathy with sensory disorders. The study was conducted in order to assess the various types of sensory modality disorders by methods of functional diagnostics in HAVS.

Material and Methods: The main group of patients with an established diagnosis of HAVS (n=92) and a control group of healthy individuals who have not worked in harmful and dangerous working conditions during their lives (n=40) were examined. The methods of computer pallesthesiometry, quantitative sensory testing (QST) and stimulation electroneuromyography were used in the study.

Results and Conclusions: A comprehensive study revealed disorders of the perception of sensitivity of various modalities (vibration, pain and temperature), which indicated damage to all types of peripheral nerve structures when exposed to local vibration- non-myelinated type (C-type fibers of slow pain sensitivity, temperature thermal and postganglionic fibers of the sympathetic nervous system), myelinated (A-β-type fibers of vibration and tactile sensitivity) and weakly myelinated (A-δ-type fibers of temperature cold and rapid pain sensitivity). A quantitative assessment of vibration, tactile, pain, cold and heat sensitivity makes it possible to more accurately diagnose the patient's sensory disorders at the early stages of the disease, which gives grounds for carrying out therapeutic and p

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How facial masks against Covid-19 spread affect the speech spectrum

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Introduction: At the aim of counteracting the spread of the infection, the European Center for Disease Prevention and Control has provided indications on the suitability of the use of face masks when the social distancing cannot be implemented. Facial masks can alter verbal communication, causing potential safety problems. **Methods:** Eight types of masks (medical, PPE and cloth), one face-shield and four combinations of the same devices were tested, mounted on Head and Torso Simulator with an artificial mouth. For each configuration, tests were carried out in an anechoic chamber with an appropriate measurement chain for signal acquisition and processing.

Results: The results show that medical devices exhibit lower attenuation at high frequencies, even compared to cloth. FFP2 and FFP3 have attenuations greater than 5 dB in the octave bands of 4 and 8 kHz, with negligible influence on acoustic performance due to the presence of valves. Face shield distorts the vocal spectrum, behaving like a low-pass filter with a cut-off frequency around 1 kHz, with a steep slope (with attenuation > 10 dB at 4 and 8 kHz) and an accentuated resonance at 1 kHz (about 6-8 dB), due to the thin PET screen. Clear mask shows low attenuation up to 4 kHz and adds the benefit of lip reading, especially useful for workers with hearing difficulties.

Conclusions: These results show that the devices examined can alter the quality of speech. Further insights will concern the assessment of speech intelligibility in order to provide a contribution to an ergonomic design also linked to the acoustic comfort of these devices, which would be desirable in a post-p

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Occupational Exposure to Airborne Ultrasounds

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Introduction: Ultrasounds (US) are mechanical waves characterized by frequencies above the upper limit of the range of human hearing, which is between 16 kHz and 20 kHz. In the occupational settings they are used in the industrial sectors (e.g. for welding and cleaning of plastics and metals), healthcare (e.g. in diagnostics and therapeutic devices) and aesthetics (e.g. for aesthetic cavitation). US are also used in consumer products such as motion detectors and anti-intrusion devices.

Materials and Methods: Health and safety issues of workers exposed to US are addressed, pointing out the critical issues

concerning health effects, preventive and protective measures as well as regulation.

Results: Unlike other physical agents, the EU Regulation does not give specific indications to protect workers from risks arising from US exposure, even if US are explicitly indicated among the physical agents that may pose risks for health and safety of workers, for whom the assessment is mandatory. Moreover, there is currently no national legislation defining exposure limit values and a reference framework at the European level is lacking. It is possible to refer to protection standard/guidelines such as IRPA-INIRC (1984), Health Canada guidelines (1991) and ACGIH (2019), but a shared approach in this regard is not still available at international level. **Conclusions:** Given the lack of consolidated national and international references on US occupational risk assessment and management, a special section on the Italian Physical Agents Portal (PAF) (<https://www.portaleagentifisici.it/?lg=EN>) is under construction and will be available soon.

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Screening and prevalence of hearing loss in professional musicians

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Introduction: The aims of this study were to detect hearing loss in professional musicians and to assess its importance according to the duration of exposure and the intensity of the noise suffered.

Materiel and methods: this cross-sectional epidemiological survey involved 241 musicians aged > 20 years with professional seniority > 2 years. The study included an analysis of working conditions with noise metrology (standard NF EN ISO 9612) and a medical assessment (questionnaire, clinical examination and audiometry).

Results: The average age was 43.6 ± 10.5 years, the average seniority was 20.1 ± 6.1 years and the average weekly working time was 33.8 hours. The instruments played were percussion (49.4%), strings (29.4%), winds (14.9%) and brass (5%). Personal and family history of deafness was found in 5% of musicians not playing amplified music at loud levels and 14.5% playing amplified music at loud levels. 24.5% had normal audiometry, 51% sensorineural hearing loss, 14.5% conductive hearing loss and 9.9% mixed hearing loss. Sound exposure measurement showed high values in orchestras not playing loudly amplified music with intensities of around 98 dB (A). LAeq (3h) sound levels ranged from 94 to 106 dB (A). The LAeq (3h) to which musicians from orchestras playing loudly amplified music were exposed were between 98 and 108 dB (A) indoors and exceeded 112 dB (A) during outdoor concerts

Conclusions: There is no information campaign on the preventing hearing impairment amongst musicians in our country. The prevention approach will be more accepted and applied if the representatives of musicians are involved in its elaboration

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Occupational noise generation and its exposure at an Indian black tea factory: a neglected problemAlapan Bandyopadhyay¹, Rishav Ghosal¹, Abhijit Mukherjee²¹North Bengal Medical College and Hospital, Department of Community Medicine, Siliguri, India, ²Nil Ratan Sircar Medical College, Department of Community Medicine, Kolkata, India

Workers of tea factories are exposed to a wide variety of occupational hazards. While workplace safety standards are mandated by laws, most of them are focused on preventing accidents and musculoskeletal problems. Furthermore, in India, these standards are not widely followed or enforced, especially those related to noise. This study aimed to provide data regarding noise generation in the various parts of a black tea factory of Darjeeling, India and its exposure among the workers employed there. For 2 non-consecutive weeks, noise levels were measured. The time weighted equivalent noise exposure (dBA) at the ear level of a worker for 8-hour shift was found to range from 70–84 dBA in withering area, 82–86 dBA in CTC room, 66–74 dBA in drying area, and 62–74 dBA for sorting and packing areas respectively. The highest equivalent noise pressure levels were produced by blowers (90.3 dBA) and the fans of the withering trough (84.2 dBA). The lowest equivalent noise pressure levels were produced by the sorting vibromachines (62.7 dBA) and packing machines (66.1 dBA). Since the workers specialised in their jobs and did not move from one area to another; based on tasks done, it was observed that the equivalent noise exposure of workers for one 8-hour shift was 71.5 dBA for unloading, 80.7 dBA for withering, 85.3 dBA for curling, 72.8 dBA for drying, and 66.7 dBA for sorting and packing respectively. As daily noise exposure levels reached NIOSH action values of 85 dBA, the study found that workers at the tea factory were at a high risk of developing occupational noise related complications.

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Key factors influencing noise-induced hearing loss in the automobile manufacturing industryZhi-hao Shi¹, Jia-ruì Xìn², Lifang Zhou³, Xiangjing Gao³, Meibian Zhang⁴¹Ningbo University, School of Medicine, Ningbo, China, ²Hangzhou Normal University, School of Medicine, Hangzhou, China, ³Zhejiang Provincial Center for Disease Control and Prevention, Occupational Health and Radiation Protection Institute, Hangzhou, China, ⁴Chinese Center for Disease Control and Prevention, National Institute of Occupational Health and Poison Control, Beijing, China

Introduction: To explore key factors influencing noise-induced hearing loss (NIHL) in the automobile manufacturing industry. **Material and Methods** A cross-sectional survey, including questionnaire survey, individual noise recording, and pure tone audiometry, was conducted on 656 workers from 5 automobile manufacturing enterprises to collect data on noise exposure and hearing loss. An average hearing threshold ≥ 30 dB at high frequencies (3, 4, and 6 kHz) in either ear was defined as high-frequency NIHL (HFNIHL). The prevalence of HFNIHL and its relationships with age, sex, exposure duration, LAeq,8h and kurtosis were analyzed. This study was approved by the ethics committee of the Zhejiang Center for Disease Control and Prevention, China (the approval number: ZJCDC-T-043-R).

Results The prevalence of HFNIHL was 32.6%. Chi-square trend tests showed that the age, proportion of male, exposure duration, LAeq,8h and kurtosis of workers with HFNIHL were all greater than those without HFNIHL ($P < 0.05$). The prevalence of HFNIHL increased with the increase of age, exposure duration, LAeq,8h and kurtosis ($P < 0.01$). Logistic regression showed that age (OR=2.13, 95% CI 1.67–2.71, $P < 0.01$), sex (OR=2.29, 95% CI 1.44–3.62, $P < 0.01$), exposure duration (OR=1.43, 95% CI 1.11–1.85, $P < 0.01$), LAeq,8h (OR=1.37, 95% CI 1.08–1.76, $P < 0.05$), and kurtosis (OR=1.37, 95% CI 1.14–1.63, $P < 0.01$) were all significant factors. **Conclusions** In addition to age, sex, exposure duration, or LAeq,8h, kurtosis is a risk factor for NIHL among automobile manufacturing workers.

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Analysis of the causes of morbidity working with vibration equipment according to the sociological survey

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Hard work with vibration equipment leads to disability. Purpose of the work: to determine the proportion of factors in the working environment that have a negative effect.

Materials and methods. The analysis of the causes of morbidity of 48 workers of vibration-hazardous professions with work experience of 5,2(1.5) years (age-32.8 (2.5) years) has been carried out. Casting cutters, repairmen and electric crane operators are more likely to get sick. Hypertension was in 5 patients with work experience of up to 3 years and in 4 patients with work experience of up to 5 years, an increase in morbidity due to respiratory infections, diseases of the musculoskeletal system. The survey was conducted according to a developed questionnaire, which included questions on the incidence rate during the year, the nature of the diet, participation in health-improving and preventive measures, the presence of heavy physical labor, neuro-emotional stress, monotony in work, poor work organization.

Results: unsatisfactory sanitary conditions (89.6%), hard physical labor (70.8%), poor work organization (62.5%), non-observance of safety techniques (54.2%) have a significant impact on health, irregular nutrition (54.1%), lack of health-improving and preventive measures during work and rest (50%), excessive neuropsychic stress (41.7%). 85.4% of the respondents do not use protective equipment in their life.

Conclusions: unsatisfactory sanitary and hygienic conditions are the main negative factor of adverse effects on the organism of workers, the modification of which is not always possible.

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Clinical and paraclinical profile of occupational deafness: about 90 cases

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Introduction: Exposure to high noise levels may affect the hearing system, causing occupational deafness, which is the second most common occupational diseases reported in Tunisia.

Objective: To study the socio-professional, clinical, para-clinical characteristics of occupational deafness, and their impact on ability to work.

Material and Methods: Retrospective descriptive study of 90 cases of occupational deafness collected between 2001 and January 2021, at the Department of Occupational Medicine and Occupational Diseases of the University Hospital Rabta, Tunisia.

Results: This is a population with a mean age of 38.39 ± 9.8 years and a predominance of men gender (65.9%). The majority belonged to the telephone call centers (63.7%), followed by the construction and public works sector (11%). The posts of work most responsible for occupational deafness were telephone advisor (63.7%) and construction and public works worker (7.7%). Lack of personal protection was reported by the majority of employees (95.6%). The time to onset of first auditory manifestations relative to noise exposure was 5.02 ± 4.46 years. Tonal audiometry performed for all patients showed bilateral perceptual deafness in 85.7% of cases. Mean hearing loss on the best ear was 37.61 ± 18.58 dB, on the right and 36.59 ± 19.01 dB, on the left. Auditory evoked potential was practiced in 27.5% of cases. Deafness was considered as a compensable occupational disease for 23.1 per cent of the employees.

Conclusion: The often-delayed onset of auditory warning signs justifies early and regular audiometric monitoring from the onset of sound exposure.

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Noise exposure and hearing health among US Firefighters

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Introduction: Firefighters (FF) are exposed to recurrent hazardous noise during their work shift both during routine tasks and responding to emergency calls, putting them at an increased risk of occupational hearing loss. However, little is known about FFs' noise exposure and associated health outcomes. The purpose of this study is to gain an understanding of FFs' perceptions of noise in the fire service and of their risk of hearing loss.

Materials and Methods: A cross-sectional study design was used to evaluate noise in the FFs' work environment, determine current types of hearing protective actions, and identify firefighters' perceptions of occupational noise exposure and their perceived health risk. A 53-item survey was administered to a non-probabilistic sample of US first responders.

Results: A total of 220 FFs with a mean age of 40.1 years completed the survey, 93% male and 81% identifying as white with an average tenure of 13.8 years. 55% of participants reported having ringing/buzzing and hearing muffled sounds in their ears following hazardous noise exposure. 82% reported exposure to hazardous sounds during a work shift while only 64% reported never to rarely wearing hearing protection while working. Moreover, 25% were unaware of work policies for hearing protection use, and 73% reported never receiving information about noise induced hearing loss. Finally, 68% said they were not concerned about their hearing.

Conclusion: FFs' substantial exposure to noise and associated health risks reveals a clear need for policy aimed at mitigating the consequences. We need to explore ways to integrate hearing protection.

33. WOMEN HEALTH AND WORK

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Women at work: wrist and elbow injuries and pathologies in different occupational settings from the National Compensation Authority (Inail) data records (2015-2019)

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Introduction: In a previous study, women's upper limb injuries were found frequent in some typical work settings. This study goes in deep on wrist and elbow injuries, taking into account their main occupational pathologies (carpal tunnel syndrome (cts) and epy-condilitis (epy)).

Methods: Wrist and elbow compensated injuries and pathologies were selected from Inail data records in five years (2015-2019). Incidence Rate and Odds Ratio were studied for gender and occupational settings.

Results: A total of 29.494 wrist and 12.379 elbow injuries were collected together with 5.077 cts and 2.455 epy. Women were more at risk than men for wrist+elbow injuries (OR 1.32, IC 95% 1.31-1.34) and cts+epy pathologies (OR 3.13, IC 95% 3.02-3.24). Women injury incidence rate was higher among cleaners for wrist (1.62‰) and elbow (0.71‰) while incidence rate for cts (0.50‰) and epy (0.27‰) was higher among hairdressers, laundresses and wellness services (HLW). Cleaners were at the highest rank (2.5‰) for overall wrist and elbow injuries and pathologies. Frequency analysis showed higher OR for overall wrist (injuries and pathology) in HLW services (OR 2.41, IC 95% 2.24-2.60) and overall elbow (injuries and pathology) (OR 2.05, IC 95% 1.88-2.24) and their global impact (OR 2.23, IC 95% 2.09-2.37). Wrist injuries were mainly fractures (33.1%), bruise (48.6%) for elbow. HLW presented more wrist fractures (51.2%) and mail delivery more elbow bruise (54.2%).

Conclusion: Wrist and elbow injuries and occupational diseases should be considered in a global framework for prevention especially in work sector at higher risk as cleaning and HLW activities.

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Understanding the process of returning to work of breast cancer survivors: emergence of a conceptual, integrative, transactional and ergonomic model

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Introduction: There is a need to develop integrative approaches explaining the breast cancer survivors' (BCS) return to work (RTW) process and allowing a better understanding of the articulation between the factors involved. We aimed at proposing a conceptual framework of the BCS' RTW according to the transactional perspective.

Methods: The TRIAGE expert consensus technique was implemented. For each determinant in an initial list established from the literature, experts were first asked to indicate their agreement level individually, via an online questionnaire. Determinants obtaining an agreement level of 80% or over during this first phase were

retained. The remaining and additional determinants suggested by the experts, were then discussed collectively. After discussion, experts voted via a new online questionnaire to (not) retain each determinant. Determinants obtaining an agreement level of 80% or over after this second phase were retained. A conceptual model was then developed following the transactional approach.

Results: 62 determinants were included in the conceptual model which has been reviewed by 6 of the 11 experts recruited for the TRIAGE exercise. The final conceptual model comprises the BCS' characteristics and the broad categories of the transactional approach (1st appraisal—work ability; 2nd appraisal—resources; adjustment strategies; outcomes—[non-]RTW; feedback)

Conclusions: Based on knowledge, experience and clinical practices, the REWORK-BC model includes the medical, psychosocial, financial, professional and ergonomic aspects of the BCS' RTW. The model will be illustrated with concrete clinical cases

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Does the occupation of women associated with domestic violence? Evidence from National Family Health Survey, India 2015-16

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Background: Although working women help in delivering financial stability to a family, their professional life often subjects them to increased domestic violence (DV). The paper aims to explore the relationship between women's occupational category and their exposure to domestic violence using a nationally representative sample in India.

Methods: This was a cross-sectional study among women of reproductive age from all over India. The domestic violence module in the survey was administered per the World Health Organization's guidelines. In total, 83,397 women were selected for the domestic violence questions, and 79,729 completed the module, from which 66013 were ever-married women. Logistic regressions were used to assess the independent contribution of the variables of occupational status in predicting exposure to three categories of domestic violence, namely less severe, severe and sexual violence. Results: The prevalence of less severe violence, severe violence, and sexual violence was 27%, 7.9%, and 6.7%, respectively, among ever-married women in India. This study found that manual working women were at high risk (AOR= 1.596; 95%CI 1.481-1.720) of less severe violence than women currently not in the workforce. However, the risk of severe violence (AOR=1.74495%CI 1.354-2.247) and sexual violence (AOR=1.896; 95%CI 1.494-2.404) was higher among professional /technical/managerial women.

Conclusions: This study concludes that working women are at higher risk of domestic violence. Professional /technical/managerial women were at higher risk of severe and sexual violence among occupational categories.

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"I Get That Spirit in Me" — Mentally Empowering Workplace Health Promotion for ethnically diverse Female Workers in Low-Paid Work During Midlife

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Introduction: During midlife, female workers, particularly those with a migratory background and in low-paid work, experience more occupational health challenges than other groups of workers. The Work-life program (WLP) has been developed as a workplace health promotion intervention to support these female workers. In this exploratory mixed-methods study, we aimed to address the research question: What is the impact of the WLP on the women's health and work functioning?

Material and Methods: We included women aged between 45 to 60, working in low-paid jobs (e.g., patient food service assistants and cleaners) in a hospital. We used questionnaires before and after the intervention and 12 semistructured, in-depth interviews.

Results: The total number of participants was 70 at pre-test (t0), and 56 at post-test (t1). More than half of the participants had a migration history that varied greatly — 21 different ethnicities. Almost all participants had a low or intermediate educational level. Our quantitative data showed that menopausal symptoms improved significantly after the WLP. Our qualitative data showed that the WLP initiated a process of mental empowerment that initiated positive changes in four domains: behavior, physical health, mental wellbeing, and in the workplace.

Conclusions: Our findings suggest that female workers in low-paid work experience a positive impact from the WLP. The WLP is an intervention that mentally empowers female workers to make choices that enhance their health and wellbeing, both at work and in their private lives, as summarized in the quote of one participant: "I get that spirit in me!".

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Implementation Evaluation of Workplace Health Promotion among Ethnically Diverse Women in Midlife with a Low Socioeconomic Position

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Introduction: Women with a low socioeconomic position (SEP) often have unfavorable working conditions, and experience additional occupational health challenges during midlife. Little is known about the implementation of workplace health promotion (WHP) among women at the intersection of midlife, low SEP and ethnicity, and how they may be supported.

Material and Methods: For these women, we implemented a WHP intervention aimed at supporting women during midlife as a pilot in an academic hospital. This pilot comprised multiple steps: first tailoring the intervention to these women's needs and developing an implementation protocol; then implementing the WHP and qualitatively evaluating the implementation process using the RE-AIM framework.

Results: Six elements are important in the implementation of WHP among this target group. First, recruitment must take an proactive and personal approach. Second, the intervention should be tailor-made. Third, the intervention should take place at the workplace with the option for participation during working hours. Fourth, varying forms of practical support should be provided, such as the help of video's, illustrations and interpreters for low literacy level and language barriers. Fifth, female professionals should be deployed. Sixth, awareness of midlife as an occupational health challenge should be raised at different levels within the organization.

Conclusions: We recommend taking these six elements into account when implementing WHP for ethnically diverse midlife women with a low SEP. Implementing among this target group requires an accommodated strategy.

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Work related illness among female domestic workers employed in private homes in South India

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Background: Women in urban slums play a manifold part by bearing the burden of their family and assist in economic support by working in informal job sectors as domestic workers as invisible work force. No studies have yet addressed these workers work-related health problems.

Objective: The objective of the study is to determine the prevalence of work-related health issues musculoskeletal disorders (MSD), respiratory illness and non-fatal injuries among female domestic workers (FDW) employed at private houses in Bangalore, South India.

Method: A cross-sectional study was conducted among 408 randomly selected domestic workers with a comparative group. Trained interviewer assessed MSD (Nordic Musculoskeletal questionnaire), respiratory illness (BMRC Respiratory questionnaire) and work-related non-fatal injury using the questionnaires among the participants.

Results: A high prevalence of MSD was reported in neck (19.6%, OR=2.0; 95% CI 1.4 - 3.0), shoulder (23.8%, OR=1.6; 95% CI 1.1 - 2.2), elbow (12%, OR=2.4; 95% CI 1.4 - 4.0), upper back (31.9%, OR=1.5; 95% CI 1.1 - 2.1), and ankle (26%, OR = 2.1; 95% CI 1.5 - 3.0) in domestic workers than the non-domestic worker. Prevalence of self-reported chronic cough, chronic phlegm, shortness of breath and work-related non-fatal injury among the domestic worker was higher than non-domestic workers in our study.

Conclusion: FDW are affected by the health hazards at workplace setting and these health hazards are to be prevented with the necessary precautions. More research should focus on developing compensation strategies towards this informal working group.

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To establish a safe, healthy and inclusive work environment for Women employees in IndianOil

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Introduction: IndianOil has always been a leading organisation in promoting gender diversity and inclusion at workplace. Initiatives are taken to promote a safe, healthy and inclusive work environment for women employees across the organisation.

Materials and Methods: IndianOil is a gender-neutral organization with women oriented policies such as maternity leave, child adoption leave, child care leave, husband joining leave when spouse is posted at different location. Workshops focussing on physical & mental health of women employees were conducted to address the issues related to added responsibilities of women employees on both professional and domestic front. Training programs and awareness sessions on "Gender Sensitization" & "Prevention of Sexual Harassment at Workplace" were also conducted with the objective to create awareness about the rights and facilities for women employees at workplace. "Aarohi 3.0" a flagship program at IndianOil, aims at all-round development of leadership qualities in Women employees.

Result: IndianOil being a progressive and responsible organisation promotes gender diversity and inclusion at workplace. These initiatives have helped in creating a healthy & safe working environment for women employees across the organisation.

Discussion: A culture of inclusion and progressive policy on women health creates a more relaxed work environment, women at workplace feel valued and respected, which leads to greater collaboration and creativity. Inclusive workplaces show higher levels of engaged women workers, and this leads to better job performance and enhance their productivity.

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Physical activity and well-being in a group of women employees before and during the pandemic period

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Introduction: The adherence to physical activity programs of women in the peak of their active life is very difficult to be obtained and maintained. But it's well known that physical activity plays a critical role in the prevention and treatment of cardiometabolic risk factors, heart disease and stroke, some cancer. We have administered a questionnaire to examine the behavior of a group of workers in relation to perceived well-being in terms of self-mitigation of risk factors by sport practice or weight control and healthy habits. We also assessed how these habits changed during the pandemic period and made some comparisons with national data and other data related to previous period.

Material and Method: A survey was submitted by email to employees of CNR Headquarters in Rome and of the Institutes of the CNR Research Area in Bologna. More than 200 women aged 20-65 years completed the questionnaire, over a one month period (April 2021). Data collected from other sources are considered to compare the results of our sample with the aim of better understanding and contextualizing the data collected.

Results and Conclusions: From the quite good data of 70% of women that performed physical activity, the pandemic situation has halved the percentage of active women. The study will be used to design and implement appropriate actions and policies applicable in the workplace to encourage regular physical activity in female employees, promote a healthy lifestyle and improve perceived and real well-being.

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Women in Teleworking at the Brazilian Federal Court: Multiples Roles During the Pandemic

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Introduction: As COVID-19 spread in Brazil, the Brazilian Federal Justice determined compulsory telework starting March 2020. We aimed to contextualize the impact of telework and the social roles of females working for the Federal Justice during the pandemic.

Material and Methods: Content analysis of open interviews was conducted with seven women from different job titles in the Judiciary. Results are part of an ongoing doctoral study, approved by the Ethics and Research Committee of the School of Public Health, University of São Paulo.

Results: It was evident that there were both favorable aspects and constraints imposed by the new work organization. A “multiple” journey was imposed on female workers who have children or other dependents. The need to find additional time in their day to do their work, either by starting work very early in the morning, or working very late at night, as well as interrupting the working day in smaller segments, with breaks for childcare, domestic chores, home education, among others. However, participants perceived the post-pandemic partial telework as favorable.

Conclusions: Public and private spaces merged and blended for women working as teleworkers during the pandemic. Female workers were forced to take care of domestic and professional work, overwhelming themselves, as they need to manage two social spaces in a single geographical place. Redesigning the temporalities of work and private life require to be accompanied by social policies addressing caregiving responsibilities and gender equality.

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Associated factors with return to work in Breast Cancer survivors

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Introduction: Women treated for breast cancer are reported to experience an excess of job loss, demotion, unwanted changes in tasks, problems with the employer and co-workers, personal changes in attitudes towards work, and diminished physical capacity. We aim to identify the associated factors with reintegration to work after breast cancer.

Methods: It is a cross sectional analytical study which enrolled all women that had breast surgery for an invasive primitive breast cancer at our institution and that were in remission 5 years after the procedure. The study took place from January

to December 2019. Patients enrolled in the study were contacted by phone to answer a 25-item questionnaire exploring the perception of health, the support system, and the occupational situation.

Results: We enrolled 100 breast cancer patients during the study period. The mean age was 52 ± 8 years. At the time of the diagnosis, 50% were farmhands and 43% were craftswomen. Among our population, 84% returned to work, of which 80% did not perceive any change in their occupational outcome. Return to work was associated with occupational category ($p < 10^{-3}$), the poor state of health of the patients at the time of the survey ($p = 0.01$) and perceived employer discrimination because of a cancer diagnosis ($p = 0.049$).

Conclusions: Workplace accommodations play an important role in the return of employed breast cancer patients. Employers seem to have a pivotal role in breast cancer patients' successful return to work.

34. WORK AND VISION

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Focus on Tank truck drivers Vision in ensuring Safe Road transportation of hazardous petroleum products

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Introduction: The trend of rise in road accident of the tankers containing petroleum products was a concern for IndianOil. Road Transportation Safety policy was re-visited and measure for an Eye check-up campaign of tank truck drivers was initiated.

Materials and Methods: The eye check-up camps were started as a pilot project in which a target population of tank truck drivers were screened for refractory errors. It was found that 50% of the drivers had refractory errors which required intervention. The tank truck drivers with defective vision were provided with corrected glasses, medical and surgical intervention (cataract surgery) free of cost by IndianOil. Tank truck drivers were motivated to use the corrective glasses for improved vision while driving a commercial heavy vehicle carrying petroleum products to ensure road safety. A decline in road traffic accidents was observed following the interventions. Quarterly Road safety campaign with eye check-up camps for the tank truck drivers was extended to all IndianOil locations across India.

Result: The result of this project were affirmative and helped in significantly reducing road accidents thereby saving lives, preventing loss of property & loss of petroleum products.

Discussion: Periodic eye check-up of tank truck drivers is extremely important and helps in reducing roadside accidents and ensures safe transportation of hazardous petroleum products safely to their destination. Thus, eye check camps of tank truck drivers is a step in line with the Core values of IndianOil i.e. Care, Innovation, Passion & Trust.

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Recognize risks and avoid them in the future through communication and a good error culture!

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Introduction: Good communication between managers and employees and an open approach to mistakes are an essential basis for a culture of prevention. It is also characterized by the fact that near misses as well as minor accidents are not simply attributed to individual misconduct, but the question is always asked about the conditions that made this behavior possible. A corporate culture that places the blame first and foremost on the employees encourages silence about near misses and minor accidents and makes it more difficult for both the company and the employees to learn from them. How can we create an atmosphere in which mistakes can be discussed and solutions found for avoiding possible accidents in the future? How can information be communicated transparently? How can the perception of risks in the company be trained?

Material and Methods: Both a literature review and interviews commissioned by BG ETEM and conducted by the Center for Responsible Research and Innovation (CeRRI) of Fraunhofer IAO on occupational health and safety showed the importance of near misses and minor accidents in everyday work. To support the communication of risks in companies, action aids were developed for practical use

Results and Conclusions: The action aids give companies concrete advice on how to communicate them and how to develop an open error culture to avoid near misses and minor accidents in future.

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The Effect of Service Climate, Service Behavior and Service Quality on Customer Satisfaction in Muslim-Friendly Hotels

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Customers' satisfaction is a critical component in providing a competitive advantage for Islamic tourism and consequently, sustain the industry. In many articles, customers are always be given special treatment in consideration that they are the primary source of most organization's revenue. However, the employees' view about offering a high level of services is also important. This study aims to examine the effect of service climate, service behavior, and service quality on customer satisfaction in Muslim-friendly hotels. Particularly, contemplate social interaction which occurs between employees and customers. The social exchange theory (SET) and an extended SERVPERF model guided this study, and a 55-item instrument was adopted. As this study involves the employee-customer relationship, two sets of instruments were developed: (1) information about the service climate and employees' service behavior were obtained from employees who are involved with service delivery at the MFHs, while (2) information about service quality and customer satisfaction were evaluated by customers. Based on 120 employees working at MFHs and 120 customers who visited at MFHs at least once, usable data was gathered at 24 MFHs, and the data were analyzed using multilevel analysis. It was found that service climate significantly influenced employee service behavior. In addition, service quality significantly influenced customer satisfaction. These findings offer a better understanding of social interaction within Malaysian MFHs in the pursuit of customers' satisfaction.

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Association Between Effort Related to Psychosocial Factors at Work and Visual Function

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Several studies showed that ocular and vision problems are some among the most significant problems reported by individuals who use computers at work, which have high global prevalence and currently increasing within some professions. The aim of the present study was to investigate the association between psychosocial factors at work and visual function among employees who use computers at work. In the present cross-sectional, observational and analytic study conducted in 2014-2015, the participants responded a structured questionnaire, Visual Functioning Questionnaire (VFQ-25). Statistical treatment was based on descriptive analysis of quantitative and qualitative variables, and a linear multiple regression model was fit with the ones significant at $p < 0.20$ by means of the forward stepwise technique. The VFQ-25 items with the poorest scores were: "accomplishing tasks despite the vision problem" (mean=45.5%), "worry about eyesight" (mean=55.0%), "pain or discomfort in or around the eyes" (mean=56.8%) and "difficulty to go down stairs in dim light" (mean=57.3%). Association analysis showed that visual function declined with increasing age ($p < 0.001$) and effort at work ($0 < 0.001$). The results point to the relevance of assessing the organization of and psychosocial factors at work relative to abnormalities of the visual function of employees who work with computers. We suggest measures to improve the conditions of the work environment, as well as periodic ophthalmologic examination for this category of workers.

35. WORK DISABILITY PREVENTION AND INTEGRATION

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Development and Validation of a Prediction Model for Unemployment and Disability Benefits: Results from the Longitudinal Population-Based Lifelines Cohort Study and Biobank

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Background: This study aimed to develop prediction models for unemployment (UN) and disability benefits (DB) and to examine if predictors and discriminative ability of the models differ between five common chronic diseases.

Material and Methods: Data from the Lifelines Cohort Study ($n=55,950$) were enriched with information on employment status from Statistics Netherlands. Predictors included sociodemographic

factors, chronic diseases, unhealthy behaviors and working conditions. Data were analyzed using cause-specific Cox regression analyses. Models were evaluated with the C-index and the positive and negative predictive values (PPV and NPV). Models were externally validated using the Study on Transitions in Employment, Ability and Motivation (STREAM).

Results: Being female, low education, depression, smoking, obesity, low development possibilities and low social support were predictors of UN and DB. Low meaning of work and low physical activity increased the risk for UN, and all chronic diseases increased the risk of DB. Discriminative ability of the models of the development and validation cohort were low for UN ($c=0.62$; $c=0.60$) and DB ($c=0.68$; $c=0.75$). After stratification to the chronic diseases, discriminative ability of models predicting DB improved for cardiovascular disease ($c=0.81$), COPD ($c=0.74$) and diabetes ($c=0.74$). The PPV was low while the NPV was high.

Conclusions: Models predicting DB are more accurate than models predicting UN. Taking workers' type of disease into account may contribute to an improved prediction of DB. However, models are better at identifying predictors rather than making predictions.

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Supporting work participation in clients with cardiovascular disease: exploring the patients' experiences and needs using client experience journey mapping

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Introduction: Patient-centered care is increasingly being recognized as key in delivery of health care. However, little is known about what patients consider important in terms of work-focused health care. The objective of this study is to identify the workers' experiences and needs regarding work-focused health care when suffering work participation problems due to cardiovascular disease (CVD).

Methods: The client experience journey mapping approach (CEJM) was used to design and graphically visualize the patients' experiences and needs throughout the different phases of work-focused healthcare. Semi-structured interviews, preceded by preparatory assignments, were conducted with 19 patients diagnosed with a CVD and experiencing work participation problems. The interview data was synthesized and mapped in a client experience journey showing the needs, pains and gains.

Results: Currently, a draft design of the client journey is mapped. Final results will be presented during the ICOH conference. Employing the CEJM, work-focused healthcare phases are identified, including important touchpoints and involved stakeholders. Experiences and needs are mapped per phase, including an emotion curve showing the bottlenecks in the journey. Preliminary needs and bottlenecks have been identified in the timing of appointments with stakeholders, information provision towards the

patient, information exchange between stakeholders, and the knowledge by the stakeholders.

Conclusion: This CEJM facilitates the identification of bottlenecks in health care delivery over the full cycle of care and, thereby, point out possibilities for improvement.

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Work-related social support affects return-to-work after total hip or total knee arthroplasty

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Introduction: There is strong evidence that social support is an important determinant of return to work (RTW). Little is known about the role of social support in RTW after total hip or knee arthroplasty (THA/TKA). THA/TKA is being performed on an increasingly younger population for whom participating in work is of critical importance. Aim was to examine the predictive value of preoperative and postoperative perceived social support on RTW status 6 months postoperatively.

Methods: A prospective multicenter survey study was conducted. Patients planned to undergo THA/TKA, aged 18–63 and employed were included. Questionnaires were filled out preoperatively and 3 and 6 months postoperatively, and included three sources of social support: from home (friends, family), from work (coworkers, supervisors) and from healthcare (occupational physician, general practitioner, other caregivers). RTW was defined as having fully RTW 6 months postoperatively. Univariate and multivariate logistic regression analyses were conducted.

Results: Enrolled were 246 patients (median age 56 years, 57% female). The majority returned to work (64.2%). Preoperatively, social support from the occupational physician predicted RTW (OR 2.58, 95%CI 1.18–5.65). Postoperatively, social support from the occupational physician (OR 3.12, 95%CI 1.49–6.54) and the supervisor (OR 2.53, 95%CI 1.08–5.89) predicted RTW at 6 months postoperatively.

Conclusions: This study underscores the importance of work-related social support originating from the occupational physician and supervisor in facilitating RTW after THA/TKA, both preoperatively and postoperatively.

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A mixed methods implementation study of a participatory intervention to prevent health problems among workers with a lower socioeconomic position

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Introduction: Workers with a lower socioeconomic position (SEP) often have problems on multiple life domains and less problem solving skills. The Participatory Approach (PA) is an evidence-based approach to support workers to solve problems at the workplace. To develop an intervention for lower SEP workers with problems on multiple life domains, the PA was extended to a broader perspective on health. This study evaluated the implementation process of this intervention in occupational health practice.

Methods: A process evaluation was performed with quantitative (checklists) and qualitative methods (interviews) among occupational health professionals (OHPs) and lower SEP workers with problems on multiple life domains.

Results: The intervention was delivered among 27 workers, and among 16 workers all intervention steps were implemented. For the majority of the workers problems and solutions for multiple life domains were identified. For seven workers the supervisor was involved, and in only 2 cases stakeholders from outside the workplace were involved. The visual materials that were developed for the broader perspective on health, helped workers to identify their problems. OHPs were essential to guide workers in identifying and solving problems. The intervention was perceived useful, increased workers' awareness on health and feelings of self-control, and led to small and practical solutions.

Conclusions: This study provides valuable information on whether and how this intervention fits in occupational health practice, and how to further improve support for lower SEP workers with problems on multiple life domains.

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Single-item Work Ability Score as a predictor of rehabilitation and disability pensions: a German longitudinal study among employees with back pain

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Introduction: Sickness absence, disability pensions, and use of healthcare due to disabling back pain are a high economic burden in Germany. Assessments are needed to identify employees who are likely to need sustained and intensive support. Our cohort study examined whether rehabilitation and disability pensions can be predicted by self-rated work ability in employees with back pain in Germany.

Material and Methods: Employees aged 45 to 59 years who reported back pain in the last 3 months completed the Work Ability Score (0–10 points) in 2017. Individual scores were categorized into poor (0–5 points), moderate (6–7) and at least good (8–10) self-rated work ability. Data on rehabilitation and disability pensions were extracted from administrative records covering the period from baseline until the end of 2018. Proportional hazard models were fitted to determine the prognostic value of the Work Ability Score.

Results: Data of 6,917 participants were included (57.8% women). Maximum follow-up was 644 days. Of the participants, 52.1% had a good or excellent, 27.7% a moderate, and 20.2% a poor Work Ability Score. During follow-up, 548 persons were granted rehabilitation measures and 57 persons disability pensions. Fully adjusted analyses showed an increased risk of a rehabilitation measure (Hazard ratio; HR = 2.65; 95% CI 2.11; 3.34) and a disability pension (HR = 4.12; 95% CI 2.02; 8.39) in employees with poor work ability.

Conclusions: The single-item Work Ability Score is a potential tool to identify individuals reporting back pain with an increased risk of health-related early retirement and work disability.

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Return-to-work of transgender people: a systematic review through the blender of occupational health

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Introduction: Return to work (RTW) of trans individuals during transitioning at work and following chosen steps in gender affirming care, is a challenging process but clear information of job re-entry (RTW-rate, time-to-RTW, sick days, RTW-experiences) of this population is lacking.

Material and methods: We systematically explored databases concerning health, psychosocial publications as well as grey literature (Pubmed, Embase, EBSCOhost, Proquest, CINAHL, Scopus, Epistemonikus and Web of Science) for quantitative, qualitative and mixed methods studies between 2006 to March 1st 2021, reporting on (return to) work outcomes of adult trans people. A synthesis of the quantitative data was performed together with a thematic analysis of (return to) work experiences.

Results and conclusions: Database searches identified 14,592 records, from which 97 full text articles were screened which resulted in 20 articles as our final sample. Objective RTW outcomes were lacking, wherefore other relevant work outcomes such as employment rate and status, turnover were reported. Trans populations experienced more economic distress with 9–12% unemployment, a majority having precarious work or being on benefits, and a high turnover. General work experiences were highlighted by the importance of coming out, support from supervisors and co-workers, personal coping skills, a transition plan along with work accommodations. To the best of our knowledge, this is the first review to evaluate return to work of trans people which showed a clear gap of knowledge among all stakeholders including occupational health professionals.

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Expanding the Paradigm of Occupational Safety and Health In Integrated Disability Management

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Introduction: Approximately 15 percent of people in the world live with some type of disability. This number increases to 25 percent in people over 60 years old. As the workforce ages enterprises need more efficient ways to retain valuable older workers. Workers with disabilities can be a way to strengthen the pool of qualified candidates, and are thus a valuable asset to the viability of any endeavor. As regulations expand to provide justice and equality for disabled workers, occupational hygienists need to become part of the Integrated Disability Management team to help ensure safe and healthy working conditions.

Materials and Methods: Working with a team of occupational therapists, occupational healthcare providers, and occupational hygienists the concept and application of Integrated Disability Management (IDM) has brought new approaches to disabled worker safety and inclusion.

Results: Integrated Disability Management has been shown to improve the safety and inclusion of disabled workers through the use of coordinated programs and technologies.

Conclusion: A huge gap persists between what is known about the capabilities and needs of workers with disabilities, and the majority of practicing occupational hygiene professionals. Historically, human resource departments and disability concerns specialists would work to place disabled workers in the workplace. Many of these workers have been excluded from workplaces, jobs, and occupations on the grounds that it would be unsafe. New insights and technologies are now paving the way for these previously discriminated against workers to be included in the workforce safely.

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Hand discomfort in office workers - Croatian version of the Cornell hand discomfort questionnaire

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Background: Musculoskeletal disorders are substantial public health problem in Croatia and worldwide. It is crucial to have a simple method for evaluating hand musculoskeletal pain and discomfort.

Objective: The objective of this study was translation, adaptation and validation of the Cornell Hand Discomfort Questionnaire (CHDQ) into Croatian language (C-CHDQ).

Methods: The cross-cultural adaptation of CHDQ into Croatian language (C-CHDQ) was conducted on 221 office workers and following guidelines for adaptation of a health status self-administered questionnaire which included translation, synthesis, back translation, expert committee review and pretesting. Validity of C-CHDQ (tested through Visual Analog Scale-VAS) and internal consistency were determined on 221 office workers, and test-retest reliability on 40 office workers. Discomfort in six regions of the hand, both right and left, was subjectively estimated and total discomfort score was calculated.

Results: The C-CHDQ demonstrated good validity: Kappa coefficient and Spearman correlation coefficient between VAS scores and C-CHDQ scale scores indicated substantial to excellent agreement with all values higher than 0.850. Cronbach's alpha >0.75 proved satisfying internal consistency. More prevalent feeling of discomfort was in the right wrist.

Conclusion: C-CHDQ obtained good psychometric questionnaires criteria and is a simple instrument for discomfort hand assessment. C-CHDQ could be used as a tool in workplace intervention for work disability prevention.

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An innovative recruitment pathway for the delivery of a case management intervention

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Introduction: Our observational study tests the implementation of a multi-component strategy which aims to improve the work participation of people with a high risk of permanent work disability. Our strategy consists of screening and postal contact, telephone counseling, initial interview, and case management (trial registration: DRKS00022468).

Material and Methods: A risk score using administrative data of a German pension insurance was used to identify people with potential need of support. These individuals were contacted by postal mail and encouraged to phone their regional case manager if they needed assistance. We assessed the population reached and the fidelity of the standardized recruiting pathway.

Results: Between 27/07/2020 and 21/01/2021, 1074 persons with high risk scores were contacted. This resulted in 134 calls from potential clients, 72 initial interviews (53.7% of calls), and 57 case management activities initiated. On average, 72.5% of the predefined content of the initial telephone contacts and 88.6% of the predefined content of the initial interviews were delivered. In 52 cases, an application for interdisciplinary medical rehabilitation was considered. The final sample starting a case management intervention reported 7 weeks of sickness absence in the past 6 months and only 4.7 out of 10 points of self-rated current work ability.

Conclusion: A new pathway to support work participation of persons with a high risk of permanent work disability was established. The recruitment components were implemented satisfactorily. The effectiveness of the intervention will now be tested in a randomized controlled trial.

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Perceptions on best ways to measure work participation. An international survey among randomized controlled trialists and Cochrane systematic reviewers

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Introduction: Variability of work participation (WP) outcome measurements hampers large scale evidence synthesis. We contacted authors of randomized controlled trials (RCTs) and Cochrane systematic literature reviews (SLRs) on their perceptions and experiences with measuring WP outcomes.

Methods: We contacted (co)authors of 260 RCTs and 69 Cochrane SLRs authors. Questions pertained to their specific study and their general opinion on WP outcome measurements. In total 92 respondents from vocational and clinical fields completed the survey. A mixed methods design was used to collect and analyze both quantitative and qualitative data.

Results: WP outcomes were mainly chosen based (86%) on their use in similar previous studies. In most studies patients had not been involved in the process of selecting the WP outcome (12%). Feasibility for researchers is seen as important in choosing a measurement outcome (67%), followed by the validity of the instruments (49%). Registry data is preferred over self-report for employment status outcomes. However, the availability and validity of registries are seen as a challenge. SR authors struggle with pooling data (72%), mainly due to varying cut-off points and follow-up times (80%) and varying return to work definitions (56%). In general, authors support the use of a Core Outcome Set (COS) for Work Participation (92%). However, barriers are foreseen on the level of varying social security schemes which may impact the choice of outcomes.

Conclusion: There is a great need and support for international consensus consensus on WP outcome terminology and feasible measurement methods.

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Social insurance literacy of Dutch claimants of work disability benefits and its associations with socio-economic characteristics: a cross-sectional study

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Introduction: Social insurance systems are often complex and applying for a work disability benefit calls upon a variety of abilities. Social insurance literacy (SIL) captures the individual's ability to obtain, understand and act on information and the relation to the perceived system comprehensibility. Recently, a measure, the SILQ, was developed. We explored SIL among benefit claimants and the comprehensibility of the Dutch social security institute (SSI), and examined associations with socio-economic characteristics.

Material and Methods: Panel members of the Dutch SSI, receiving work disability benefits, completed the SILQ-NL37 and questions on age, gender, education, living situation and Dutch skills. With k-means clustering, groups with adequate and limited SIL were created. Associations with socio-economic characteristics were examined with independent t-tests and linear regression analyses.

Results: Thirty-five percent of 567 participants had limited SIL. Higher SIL scores associated with having a partner (p=0.018) and north-eastern living region (p=0.031). People with limited Dutch skills (p=0.063) and a partner (p=0.085) rated system comprehensibility higher. Higher scores for obtaining (p=0.041) and understanding (p=0.049) information were associated with female sex, and acting on information was associated with younger age (p=0.020).

Conclusions: Limited SIL is a prevalent problem and associated with socio-economic characteristics. Further research is needed to study the influence of SIL on social insurance related outcomes. Individuals with limited SIL need better support within social insurance systems.

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Challenges and resolutions in work ability meetings - a survey of Finnish occupational physicians

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Introduction: Work ability meetings (WAM) are an essential and common tool of disability management in occupational health services in Finland. A meeting is held between a disabled employee, supervisor and an occupational physician (OP). The aim of WAMs is to support work ability and/or return to work.

Materials and Methods: An internet survey was sent via e-mail to the members of the Finnish Society of Occupational Health Physicians (n=1304). We asked the physicians to describe WAMs they had attended: challenges and resolutions concerning the meetings. **Results:** A total of 302 (23%) OPs responded to the survey. One of the challenges in WAMs was a lack of confidence and personal conflicts at the workplace. These may hinder successful negotiations. The views of the participants may differ about the purpose and the aim of the meeting. The responders also noted that the employer may not have real possibilities to organize modified work for the disabled employee. As a resolution, OPs need to remain their professional and neutral role in WAMs. Also OPs mentioned the need for training in insurance medicine and rehabilitation as well as skills as a mediator.

Discussion: OPs need to recognize possible conflicting interests and in these cases contact each party before WAM. Confidentiality in WAMs is a crucial matter. Indeed – WAM is a potential tool for RTW and disability management in collaboration in an employee, employer, and occupational health when all the participants reach a common goal and become aware of their role in the process.

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Understanding current practice, needs and expectations of discussing work with a medical specialist from a patient's perspective: a qualitative study

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Aim: More attention for work in curative health care may be beneficial for patients of working age, so called work-focused health care. However, the perceptions of patients about this type of care are unknown. The aim of this study was to develop a better understanding of the current practice, needs and expectations of discussing work with a medical specialist from a patient's perspective.

Methods: A qualitative study was undertaken involving patients with diverse medical histories (n=33). Eight online synchronous focus groups using video calling were held. A thematic analysis was performed.

Results: Most patients experienced interference of disease or treatment with work participation, while work was an important part of their lives. To address their work concerns patients wished to discuss these with their specialist, but not all felt supported in this request. Three groups of work-concerns were identified and related to the expected role of a medical specialist. Concerns on work-relatedness of their disease arose at diagnostics; most emphasis for the role of the specialist was in this group. Next, they wanted advice from their specialist on how to balance health and work. Finally, they wished support with decreased work ability, for which they preferred referral to other health care providers.

Conclusion: Work participation is important for patients, but often interferes with disease or treatment. Patients want to discuss this work-health interference with their medical specialist. Currently, patients have unmet needs regarding work-focused health care and they wish medical specialists would pay more attention to work.

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Challenges and Adaptation Strategies of Service Providers of Occupational Rehabilitation in Germany – Results of a Mixed Method Analysis

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In Germany, there is a well-developed network of occupational rehabilitation service providers. They offer specific programs for people with disabilities or those at risk of becoming disabled. Despite their importance, little is known about these institutions and the potential challenges that they face. The goal of this study is to examine the challenges of rehabilitation providers and their adaptations strategies. To achieve the goal, a mixed-method approach is adopted in this study. The quantitative part of the study is based on the online survey of the service providers (n = 266). 32 in-depth structured qualitative expert interviews were conducted before and after the quantitative survey to deepen the analyses. The online survey and interviews were organized in summer/winter 2017. In our analysis, we look at the individual challenges faced by service providers and the strategies they are pursuing to address them. Our results suggest that rehabilitation providers face challenges in several important domains. They face increasing planning uncertainties as well as increasing price competition. In addition, the majority of rehabilitation providers see an increase in the number of rehabilitants with mental disabilities and behavioural problems as a challenge in their daily work. Also, the rapidly changing labour market and falling demand for traditional occupations are views by many service providers as a challenge. Active development of new study programs, innovations in teaching and strengthening ties with social partners are the most common adaptation strategies of service providers to the challenges.

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Analysis of case studies on working with chronic musculoskeletal disorders

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Introduction: An EU-OSHA study involved 8 case studies of people with chronic MSDs who successfully returned to work after sick leave or continued to work with the MSD. It aimed to examine the experiences of these workers — recruited from a variety of organisations, sectors and European countries — to identify good practices.

Materials and methods: The participants completed a questionnaire and took part in a semi-structured interview. A comparative analysis was carried out to identify success factors in managing worker retention with chronic MSDs, using the biopsychosocial model as a framework. It formed part of a larger study that included a literature view.

Results: Success factors identified included: good workplace safety system; commitment to work retention; a return-to-work policy; existing policies on flexible hours/teleworking; motivation to continue working; early intervention; support from managers and colleagues, and open communication; gradual return to work. Accommodations included: adjustments to working hours, opportunities to work flexibly or work from home occasionally, ergonomic measures such as a different mouse or chair, a cordless telephone headset, swapping some more arduous tasks with a colleague, being able to stretch and exercise at work, using a range of measures, allowing sufficient time.

Conclusions: Simple measures often enabled the people to continue working, which could be implemented in workplaces of any size. Having a good health and safety culture that promotes musculoskeletal health and a good organisational culture and focusing on the person's capabilities not disabilities were key.

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Effective use of musculoskeletal injury risk factor screening tools – a systematic review

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Introduction: Musculoskeletal injury (MSI) remains the most common reason for disability and work loss globally. Effective

prevention of MSI is necessary. MSI Risk Factor screening tools can be used by employers and health care providers to identify and mitigate hazards. A rigorous synthesis of effective application of these tools had not previously taken place.

Materials and Methods: We searched MEDLINE, EMBASE, Cochrane Library (Trials), CINAHL, and Scopus databases up to March 2021. Eligible studies had an analytic design, utilized an MSI Risk Factor screening tool to guide an intervention, and reported at least one outcome measure related to MSI development, injury occurrence, or compensation/sick leave. Two authors independently assessed study eligibility. Data were extracted and study quality assessed (Downs and Black criteria) by one author with verification by another author.

Results and Conclusions: The database search resulted in 8,116 unique records. A total of 92 full-text articles were assessed for eligibility, of which five articles were deemed relevant and included in the analysis (5 RCT). Each of the five studies had fair quality (Downs and Black). Use of screening tools and choice of outcome measures were heterogeneous across studies, which precluded completion of a meta-analysis. Results did not uniformly show a protective effect of tool use on MSI outcomes, and overall do not present dependable evidence that MSI Risk Factor screening tool use is effective.

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Worker Characteristics and Factors Associated with Return-to-Work Among Workers with or without Co-Occurring Posttraumatic Stress Injuries and Physical Injuries

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Introduction: Despite evidence that workers with co-occurring posttraumatic stress injuries (PTSI) and physical injuries are less likely to RTW, factors associated with RTW have received little empirical attention. The purpose of the current study was to explore worker characteristics and factors associated with return-to-work (RTW) among workers with or without co-occurring posttraumatic stress injuries (PTSI) and physical injuries.

Material and Methods: A population-based cohort study was conducted utilizing secondary administrative (i.e., demographic, injury-related) and clinical (e.g., patient-reported outcome measures) data were obtained on 488 injured workers with (n=170) or without (n=318) co-occurring PTSI and physical injury admitted to PTSI rehabilitation programs. Chi-squared tests and independent samples t-tests were conducted to examine factors associated with RTW, and RTW prediction was modelled using logistic regression.

Results and Conclusions: RTW rates were significantly lower among workers with co-occurring PTSI and physical injuries compared to workers with PTSI only (50.0% and 22.9%, respectively; $\chi^2=33.64$, $p<.001$). RTW was less likely for workers with longer average treatment durations, those admitted to higher intensity PTSI interventions, and those with higher levels of self-reported pain intensity, depression, and posttraumatic stress, and higher levels of self-reported readiness to return-to-work. Co-occurring PTSI and physical injury was associated with worse RTW, but this was attenuated after adjusting for pain intensity and PTSD symptomatology.

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Work disability, suicide and self-harm: A scoping review

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Introduction: Evidence suggests a link between work disability and later suicide or self-harm, however the evidence-base is disaggregated across systems, populations and nations. This review examined the relationship between work disability and subsequent suicide and self-harm.

Materials and Methods: A systematic scoping review of quantitative and qualitative studies reporting suicide or self-harm outcomes in people aged 15 years or older who had experienced an episode of work disability. Evidence was tabulated and charted for three major systems of financial support for work disability.

Results: Literature search yielded 883 articles of which 47 were included in data extraction. 9 studies in workers' compensation systems reported increased rates of suicide in people with lost time claims and higher rates among injured workers than the general population. 20 studies of people receiving sickness absence benefits reported elevated rates of suicide and self-harm, highest in those with longer absences and mental health conditions. 13 studies of disability pension recipients reported elevated rates of suicide and self-harm, highest in those with mental health conditions. Elevated rates were also observed in work disabled people with musculoskeletal disorders and after accounting for pre-existing health.

Conclusions: Work disability appears to be an independent predictor of later suicide and self-harm. This effect appears across systems, nations and in people with diverse health conditions. Suicide screening and intervention programs in work disability systems are warranted.

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Fit to Work Assessment among Production Unit Leader of Upstream Oil and Gas Industry with Myelofibrosis (A case report)

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Myelofibrosis is a malignancy in the bone marrow that might cause by exposure to benzene, one of the potential hazards found in the oil and gas industry, especially in the production sector. Fit to work evaluation of workers diagnosed with myelofibrosis in the oil and gas industry is very important. A male, 48 years old, works as a unit

production leader in the oil and gas industry with regular working hours, 8 hours a day, 40 hours a week, with a full administrative job. During work, the physical capacity required is at least 4 METs, with low mobility, good gross and fine motor skills, and sound active and passive communication skills. In general, the employee's health condition was good, but there was anemia and an enlarged spleen. Mobility function is not impaired, visual acuity is normal. The employee is at risk of aggravating the disease if it is not handled properly, but he does not risk endangering co-workers or the work environment. The employee is currently still able to work. The general condition does not interfere with his work. Based on the analysis results above, it can be concluded that the fitness for duty status is fit to work as a unit production leader with a note of not doing heavy physical activity, not driving, not lifting heavy loads above 10 pounds. Workers are recommended to continue treatment with an internal medicine specialist. Myelofibrosis patients are still able to work in the production section oil and gas industry, of course, with a thorough assessment first

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Designing a new working method to support physicians' (dis) ability prognosis evaluation

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Introduction: Physicians performing disability assessments have to evaluate the prognosis of the (dis)abilities for work. This is a very complex task challenged by limited knowledge and skills of evidence-based medicine (EBM), time constraints, high quality demands and conflicting interests.

Material and Methods: A new working method was developed to support physicians' (dis)ability prognosis evaluation. The Intervention Mapping framework was used to identify content items, design features and considerations on implementation and evaluation of this working method.

Results and Conclusions: The new working method consists of a stepwise EBM-approach to support physicians to gather available evidence, to review and weigh important prognostic aspects and to integrate these aspects into a transparent, tailored assessment. This working method is supported by a software tool, containing a database with links to evidence and other resources in order to facilitate searching, appraising and applying evidence-based information. An additional training program will further support the use of this working method. Physicians attending the training program will learn to apply the stepwise EBM-approach with support of the software tool and evaluate the prognosis of (dis)abilities in case scenarios based on daily practice. In a next phase limited efficacy, acceptability and practicality testing of the new working method is planned in a pilot study.

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Workers Requesting Disability Benefits Due to Musculoskeletal Disorders: A Cross-Sectional Brazilian Data

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Introduction: Musculoskeletal disorders (MSD) are the leading clinical cause of disability benefits granted by the Brazilian Social Security Institute in the last decades. The aim of this study is to present information about workers who requested temporary disability benefit due to MSD through the public social security system in Brazil.

Material and Methods: A longitudinal study is being carried out since 2020 in the city of Sao Paulo. Baseline information was obtained between November 2020 and April 2021. Two hundred seventeen workers took part in this study. They were in sick leave over 15 days due to a disabling MSD and requesting a social security benefit when were invited. Participants answered an electronic questionnaire on sociodemographic characteristics, health risk behaviors and occupational aspects.

Results: Most participants were males (53.0%), married (50.7%), school education higher than 11 years (60.4%), mean age 39.5 years (sd +-10.6), BMI 27.9 kg/m² (sd +-4.9), did not smoke (85.2%), abstemious (52.5%), working for less than 05 years (59.4%), morning shifts (73.2%), underwent physiotherapy (53.9%). The imbalance between extrinsic efforts at work and reward (ERI) was perceived by 75.1% of participants.

Conclusions: Information about the profile from disabled workers can help to map groups susceptible to sickness absence due to musculoskeletal disorders. Companies' health service professionals should start the process of return to work at the first day of absence in order to reduce the time to reintegration and promote a sustainable return.

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The Effects of a Stigma Awareness Intervention on Finding and Retaining Paid Employment a Cluster Randomized Controlled Trial among Unemployed People with Mental Illness

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Introduction: Stigma is one of the barriers to paid employment for people with mental illness. Deliberate (non-)disclosure decisions may prevent this, but the effects of stigma awareness interventions are mostly unknown. This study aims to examine the effectiveness of a stigma awareness intervention for employment specialists and a decision aid and two infographics about disclosure of mental illness on finding and retaining employment for unemployed people with mental illness, compared to usual guidance.

Material and methods: A clustered RCT was conducted. Participants were unemployed people with mental illness who receive social benefits (N=153) and were recruited at eight locations. The control group received guidance as usual and the experimental group

received guidance as usual combined with the stigma awareness intervention. Health, wellbeing, job seeking activities and disclosure were measured at baseline and 3, 6 and 12 months. Multilevel analyses were conducted to analyze the effects of the intervention on finding and retaining employment, controlled for other factors. Results: In the experimental group, after six (T2) and twelve months (T3) almost twice as many participants had found paid employment (T2: CG=26.1% vs EG=50.7%, $p=0.003$; T3: CG=34.4% vs EG=53.8%, $p=0.026$), and retained paid employment after twelve months (CG=23.4% vs EG=49.2%, $p=0.002$), compared to the control group.

Conclusions: A stigma awareness intervention contributes to more often finding and retaining paid employment for people with mental illness.

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The evolution of work disability policies: from the UN Convention to the European Union (EU) strategies

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Introduction: According to the International Labor Organization (ILO) people with disabilities make up an estimated one billion of which about 800 million are working age. However, the right of people with disabilities to decent work is frequently denied. Their exclusion from the labour market represents a significant waste of potential, resulting in an estimated loss of GDP of between 3% and 7%. This study aims at explaining a summary of the policies produced, in particular in the EU, to support the protection and social participation of disabled people, based on the three fundamental elements: the guarantee of individual rights to eliminate discrimination, the elimination of environmental barriers, the promotion of an active inclusion of people with disabilities.

Material and Methods: The study on disability and work focused on the context analysis, the evolution of the concept of disability, the cultural and regulatory framework and finally on the policies adopted in United Nations and EU countries.

Results: From the analysis of the main policies adopted over time, come to light useful suggestions to combat discrimination and above all to promote the inclusion of people with disabilities.

Conclusions: The strategies of supranational and international organizations have evolved, embracing the changes that have occurred in the cultural and scientific paradigms relating to issue of disability contributing to a real inclusion of people with disabilities in all contexts, including the workplace, in order to guarantee good health and safety conditions.

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Piloting a return-to-work intervention for people with burnout: a qualitative feasibility study

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Introduction: Burnout may cause long-term sick leave. Return-to-work (RTW) interventions for burned-out people aim to prevent long-term work disability. Fifty burned-out patients and 98 GPs were recruited in a pilot cluster-randomized trial (CRT) of a RTW intervention for burned-out people. The RTW intervention was presented as a multidisciplinary care pathway initiated by the general practitioner (GP) followed by a referral to a psychologist. This qualitative study evaluates key feasibility issues (e.g. willingness of GPs to recruit patients, willingness of patients to participate) in order to prepare a full-size CRT.

Material and methods: The key steps for qualitative research in a feasibility study according to O' Cathain et al (2015) were followed. Twenty-two participants were interviewed: 7 patients (5 from intervention group (IG) and 2 from control group (CG)) and 15 GPs (10 from IG and 5 from CG). A semi-structured interview guide with open-ended questions was used. Interviews were audio-recorded and transcribed verbatim. Thematic content analysis (Braune and Clarke 2006) is used to explore participants' perceived barriers and facilitators to participating in the pilot CRT. (Approved by the Social and Societal Ethics Committee of University of Leuven, Belgium.) Results and conclusions: The analysis of the data is still ongoing. Preliminary findings are: in- and exclusion criteria aren't always clear for GPs, feeling overwhelmed and refusal to be referred to a psychologist are patients' reasons for not participating in the pilot CRT. The final results of this study will guide the development of a full-size CRT of the RTW

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Determinants in loss of work capacity and disability in occupational diseases

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Introduction. Disability due to occupational diseases (OD) is of great social significance, due to the fact that it is associated with the need for compensation payments and payment of expenses for their rehabilitation. Hazardous industrial factors, are the main disabling factor for patients with respiratory diseases ($p<0.001$). Persons with respiratory OD predominate in the structure of people with disabilities for OD.

Material and Methods: analysis of medical records of the occupational pathology center and the bureau of medical and social expertise. The study was carried out using specially developed statistical cards (Ishteryakova O., 2008).

Results and Conclusions. The highest rate of disability in the primary diagnosis of OD was recorded in the agro-industrial complex - 39% of patients. Among patients with persistent loss of working capacity, 15% work in the automotive industry, 10%-in construction. 3.5% in the shipbuilding industry; 7%- in the production of building materials and others. 76-91% people with OD, of those recognized as disabled for the first time, are of working age. The main causes of disability are: violation of body functions and limitation of work capacity, medical contraindications to work with hazardous factors in the diagnosis of OD. Investing money in the rehabilitation of persons with early signs of OD is more economically efficient, since it allows them to maintain their work

capacity. Rehabilitation measures with a comprehensive solution of issues of treatment, employment, motivation allows to prevent the progression of the OD and contributes to improving the quality of life of patients.

36. WORK ORGANISATION AND PSYCHOSOCIAL FACTORS

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Inspection of job risks, burn out syndrome and job satisfaction of Greek Public Health Inspectors

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The ever-changing business environment in which modern organizations operate, rapid technological developments, mergers, acquisitions, economic policy, changes in consumer and the economic slowdown of the recent decades, have increased the probability of existing job risks and has also introduced new risks for employees, such as psychological risks and burnout. In the EU, before the mid-1980s, Greece, Spain, Portugal and Italy had only fragmentary regulations, combined with weak control and enforcement capabilities. Since the 1987 adoption of the Single European Act, and the framework directive 89/391/EEC, a broad concept of occupational safety has been introduced, going beyond the traditional mechanistic approaches. In this frame, the examination of job risks and employees' risk perceptions is becoming increasingly important for the protection of health and safety at work, as well as the prevention of the consequences of harmful factors in the workplace. Yet, the risks that are related to the work life of public health inspectors are under researched, although this specific occupation possesses a range of threats to physical and psychological health of employees. It has been suggested that Public Health Inspectors face various work-related risks due to the specific nature of their responsibilities. One of the limited studies on the work-related health and safety risks of public health inspectors showed that public health inspectors face a variety of chemical, biological, physical, safety, ergonomic and psychological risks. The above-mentioned occupational and psychological risks are highly likely to be faced

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Update of the permanent clinical impairment adjudication guide for occupational mental diseases in France

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Introduction: The French Social Security system is responsible for determining the rate of permanent clinical impairment (PCI) once a claim for an occupational disease has been accepted. Rules for determining the PCI needed revision. Our objective is to present the proposal of the updated rules for determining the PCI for work-related mental diseases.

Material and Methods: Social Security has mandated a group of experts (listed as co-authors) of Occupational Medicine Specialists, Psychiatrists, and Social Security Medical Advisors from 2019 to 2021. We conducted a review of adjudication guides, and a survey sent to ICOH-WOPS members in 2019. Substance-use disorders, traumatic brain injuries, schizophrenia were excluded. Case scenarios have been used to test the new rules.

Results: The group proposed the adjudication of the PCI on a mixed approach, taking into account the diagnosis and the functional capacity. A ceiling rate has been set for each diagnosis: 40% for mood disorders and post-traumatic disorders, 30% for stress-related disorders. This ceiling rate would be multiplied by a functional capacity coefficient (from 0 to 1.2), based on the Global Assessment of Functioning (GAF) scale.

Conclusions: These updated grids aim to help the adjudication be fair and simple. The updated PCI rates are in the same range as the old ones. An additional compensation rate similar for all groups of diseases (mental and physical) will be added to this compensation rate, based on the age and job status of the claimant. The final report has been sent in June 2021 to Social Security who will decide on its implementation.

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Contributors to stress and burnout in junior doctors during the COVID-19 pandemic

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Introduction: Junior doctors have reported high levels of burnout and additional stressors emerging from the COVID-19 pandemic may further accelerate burnout. There is a need to identify which stressors are most likely to lead to burnout in order to develop appropriate interventions. This project therefore aims to compile a comprehensive list of stressors relevant to junior doctors and assesses which stressors are most strongly associated with burnout. **Materials and Methods:** An anonymous online questionnaire was sent in July 2020 to 1000 randomly selected junior doctors in the North West of England. It included 37 questions on general and pandemic specific stressors and the Maslach Burnout Inventory Health Services Survey. Stepwise regression analysis was undertaken to explore associations between stressors and burnout.

Results and Conclusions: In total, 326 responses were received. Six of the 10 highest rated stressors were specific to the pandemic. Fatigue ($\beta=0.43$), pandemic-related workload increase ($\beta=0.33$)

and feeling isolated ($\beta=0.24$) had the strongest associations with Emotional Exhaustion. Fatigue ($\beta=0.24$), uncertainty around COVID-19 information ($\beta=0.22$) and doing unfulfilling tasks ($\beta=0.22$) had the strongest associations with Depersonalisation. Lacking in ability ($\beta=-0.24$) and not feeling valued ($\beta=-0.20$) had the strongest associations with Personal Accomplishment. In conclusion, junior doctors reported a combination of general and pandemic-specific stressors that significantly impact burnout. Monitoring these stressors and targeting them as part of interventions could help mitigate burnout in junior doctors.

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Precarious work in the care sector in Finland: A matter of collective agreements or local conditions of job quality?

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Introduction: Precarious work refers to insecurity, low pay and problems in worker rights. The study aims to examine the dimensions of precarious work and job quality in the care sector and analyse their association with psychosocial health and work experience.

Material and Methods: Surveys were carried out in 2020 and 2021 among care workers ($n=7925$). The first survey used Employment Precariousness Scale EPRES (temporality, wages, agreements on working hours and wages, worker rights and their realization and vulnerability). 2021 survey added working community, professional development, workload, benefits, work-life balance and employability. Associations of the dimensions with psychosocial health and work experience were analysed with linear regression. **Results:** The most significant dimensions of EPRES were inadequate wages, perceived vulnerability and lack of rights. The most prominent job quality issues were lack of professional training and development options, mental workload and lack of control over working times. Factors negatively associated with psychosocial health were wages, vulnerability and exercise of rights. Vulnerability and exercise of rights, support, mental workload, control over working times, and overtime were negatively associated with work experience.

Conclusions: The results highlight the harmful structures in care work, which hinder the sector's development, are causing labour shortages and lead workers to leave the sector. By targeting these structures, the sector's attractiveness, well-being at work and willingness to continue at work could be increased.

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"It's like juggling, constantly trying to keep all balls in the air": A qualitative study of the support needs of working caregivers taking care of an older adult

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Introduction: Many informal caregivers of older adults combine their caregiving tasks with a paid job. Adequate support is important to enable them to combine paid work with caregiving, while maintaining their health and wellbeing. To date, however, knowledge about working caregivers' support needs is fragmented. This study therefore aimed to obtain more insight into support needs of working caregivers of older adults.

Materials and methods: We conducted six online semi-structured focus group interviews with in total 25 working caregivers of older adults living at home. Data were complemented with information from seven working caregivers participating in the study's advisory board. Data were analyzed using inductive and deductive thematic analysis.

Results: Six themes related to working caregivers' needs were identified: 1) Recognition of caregivers including the challenges they face; 2) Attention for caregivers' health, wellbeing and ability to cope; 3) Opportunities to share care responsibilities; 4) Help with finding and arranging care and support; 5) Understanding and support from the work environment; and 6) Technological support tailored to the needs and capacities of caregivers and older adults. To address these needs, working caregivers' suggested several options in multiple domains of life (i.e. work, home life, personal health and wellbeing).

Conclusions: To successfully support working caregivers, a multifaceted approach including actors from multiple settings, is needed.

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Burnout and its predictors during pandemic in health workers from South-East European countries

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Introduction. Workplace factors during COVID-19 pandemic impose significant risk to occupational health in health workers (HWs). This cross-sectional study analyzes associations of burnout with job demands/resources among HWs and compares findings between 12 South-East European (SEE) countries during the pandemic.

Methods. The actual on-line survey was conducted during autumn 2020 by SEE Network on Workers' Health (SEENWH) with SEE Health Network. Job demands and burnout were measured by Hospital Experience Scale and Maslach Burnout Inventory. Hospital Survey on Patient Safety Culture and the English version of the Questionnaire sur les Ressources et Contraintes Professionnelles were used for job resources assessment. Total sample involved 4.621 HWs (78.4% females, aged 43.7±10.7 yrs, tenure 18.8±11.4 yrs) from SEE countries. Ethical issues of the study were approved by SEENWH.

Results. Data showed significant differences in emotional exhaustion between SEE countries: Albania 21.7, Bosnia and Herzegovina 21.9, Bulgaria 23.8, Croatia 23.7, Israel 13, Moldova 22.9, Montenegro 22.4, RN Macedonia 24.1, Romania 18.2, Serbia 20.1, Turkey 20.4 (Welch F = 17.98, p<0.001). Cross-country differences were also registered in job demands/resources. Regression models, controlling for gender, age, tenure, working hours/week, night shifts, showed job demands (R²=.37, ΔR²=.35) and job resources (R²=.18, ΔR²=.16) as significant predictors of emotional exhaustion.

Conclusion. There is an urgent need for implementation of country-specific preventive measures towards burnout prevention and improvement of work ability in HWs during pandemic.

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Global Cry for Strategies to Support the Mental Health and Well Being of Health Care Workers

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INTRODUCTION: Health care workers are often at the forefront of most medical scenarios and crisis, the latest being the COVID-19 pandemic. Due to their pledge of service to society and humanity, they suffer from fatigue and mental exhaustion which is attributed to an over expanding health care system. This goes unnoticed due to their acts of kindness whilst their own health and mental well-being is jeopardised. Moreover, they suffer an internal conflict of wanting to do what is right despite their own challenges.

METHOD: A group of health care workers that assisted during the COVID-19 outbreak was interviewed. They completed questionnaires on their emotions before and during the start of the pandemic and the availability of any support structures.

RESULTS: Overall, health care workers indicated they felt frustrated and fearful as employers exploited and exposed them to many adversities at workplaces. Their extension of working hours, and disappointment at the lack of appreciation was noted. Demands on their energy, strength and resources were placed on them. No

support systems were in place to assist with their burnout, mental exhaustion, nor any incentives for additional services rendered.

CONCLUSION: Health care workers are the building blocks of any country's health system and investigations should be done on their mental health, well-being and challenges. It is critical to develop global policies, wellness strategies and coping mechanisms to ensure emotionally stable persons assist our nations to good health. Employers need to be well informed of such strategies so that early interventions are sought for quick recovery.

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Work Engagement (WE) of Nursing Faculties in Japanese Universities

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INTRODUCTION: The purpose of this study is to identify the work engagement (WE) of nursing faculties in Japanese universities.

METHODS: The research design was that of a qualitative study. A self-administered questionnaire was sent to randomly selected nursing faculty members from universities in Japan, and 170 who expressed their opinions about WE were included in this study. The codes were categorized. The approval of the ethics committee of Yokkaichi Nursing and Medical Care University was obtained.

RESULTS and CONCLUSION: 325 codes were obtained regarding WE and they were divided into two categories: [Stressors of Nursing Faculty] and [Strategies to Activate WE]. In the category of [Stressor of Nursing Faculty], eight subcategories were extracted: including "Relationships among faculty members," "Unreasonable requests from students," "Balance between research and teaching," "Long working hours," "Lack of manpower," "Impatience due to employment deadlines," "Too much work," and "Unclear university policies". In the category of [Strategies to Activate WE], eight subcategories were extracted: comprising "Education to faculty members," "Good relationships with colleagues and supervisors," "Ensuring work-life balance," "Goal setting and sharing," "Mutual respect among teachers," "Improving the environment," "Financial guarantees," and "University leadership providing direction". The stressors of nursing faculties were consistent with the findings of previous studies. Strategies for activating WE were divided into individual efforts and organizational system building.

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"Morality Matters": The Relative Impact of Moral Demands on Indicators of Wellbeing in Hospital Personnel

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Introduction: In order to prevent stress and promote health and well-being of health care employees, a better knowledge of the job aspects that may impact well-being is important. In nursing

research, moral distress –the psychological suffering that arises when one is constrained from acting morally– has been receiving increased attention as a phenomenon that is associated with a broad range of negative outcomes. The aim of this study was to investigate the relative impact of moral distress as a source of work stress in health carers, compared to established work-related stressors.

Method: A quantitative survey on work characteristics and well-being outcomes was completed by 5,427 hospital workers. Confirmatory factor analysis, Pearson correlations, and regression analyses were conducted to identify the factor structure of the measure for moral demands and relations with other study variables.

Results: Primary care workers reported the highest levels of moral demands, compared to other represented professional groups. Moral demands were negatively associated with positive, and positively with negative indicators of well-being. The predictive value of moral demands did not seem to differ across professional groups. Moreover, moral demands explained extra variance in predicting each of these outcomes, and this above and beyond the effects of established job demands and resources.

Conclusion: This study suggests that ‘morality matters’ and therefore, the moral dimension of work should be taken into account in order to improve working conditions and occupational health in the healthcare sector.

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Mental and physical disorders in graduate university teachers during the COVID 19 pandemic in Mexico City

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Introduction: During the confinement period due to the SARS-CoV2 pandemic, in July 2021, a survey was carried out to study the health and working conditions of postgraduate professors at a public university in Mexico City.

Material and methods: All postgraduate professors were invited to participate. The protocol was approved by the bioethics committee. By an electronic questionnaire was obtained information about: personal, work, distance teaching, physical and mental health, and symptoms of depression, and anxiety. The Chi2 test was used. Significant associations are reported.

Results: Eighty-nine graduate teachers participated, 50.6% women and 49.4% men. Sixty-three percent were full-time, and 44.9% were hourly teachers. During the pandemic, most received some training in distance learning, 74% had adequate equipment and furniture. Cyberbullying was not reported, and 79% allocated part of their free time to work. Fourteen percent had good physical health and 76% moderate. The most-reported complaints were neck, back, and hand/wrist pain, and sleep disturbances, mainly full-time; 45% slept 6 hours or less. Thirty-six percent had good mental health and 41.6% moderate; 37% indicated feeling nervous, higher in full-time teachers; 7% reported feeling depressed, twice higher in women. Due to academic load, 46% felt overwhelmed, and 31% burnout, higher in full-time and women.

Conclusions: During confinement, graduate professors reported moderate symptoms of anxiety and depression and musculoskeletal complaints related in part to their teaching activities, with symptoms being higher in full-time staff and women.

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Latent Class Analysis of Stressors Based on Workplace Accident Compensation Cases Regarding Mental Disorders in Japan

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Introduction: This study explored the characteristics of stressors by classifying them using data on cases in Japan in which public workers' compensation insurance was approved for mental illness caused by workplace stress.

Material and Methods: We used data from 2,923 cases approved between April 2011 and March 2018. The presence or absence of 39 stressors specified in the certification criteria was obtained. The items included extremely long working hours (more than about 320 hours per month), harassment, bullying, assault, and constant long working hours (about 260 hours per month before or after other stressors). Characteristics of the case were also collected: age, sex, industry, occupation, diseases, and suicide. Cases approved with a single stressor were typified based on the frequency, and cases approved with a combination of multiple stressors were typified using latent-class analysis. Decision tree classification examined the relationship between the characteristics of the cases and the typologies.

Results and Conclusions: Seven types of single stressor determination and five types of multiple stressor determination were obtained. The terminals of the decision tree were PTSD, male or female, with other reaction to severe stress and adjustment disorders (RSSAD), and suicide or no suicide except for RSSAD including PTSD. The proportion of suicides was relatively high in cases with major changes in work content or hours and continuous work among those other than RSSAD and PTSD. Studies based on stressor types may be useful for countermeasures against work stress-related mental and physical health problems.

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Web-based Follow-up Study on Relation Between Work-related Events and Depression in Japanese Workers

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Introduction: Several work-related events, such as experience of accident, interpersonal conflict and workload, are known to affect workers' mental health. Little is, however, known about how the magnitude of individual work-related events could affect depression among employees. To fill the gap, this 2-year longitudinal study aimed to comprehensively investigate risk factors of depressive symptoms among Japanese workers.

Materials and Methods: Ten thousand Japanese workers were recruited through an online research company and questioned for their experiences on 36 types of work-related events. They also filled the Center for Epidemiologic Studies Depression Scale to assess their depressive symptoms. Follow-up survey was conducted two years later from the baseline study and 3,098

participants responded. Of them, we analysed the data of 2,068 participants after excluding participants who were classified as being depressed in the baseline survey. The relation between experiences on work-related events and depressive symptoms were assessed by calculating odds ratios (ORs) with multiple confounders.

Results: Of 36 events, 16 work-related events were significantly related to the depressive symptoms and were sorted into 4 major types as follows: 1) accident or disaster, 2) excessive responsibility, 3) drastic change in work style or workload, and 4) interpersonal difficulty. Experiencing an accident or disaster showed the highest OR (4.78–7.67) among event types.

Conclusions: The results including magnitude relationship of ORs of risk factors, can be utilized for promoting psychosocially healthy work environment.

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WorkWell – a multi-pronged approach to prevent workplace mental injury

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WorkSafe, in partnership with Victoria's Department of Health, has invested \$50 million in a five year program to promote workplace mental health and prevent mental injury. Since its inception in 2017, the WorkWell program has clarified its primary prevention focus and has challenged the dominant model of workplace mental health. The focus of most workplace mental health programs for the past decade has been on supporting workers to "cope" with psychologically unsafe work, or providing support once workers become distressed. Whilst acknowledging all workplaces need excellent secondary and tertiary prevention programs, primary prevention is key to systemic change. This primary prevention focus champions system-based interventions and designing work in a way that does not cause mental injury, and in fact, creates workplaces that provide a net positive for mental health. WorkWell have adopted 11 work-related factors that impact on mental health as the framework for influencing change. This gives a language and a structured approach for workplaces to assess risk and enact change. WorkWell is influencing change in a ground breaking way – partnering with peak employers, unions, consultants, academics, not-for-profit organisations and government departments to build the evidence-base for creating mentally healthy workplaces. WorkWell has also developed universal resources for workplaces to assess psychological risk and "how to" actions to control these risks. WorkWell offers WorkSafe an alternative brand that uses accessible and supportive messaging to influence behaviour change.

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Workplace sexual harassment is an occupational hazard. Why should we tolerate it?

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Introduction: Recently, the victims have come forward to speak out their sexual harassment experiences, but there are still many unreported cases in the Malaysian organizations.

Objectives: This research study aimed to explore the reasons for unreported workplace sexual harassment and reveal the severity of each type of sexual harassment among the victims and witnesses at work.

Methodology: Grounded Theory Methodology (Glaser and Strauss, 1976) has been utilized to analyze semi-structured interview data from 20 participants from various organizations using purposive random sampling.

Findings: Participants either faced or witnessed verbal, non-verbal, multimedia, desire for intimacy, and physical workplace sexual harassment. The level of severity of sexual harassment ranging from low to high from verbal, non-verbal, multimedia, desire for intimacy and physical. However, the victims considered verbal, non-verbal, and multimedia sexual harassment tolerable, as they were afraid to lose their jobs if they report the incidents to the organization. Further, the procedure for reporting is unclear. In contrast, desire for intimacy and physical sexual harassment are intolerable among the victims, as their personal dignity involved. Victims would voice out when the situation becomes unbearable, or they receive support. In addition, most witnesses remained silent and ignore the harassment because they want to avoid any further problems or loss of privileges.

Conclusion: Both individual employees and the organization play a crucial role to eliminate workplace sexual harassment and create a safe and healthy working environment.

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Return to work of trans and gender diverse people: phase 1 of a mixed methods study

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Introduction: When trans individuals choose a social and/or medical transition, these latter steps to align their body to their gender are usually followed by temporary absences at work and different return to work (RTW) processes. As such RTW during social and/or medical transition can be met with multiple challenges and need for support at the workplace. The objective is to examine several RTW-outcomes (sick days, RTW rate), –experiences and facilitators and/or barriers to going back to work.

Material and Methods: Phase 1 of our mixed methods study collected data on RTW by way of an anonymous online questionnaire and semi-structured interviews of trans and gender diverse Belgian adults. Quantitative data was analysed in SPSS and qualitative data in Nvivo.

Results and conclusions: 103 participants completed the questionnaire of which a first subsample analysis of 32 respondents showed an average age of 39.7 years (SD 11.7) with 44% (trans) women, 37% (trans) men and 19% gender diverse people. 90% are employed (52% full-time, 40% part-time). Work absences varied between short periods of 2 weeks to 3 months. Most participants (86.7%) resumed their jobs. Preliminary qualitative results of the 23 interviews showed mixed experiences of transitioning at work. Participants indicated receiving the most support from their colleagues and supervisors while human resources or occupational health services were rarely consulted. Finalized results from our ongoing analysis and data integration will be used together with new findings

collected through a diary-based study (phase 2) in order to develop a tool for a tailored guidance of RTW.

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Impact of a workplace intervention on the knowledge and attitude towards tobacco and its usage among high school teachers in Bangalore, South India

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Introduction: Teachers are critical personnel to guide vulnerable adolescent children away from tobacco initiation and usage. Knowledge about the ill effects of tobacco and the attitude of teachers is an important factor in this regard. This study was done to assess the knowledge and attitude towards tobacco and its usage among high school teachers in Bangalore City, to identify any associations with socio-demographic factors and to measure any changes after an intervention.

Materials and Methods: As a part of a larger intervention that looked at prevention and cessation of tobacco use among adolescents, 233 high school teachers from 30 randomly selected schools were studied using a modified version of the WHO Global School Personnel Survey. A tobacco cessation intervention was executed. Knowledge, attitude and usage were analysed before and after the intervention.

Results: Prevalence of tobacco usage was 21.8% and associated with age 40–49 years (OR:3.8), male gender (OR:2.8), being divorced (OR:3.5), poor knowledge (OR:1.6) and poor attitude (OR:1.5). After the intervention, there was significant improvement in the knowledge scores (6.83 to 10.87), drop in proportion with inappropriate attitude towards tobacco (42.7% to 22%) and tobacco usage dropped to 9.8% among the teachers.

Conclusion: Prevalence of tobacco use among high school teachers and knowledge and attitude regarding the same needed improvement. A targeted intervention revealed improved knowledge and attitudes, and decreased usage of tobacco possibly indicating that the teacher an important official in guiding students away from its initiation and usage.

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Organizational Socialization and Wellbeing in workers in Mexico, Peru and Ecuador during covid-19

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A correlational and comparative study was carried out on Organizational Socialization (SO) and Labor Well-being (BL) during the COVID-19 pandemic. The total n was 371, of which 126 were Mexicans, 118 Peruvians, and 127 Ecuadorians. The instruments used were the General Labor Well-being Questionnaire based on a two-dimensional well-being model: psychosocial well-being (affects, competencies and expectations) and collateral effects (somatization, attrition and alienation) created for a research on quality of work life, in addition of the Organizational Socialization Inventory of Taormina, which consists of items that measure four dimensions: training, understanding, peer support and future prospects that have been related to mental health and well-being,

to verify hypotheses that would support the protective role of OS against the collateral effects of stress, job uncertainty and technological changes, as well as differences between Peruvians and Mexicans with Ecuadorians during the COVID-19 pandemic. The findings showed negative correlations between collateral effects and organizational socialization, at different levels according to each country. In Mexico, Ecuador and Peru positive correlations were found with the affect dimension, while somatization, attrition and alienation had medium correlations. When comparing the samples (ANOVA), it was obtained that the affect, somatization and socialization scales showed differences in the samples of the three countries, so it can be concluded that organizational socialization fulfills a role as a generator of positive emotions and that allows to cushion negative effects of stress.

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Working from home: mismatch between access and need in relation to work–home interference and fatigue

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Introduction: Working from home (WfH) is a promising practice that may enable employees to successfully and sustainably combine work and private life. Yet, not every employer facilitates WfH and not every employee has similar needs concerning the practice. The current study aims to examine the association of a WfH mismatch with work–home interference (WHI) and fatigue. **Materials and methods:** Data on WfH, WHI, and fatigue of a quasi-representative sample of 2374 Dutch employees in 2012/13 and a follow-up measurement one year later were used. Cross-sectional and longitudinal regression analyses were conducted to investigate the cross-sectional and temporal associations between WfH mismatch on the one hand and (changes in) time-based and strain-based WHI and fatigue on the other hand.

Results: 21.1% of the participants experienced a WfH mismatch, i.e. their access to WfH is smaller than their need for WfH. In the cross-sectional analyses, WfH mismatch was significantly associated with higher time-based WHI (B=0.13), strain-based WHI (B=0.17) and more fatigue (B=0.32). WfH mismatch was not associated with changes in these outcomes after one year of follow-up.

Conclusions: A WfH mismatch is associated with higher WHI and more fatigue, but this is not related to further worsening of WHI and increasing fatigue over time. A tailored WfH organizational policy, in which employees' need for working from home is taken into account, may be a fruitful approach to utilize WfH as a way for employees to successfully and sustainably combine work and private life to its full potential.

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Contributors to job satisfaction and associations with employee withdrawal among patient advocates in Veteran's Health Administration

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Introduction: Job satisfaction is critical to the protection of employee health and retainment and vital to consistent, quality care within health care organizations. Patient advocates at the Veteran's Health Administration (VHA) fulfill a vital role assisting veterans with resolution of concerns regarding care. However, little is known about their job satisfaction and relationship to employee withdrawal. Data is presented from a national survey of patient advocates on these factors.

Methods and Materials: A survey was sent via email to each patient advocate. Questions explored domains of workplace characteristics, supervision, attitudes towards the work environment, and employee withdrawal. Questions related to the patient advocate role were developed from a VHA directive describing patient advocate responsibilities. Levels of satisfaction with workplace domains and associations with overall job satisfaction, exhaustion and turnover decision were explored.

Results: Responses from advocates (n=419) represent 95% of VA Medical Centers. Overall satisfaction was high, however less than 50% expressed satisfaction with adequate time and resources, appreciation from managers, workload, and a culture of shared responsibility for resolving Veteran complaints. These factors were also associated with overall job satisfaction (G=.35-.50). Job satisfaction had strong negative associations with exhaustion (G=-.57) and turnover decision (G=-.58).

Conclusions: Exploration of methods to increase satisfaction and retainment of patient advocates is warranted to support quality care of veterans and health of patient advocates within VHA.

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Prospective associations of workplace discrimination with incident hypotension: a cohort study from the U.S

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Introduction: Several psychosocial work characteristics, majorly job strain and effort-reward imbalance, have been found to contribute to onset of hypertension. To the best of our knowledge, fewer studies paid attention to emerging psychosocial factors at work, such as workplace discrimination. So far, three cross-sectional studies provided mixed and inconsistent findings, and there is no evidence from prospective cohort study yet. Our objective was to fill this research gap.

Material and Methods: Using data from the nationally population-based Mid-life in the United States (MIDUS) study with a prospective cohort design and a 9-year follow-up period, associations of workplace discrimination at baseline with incident hypertension during follow-up were examined among 1256 workers who were free from hypertension, by multivariate Poisson regression analysis. This analytic research project was reviewed and approved for

exemption by the University of California, Los Angeles Institutional Review Board.

Results: During the follow-up period, 267 persons (21.26%) developed hypertension. After taking relevant covariates into account, workers with intermediate and high workplace discrimination at baseline had significantly higher risk of hypertension incidence [RRs and 95% CIs were 1.18 (0.90, 1.54) and 1.38 (1.07, 1.78), respectively, p for trend < 0.05], compared to those with low workplace discrimination.

Conclusions: For the first time, workplace discrimination was observed to be prospectively associated with elevated risk of hypertension among workers. Further investigations are warranted.

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Psychosocial factors, musculoskeletal symptoms and presenteeism among Brazilian judges

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Background: Labor judges are subjected to productivity targets that do not contemplate the complexity of the analyzed processes, which can expose them to work overload.

Objectives: To evaluate the psychosocial factors, musculoskeletal symptoms, and presenteeism between these variables in Brazilian labor judges.

Methods: A cross-sectional study was carried out with 151 judges who answered a sociodemographic and occupational characterization questionnaire and Nordic Musculoskeletal Questionnaire (NMQ), Health and Safety Executive – Indicator Tool (HSE-IT), and Stanford Presenteeism Scale (SPS-6).

Results: Demands had a higher risk of occupational stress, while role had a lower risk. Presenteeism was more affected by the avoiding distractions dimension. Psychosocial dimensions had a significant correlation with musculoskeletal symptoms and presenteeism. The multiple linear regression analyses presented relationships between demands with the occurrence of musculoskeletal problems and with presenteeism (p<0.05).

Conclusions: Our results showed that the high work demand among the judges can be related to a lower ability for concentration and performance, with a potential impairment in the quality of the work performed.

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Navigating the Covid-19 Pandemic at the Workplace – the Experience of Uganda's Formal (Public and Private) Sector

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Introduction: Uganda has not been spared by the global challenges of the C19 Pandemic, but responses dictated by Governments with WHO guidance focus on Individual and collective actions but not much done to address the psychosocial aspects on the individual. This study on selected formal workplaces in Uganda explored these

emerging work-related challenges and how effectively employee psychosocial needs can be addressed.

Methods: Comparative study of Uganda's formal sectors was done with the aim of identifying, analysing & explaining similarities / differences in these responses. Challenges in accessing information and equivalent study parameters were faced. Qualitative and quantitative methods were simultaneously applied, to contextualize findings for comparable data. The information was synthesized based on pre-selected key themes. Data collection was based on available credible sources & methods varied in public and private sectors hence flexible coding criteria. Study design was more observational than experimental and retrospective versus prospective.

Results: Based on UBOS Manpower Survey of Uganda, 2016/2017 77% of Uganda's formal workplaces are in Private Sector and 23% in Public Sector. Employees & employers were able to articulate the psychosocial occupational challenges associated with the pandemic including job satisfaction, mental health, employee productivity, employer - employee expectations, limited human interactions, need for additional skills for teleworking, etc. This study exposed the need for formal workplaces to acknowledge these emerging workplace challenges and design appropriate on and off job redress measures.

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Combined Effects of Overtime Work Hours and Seven Personal Health Practices on Psychological Distress

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Introduction: Long working hours have been considered as a risk factor of mental health deterioration. Although the association between seven personal health practices (smoking, exercise habits, alcohol consumption, sleeping time, body weight, breakfast frequency, and snacking frequency) (Breslow, 1983) and mental health has been investigated, little has been reported on the combined effects of working hours and health practices on mental health.

Material and Methods: We used data from a health examination of 1,109 workers in FY 2013. We obtained information on the monthly average of overtime work hours in the past year from personnel records. The seven personal health practices were measured by a health examination questionnaire. Psychological distress was measured by the 12-item GHQ. Overtime work hours were classified into short (<45 hours) and long (≥45 hours). Personal health practices were classified into favorable and unfavorable. We created a four-category variable for the combination of each personal health practice and overtime work hours: favorable with short, unfavorable with short, favorable with long, and unfavorable with long overtime groups. ANCOVA was conducted to estimate the degree of psychological distress.

Results and Conclusions: Significant or marginally significant difference among the groups was observed in sleeping time and breakfast frequency. In the Bonferroni multiple comparison test, GHQ scores were highest in unfavorable with long overtime groups. Long working hours with unfavorable sleeping time and breakfast frequency may lead to mental health deterioration.

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Work-Related Quality of Life; A Case Study of Resident Doctors at the University College Hospital Ibadan, Nigeria

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Introduction: Residency training is an intense skill acquisition program duration of which varies with specialties. Doctors have reported it as stressful, and studies have shown that resident doctors are at increased risk of burnout and poor well-being while combining work, training, and personal life. The study aimed to assess work-related quality of life of resident doctors to develop templates for intervention considering the interaction between work and health.

Materials and Method: This cross-sectional survey measured resident doctors' job and career satisfaction, general well-being, home-work interface, stress at work, control at work, working conditions, and employee engagement using 32-item Work-related Quality of Life Scale-II. Also included were data on monthly income and hours of work per week.

Results: Three hundred and forty-four resident doctors responded. Majority (87.6%) had an average work-related quality of life. Some (19.5%) reported poor control at work, 22.4% reported poor home-work interface, 39.2% reported stress at work, and 15.1% reported poor work environment. Majority (53.9%) reported a monthly income of between 555 and 833 dollars (exchange rate of 1 USD to 360 Naira). The mean hours per week worked was 52.98 ± 29.1, and 45.3% reported working more than 42 hours per week.

Conclusion: Resident doctors are not well paid. Interventions should focus on improving work conditions, instituting flexible work patterns, reducing stress at work, and developing a support framework during training. Employing a holistic approach will be beneficial in improving the psychosocial components of their work lives.

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The Effect of Proactive Personality as a Buffer Mechanism on Organisational Citizenship Behaviour: The Role of Contextual Factors and Work Engagement

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Introduction: Citizenship behaviour nature of a service sector determines its perseverance and, particularly, employees' organisational citizenship behaviour plays an important role. This study examines the effect of contextual factors (in the form of transformational leadership, organizational climate, and supervisory support) on managerial employees' organisational citizenship behaviour.

Material and Methods: We emphasized these interests with multilevel study among 401 bureaucrats in Malaysia, which will lead to further investigations of organisational citizenship behaviour in Eastern workplace settings. Through the mediating effect of work engagement, the relative strength of contextual factors and

organisational citizenship behaviour has also been scrutinized by the buffering mechanism of proactive personality.

Result and Conclusions: Some of the limitations in this study include it was conducted entirely online which resulted in limited feedback and cross-sectional data for analysis was carried out. This study provides new insights into both mediating and moderating effects of the work engagement and proactive personality level, respectively. Surprisingly, our results establish when employees perceive high contextual factors, it increases their organisational citizenship behaviour even though during a low proactive personality environment. Overall, the conclusion of our study is useful for policymakers and practitioners in their efforts to enhance this work behaviour of the public sector, which will rely on the potential of contextual factors, work engagement, and proactive personality of Malaysian bureaucrats.

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Employee well-being and performance during times of change in the organization: a qualitative study to explore intervening mechanisms

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Introduction: Studies investigating mechanisms that can explain or influence the relationship between organizational change and employee well-being and performance are scarce and mainly quantitative, making it impossible to investigate direct relationships. Furthermore, previous research has mainly focused on structural changes (e.g. mergers, acquisitions) and on negative indicators of well-being. When using qualitative methods, we can gain a deeper and broader understanding of these mechanisms. **Materials and Methods:** Semi-structured group interviews were held with five groups of employees (n = 35) and four groups of supervisors (n = 28) from five different Belgian organizations. Participants were asked to think back on changes at the workplace, how and why these changes affected their well-being and performance (i.e., explanations), and which contextual (i.e., influencing) factors could positively influence the impact of change on these outcomes.

Results: Results show that particularly work intensification and job insecurity underlie the relationship between organizational changes and well-being/performance. Next, communication, procedural justice, social support of the supervisor, and resilience seem to help employees cope with the negative impact of changes.

Conclusions: The results of this study broaden the theoretical framework about intervening mechanisms in the relationship between organizational changes and both employee well-being and performance and provide guidelines for practitioners.

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Work organization and psychosocial factors: application of affective neuroscience to detect and analyze emotional flow at work, the health of an organization and the ability to face critical events

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Introduction Psychological and emotional aspects play a central role in the organization and sustainability of work, employee well-being and productivity. To understand the interaction between work organization and psychosocial factors, we considered work as a system that has its own emotions (emotional life of organizations, not emotional life in organizations).

Materials and methods We identified the activation of primary affective states as significant indicators of well-being. Following the work of Panksepp and Biven (2012), significant emotions were identified for workers, which corresponded to the activation of seven core systems of emotions: SEEKING, RAGE, FEAR, LUST, CARE, PANIC/GRIEF, and PLAY. Through a web app, the workers of a large Italian company indicated their emotional states daily and, through tags, their reasons. The research and data processing were conducted in compliance with ethical and legal standards.

Results We analyzed 488 recordings from different teams. Each team activated specific emotional states. For example, in highly competitive teams with a perception of identity built on differences from others, LUST and RAGE systems are highly activated.) Successful functioning is linked to the activation of the CARE (team cohesion), PLAY (social ties and workforce solidarity) and SEEKING (challenges, creativity, and autonomy) systems.

Conclusions Awareness of emotional flow can support the development of more tailored organizational strategies to enhance employees' wellness.

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Representations of authority and work organization in public sector. A difficult balancing between political pressure and authority deployment

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Introduction The relationship between work organization and psychosocial well-being factors usually assessed in the relationship between managers, those responsible for the organization, and employees. In a systemic view, this subdivision is certainly simplistic, but there are situations in which it is also misleading. This is particularly the case for managers in the public sector, such as municipal managers, whose autonomy is confronted with the political dimension, represented by councillors. In this paper, we want to highlight the relationship and the representation of authority, as a modulator of health and organization.

Method. Training activity, articulated in frontal lessons and activities in small and large groups with the managers (N°17) of a large municipality in northern Italy.

Results. Political interference in work management and organization is not an openly discussed topic but it emerges as a background that is (almost) forgotten. In a specific training activity, in which the two groups experimented two different ways of exercising authority, it emerged that, although the ability to respond correctly to the delivery of work was preserved in both groups, the possibility of accessing more creative solutions and better results linked to a more supportive than directive relationship with authority.

Conclusions The possibility of entering a dialogical rather than obedient relationship with authority seems to promote better and more creative performance. Designing work organization in functional terms does not seem to be reconcilable with immediate responses to political urgencies.

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A sound mind in a healthy work: How to Anticipate the Risks of Mental Health Disorders in the Public Service?

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INTRODUCTION: In the past 7 years, more than 15,000 Brazilian federal employees have been dismissed for mental disorders. This impacts the productivity levels of the employees, their teams and the public service as a whole, in addition to generating costly lawsuits. It is important that the public administration seeks to manage stress at work, not only to provide better working conditions for its employees, but also to avoid financial losses, which are related to medical leave, treatment costs and reduced productivity. METHODS: It is already known that to solve complex problems sometimes we need non-traditional solutions that are effective and that bring new ways of acting on the problem. The innovative method in this case it is not only the solution to the problem itself, but also the way to find the solution which, in this case, is an "open innovation challenge". The goal was to create a technological solution artifact that added data science and psychological assessment methodology, reducing cases of mental illness.

RESULTS: Monitoring each individual with a technological tool, it is possible to identify and correlate health indicators with the potential triggers that generate mental illness and define a more precise prevention policy or intervention to anticipate the risk of mental health disorders.

CONCLUSIONS: A solution of this magnitude will help to identify the main gaps where the public manager can intervene to improve the work environment of his team and, consequently, the quality of life of the employees at work, increasing performance and productivity at work with a healthy return for society.

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The burden in palliative care assistance: a comparison of psychosocial risks and burnout between hospice and homecare services workers

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Introduction: literature suggests that home care professionals could be at higher risk of burnout than their colleagues in hospital

setting, however research on home-based palliative care is still limited.

Material and methods: the study compares hospice and homecare settings. A cross sectional study was carried out in a single palliative care organization providing hospice based and home care base assistance in Northern Italy. Participants completed a self-administered questionnaire collecting socio-demographic and occupational data, burnout and psychosocial risk factors (Copenhagen Burnout Inventory; Psychosocial Safety Climate; Conflict and Offensive Behavior-COPSOQ II; Work Life Boundaries; Work-home Interaction; Peer Support-HSE).

Results: We enrolled 106 subjects (95% of eligible population). Compared to hospice staff, home care workers reported more frequent communications with colleagues ($p=0.03$) and patients/caregivers ($p=0.01$), while there were no differences in the perception of work intrusiveness. Hospice workers showed lower peer support ($p=0.08$), lower psychosocial safety climate ($p=0.001$), and higher emotional demands related to the relationship with caregivers ($p=0.01$). Work-related burnout had the highest value compared to patients and caregivers subscales. Experience of aggressive behaviors was relatively more frequent in hospice and among female and among health assistants.

Conclusions: our study confirms the presence of psychological and physical fatigue in home-based and hospice-based palliative care. Results suggest homecare assistance as a potentially satisfactory option for healthcare workers.

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Healthy and safe telework: A WHO/ILO technical brief

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Introduction: Telework, the practice of working remotely using informational technology (IT), has an important and growing role in the workplace, and has a significant impact on the health, safety and wellbeing of workers. The WHO and ILO has taken steps to assess the impact of telework to the health of safety and workers worldwide and to disseminate information and guidance to help promote safety and health of teleworkers.

Material and Methods: A rapid review of the scientific literature was undertaken to determine the impact of telework on worker health and safety pre- and post-COVID. WHO and ILO guidance relevant to telework were reviewed by a joint technical advisory group as well national policies and "best practices" set out by professional organizations. A scientific brief and OpenWHO course were developed to guide teleworkers and their managers and employers.

Results: Telework is associated with extended working hours, increased reporting of musculoskeletal symptoms, higher incidence of loneliness, irritability, worry, and guilt. Working a digital environment in physical isolation, with high demand and low control over the work can result in mental health problems and unhealthy behaviors. Poor physical environment and workplace design, inadequate IT equipment and technology can result on musculoskeletal disorders, eye strain and injuries.

Conclusions: The joint WHO-ILO technical brief advises workers and managers on organizing and carrying out telework that protects and promotes physical and mental health and social wellbeing of workers.

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Management of Psychosocial Work Environment in a Large Italian Municipality: Preliminary Results of a Multidisciplinary Intervention

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Introduction: work-related stress is a major problem for workers in municipalities.

Methods: a multidisciplinary intervention to improve psychosocial work environment was carried out in a municipality including more than 1800 employed in 7 areas, 32 sectors and 74 services. The project comprised: a) survey and analysis of the main stress-related problems using consultants' reports from the previous three years and collection of objective data; b) design of the intervention including support to work-related stress risk assessment and implementation of a center for promotion of health and well-being ; c) analysis and interpretation of the results.

Results: data analyses showed non-comparability of data from the previous risk assessment, the lack of integration between counsellors involved in dealing with stress-related problems and the absence of a municipal policy for work-related stress were the key issues to be addressed. The intervention focused on setting up a working group, managed by a psychologist, involving occupational physicians and counsellors to assess individual cases and general issues and to elaborate specific strategies. The activity carried out revealed as a common denominator the difficulties in managing the communication of managers in relation to employees with mental difficulties. Consequently, specific educational interventions were implemented to improve communication skills.

Conclusion: Preliminary analysis highlights the importance of an integrated approach and the role of the occupational physician in improving the management of work-related stress in the context of complex public administrations.

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Occupational Injuries and Employee Satisfaction in Paid Workers: Data from the third, fourth and fifth Korean Working Conditions Survey

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Introduction: Occupational injuries constitute a major portion of total injuries in workers. Employee satisfaction is associated with working quality, productivity and lower risk of retirement. This

study aimed to analyze the association between occupational injuries and employee satisfaction in paid workers.

Material and Methods: This study analyzed the combined data of the third, fourth and fifth Korean Working Conditions Surveys (KWCSs) conducted in 2011, 2014 and 2017, respectively. Among 86,225 paid workers, there were 33,396 (44.3%) office workers, 24,731 (24.5%) service/sales workers and 28,098 (31.2%) manual workers. Occupation-stratified negative binomial regression analyses were performed after adjusting for sex, age and working time. Results: Among the study population, 214 (0.6%) of the office workers, 271 (1.1%) of the service/sales workers and 674 (2.5%) of the manual workers had occupational injuries. In the manual workers, occupational injuries were significantly associated with lower employee satisfaction in all models (e.g., the odds ratio [OR] of full model was 1.16, 95% confidence interval [CI] 1.06-1.26). In the office workers, only unadjusted model showed significant association (OR 1.20, 95% CI 1.00-1.45). In the service/sales workers, there was no significant association between occupational injuries and employee satisfaction.

Conclusions: Occupational injuries were associated with lower employee satisfaction in manual workers. Different strategies are needed for each occupational classification to effectively prevent mental problem caused by the occupational injuries.

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The effects of organizational justice and stressors on organizational citizenship behavior and health among employees in Malaysia: A Multilevel Approach

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The present study aims to examine the effects of organizational justice on organizational citizenship behavior and general health, through challenge and hindrance stressors among the employees in the manufacturing industry in Malaysia. This current study employed a multilevel method which involved 129 employees from 25 different manufacturing organizations all over from Malaysian. We expected that organizational justice positively relates to organizational citizenship behavior and employee's health along with stressors as the mediator. By using hierarchical linear modelling analysis, the results showed that only two components of organizational justice namely procedural justice and interactional justice were positively related to organizational citizenship behavior. Conversely, all three components of organizational justice were positively related to challenge stressor. In addition, the study also discovered that both challenge and hindrance stressors were positively related to employee's general health whereas, hindrance stressor were negatively related to organizational citizenship behavior. Captivatingly, the study also revealed that hindrance stressor mediated the relationship between all three components of organizational justices and organizational citizenship behavior. This study suggested that organizational justice is an important element for a better job environment, while the challenge and hindrance stressors could improve employee's organizational citizenship behavior and their health outcomes.

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The Role of Psychosocial Safety Climate in the Relationship between Work-Family Interference to Work-Related Burnout and Work Engagement among Teachers: A Multilevel Longitudinal Study

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The present study aimed to examine the role of psychosocial safety climate (PSC) as an organizational factor in the relationship between work-family interferences to work-related burnout and work engagement. In this study, work-family interfaces consist of work interfere family (WIF), and family interfere work (FIW). There were three hypotheses included in this study. First, this study proposed that WIF in Time 1 predict increased work-related burnout in Time 2 and reduced work engagement in Time 2. Second, FIW predicts increased work-related burnout in Time 2 and reduced work engagement in Time 2. Third, PSC would moderate the impact of WIF and FIW on work-related burnout and work engagement. This multilevel longitudinal design involved 309 teachers from 35 schools (both Time 1 and Time 2) in Indonesia. Based on the hierarchical linear modelling, the results show the interaction between WIF (time-based, strain-based) and PSC predicted work-related burnout, and interaction between FIW (strain-based) and PSC predicted work-related burnout. In conclusion, this study has contributed by using the “time effect” consequences to the effect of work-family interference on work-related burnout and confirming PSC’s moderation function to improve psychological health.

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Work-Related Stress and Posttraumatic Stress Disorder in South African Emergency Call-takers and Dispatchers – a cross-sectional study

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Introduction: Emergency call-takers and dispatchers (ECDs) encounter various work-related psychosocial hazards including traumatic calls and verbal abuse which may lead to work related stress (WRS), substance use and post-traumatic stress disorder (PTSD). This study evaluated the prevalence of and factors associated with increased risk for PTSD in ECDs of an ambulance service in the Western Cape Province, South Africa.
Material and Methods: WRS and PTSD risk factors, were investigated in N = 79 ECDs using self-administered questionnaires: Impact of Event Scale-Revised, EMS Critical Incident Inventory, EMS Chronic Stress Questionnaire, SF-36 Quality of Life questionnaire.
Results: The ECDs were predominantly female (65%), median age 35 (IQR; 30 - 40) years with a higher certificate/diploma (66%). A PTSD prevalence of 33% was found. A third (39%) were current smokers, alcohol (58%) and 4% illicit drug users. A third (28%) felt the need smoke to manage WRS while, 15% felt the need to use alcohol, prescription drugs (22%), and illicit drugs (9%) to manage WRS. Current smoking (OR=3.4, 95% CI: 1.05 – 11.16), chronic organisational (OR= 1.1, 1.05- 1.17) and operational (OR=1.1, 1.05 - 1.17) stress and critical incident stress (OR=1.05, 1.01 - 1.10)

exposure were positively associated with PTSD risk. The majority (73%) reported receiving no training on managing WRS.

Conclusions: ECDs in this study experience high levels of PTSD, acute and chronic WRS with associated high levels of substance use. Early workplace interventions should be aimed at addressing these identified risk factors for improved psychological wellbeing.

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TElework-RelAted Stress (TERRA) as an emerging problem during the Covid-19 Pandemic: a Systematic Review

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Introduction: In recent years, due to the COVID-19 Pandemic, an increasing number of people were forced to stay at home. Working from home seems to have resulted in an increase of TELEwork-RelAted stress (TERRA), defined as physical and mental stress due to telework, including the inability to cope with new information and communication technologies in a healthy manner, recognized as technostress. TERRA is a primary concern for Occupational Health worldwide, affecting psychophysical health and productivity. The aim of this systematic review is to determine if and how telework has actually increased TERRA levels in workers and its impacts, during the COVID-19 Pandemic.

Materials and methods: Following the PRISMA statements, a systematic review was performed across three scientific databases (Pubmed, ISI Web of Knowledge and Scopus), using “telework”, “technostress” and “COVID-19” (and relative MeSH terms) as keywords. The research was restricted to articles in Italian and English, published up to August 2021.

Results: As results, 518 articles were found; after removing duplicates, and exclusion based on title, abstract, and full text, 36 articles were included in the review. Most of articles demonstrate that women and who work at distance in full time mode show higher TERRA levels.

Conclusions: This systematic review highlights some of the emerging psychophysical health issues related to TERRA, and offers an overview into the modern challenges workers have to face, in order to improve Total Worker Health through Occupational Medicine.

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The Impact of Telework on Mental Health during the COVID-19 Pandemic: A Four-Wave Cohort Study among Belgian Workers in the First Wave

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Introduction: Since the start of the COVID-19 pandemic, many governments have promoted telework to contain the spread of the virus. This massive switch to telework may have an important impact on workers' mental health. Research from before the pandemic has shown inconsistent findings on its effect on health, which might be explained by opposing mechanisms underlying this effect (e.g. better work-life balance versus less social support). We aim to enhance our understanding of the impact of telework on mental health during the COVID-19 pandemic by investigating the explanatory role of work-home interference (WHI) and social support by colleagues.

Methods: Data were collected in a heterogeneous sample of 5959 Belgian workers, who participated in at least one of four online surveys during the initial lockdown and a period of initial relaxations of the COVID-19 measures (April-June 2020, time lag of four weeks between measurements). Psychological distress was measured with the General Health Questionnaire (GHQ-12), using a threshold of 2/3.

Results: Repeated-measures ANOVAs, with age, gender and cohabiting children as covariates, showed significant changes in telework ($F(3,1702)=8.55$, $p<.001$), psychological distress ($F(3,2653)=5.29$, $p=.001$) and social support ($F(3,2753)=7.17$, $p<.001$) across measurement points, but not for WHI ($F(3,2618)=0.58$, ns). The percentages of workers with psychological distress were 58%, 53%, 49% and 38% at the four measurement points. The results of a time-lagged mediation model will be presented at the conference.

Conclusion: Conclusions and implications for practice will be discussed at the conference

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The Influence of Management Scale Reduction on the Brief Job Stress Questionnaire Results

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Introduction: In March 2020, it was announced that a large-scale business reorganization would take place at the company, involving the elimination of core plant. The survey was conducted on how the Brief Job Stress Questionnaire, which are part of workplace environment improvement activities and occupational stress countermeasures, reflects the psychological stress on employees caused by management slump and downsizing.

Methods: We compared the subjects of Stress Questionnaire in 2019 and 2020. The Brief Job Stress Questionnaire were consisted of "Area A: Factors considered to be causes of stress (17 items)," "Area B: Mental and physical reactions caused by stress (29 items)," and "Area C: Support from surroundings (9 items)". We compared the two divisions that have been decided to be completely abolished at this time, Division X and Division Y on the rate of high-stress individuals (those with A+C scores of 26 points or less and B scores of 17 points or less) and health risk values (calculated from 12 items from Area A and C).

Results: As a result of comparison, the overall rate of high-stress employees decreased from 11.3% to 10.8% this year compared to the previous year. In Division X, the rate increased from 14.5% to 14.0%, and in Division Y, the rate increased from 5% to 12%.

Discussion: The results suggest that the increase in the rate of high-stress employees in Division Y may be due to an exacerbation in the evaluation of psychosomatic reactions to stress caused by management slump and downsizing.

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Train drivers exposure to psychosocial hazards in railway industry: A literature review

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INTRODUCTION: Twenty two percent of workers in the European Union countries are exposed to hazards in the workplace that are linked to work related health complaints, loss of productivity, and loss of performance. Train drivers are at risk of developing psychological stress related conditions due of the psycho-social hazards they are exposed to. Psychological stress can result in increased sick days, health care costs, reduced quality of life and decreased productivity. The presentation aims to describe the psychosocial hazards train drivers are exposed to based on a literature review.

MATERIALS AND METHODS: The researcher performed a literature search to find appropriate studies to be included in this review. The online search was carried out within the databases of EBSCOhost, Research gate and Science direct. Articles published in English between January 2014 and December 2020 were reviewed. Key search concepts: Train drivers, railway, psychosocial, hazards and transport.

RESULTS AND CONCLUSION: This review paper discussed a number of relevant research studies to describe the psychosocial hazards train drivers are exposed to. Numerous hazards exist in the railway industry that can result in damage to humans resulting in fatalities as well as damage to the train. The effectiveness and the safety of railway operations depend on many factors including rail traffic rules, equipment reliability, general and safety management, and railway human factors.

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Prevention of violence and harassment at workplace: the role of the Advisory Committees for equal opportunities, the workers welfare and antidiscrimination (CUG) in Public Administrations

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Introduction: Violence and harassment at work, including gender-based, have to be monitored and prevented in the PA. The CUG in the National Institute for Insurance against Accidents at Work (INAIL) has been working since 2011 in this context. An Italian Directive in 2019 enhanced the CUG role in making proposals, advising and verification against violence and harassment at workplace. INAIL CUG's promoted since 2015 a CUG National Network and is jointly planning a program to face this priority issue. 172 public administrations joined the CUG National Network, so this program is including 800000 workers. It's the first example, in Italy, of an equal and representative composition committees synergy. COVID-19 pandemic has forced many workers to smart working: the risk of gender violence and psychological harassment has increased.

Materials and Methods: Activities planned and realized by INAIL CUG and the CUG National Network, according to the Italian Directive, during COVID-19 pandemic too, will be described.

Results and conclusions: The program includes prevention of violence and harassment, monitoring unpleasant situation through confidential counsellors, organized counselling services and disability managers; training addressed to workers and management. Information will be available on a dedicated web portal of the CUG National Network. INAIL CUG and the CUG National Network work together towards a cultural change in the PA against violence and harassment at work. The target is reducing work-related stress factors, improving the well-being and increasing the productivity.

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Overwork association with presenteeism – Results from a national survey on working conditions in Latvia

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Introduction: Underlying factors that affect going to work despite illness, resulting in presenteeism, differ. Presenteeism is influenced by both - work-related factors and personal factors. The study aimed to investigate the association between individual overwork (working for more than one employer and working overtime) and sickness presenteeism.

Material and Methods: The study used cross-sectional survey data representative of the working population of Latvia and pooled from four periodic surveys - Work conditions and risks in Latvia (2006 - 2018). The study sample (n=6368) consisted of employees between 16 and 80 years old (average 42.9 +/- 12.6) - 47.1% males and 52.9% females. The association between overtime work and work for several employers and sickness presenteeism was analyzed by using multinomial logistic regression and calculated as odds ratios (OR) with 95% confidence intervals (CI), with adjustment for gender, age, education, and survey year.

Results: The odds of sickness presenteeism were higher among employees working for more than one employer (OR=1.50, CI 1.13-1.99, p <0.01) and working overtime (OR=2.12, CI 1.76-2.54, <0.001). The highest odds were observed among employees working overtime frequently (OR=3.53, CI 2.86-4.35, p <0.001) and sometimes (OR=1.78, CI 1.48-2.13, p<0.001).

Conclusions: Our findings suggest that employees working too much have higher odds for sickness presenteeism, however, further analysis is needed to identify mediating factors explaining the underlying mechanisms for the association between presenteeism and overwork.

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Thriving from Work Questionnaire: Conceptualization and Development

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Introduction: “Thriving from work” is the state of positive mental, physical, and social functioning in which workers’ experiences of their work and working conditions enable them to thrive in their overall lives, contributing to their ability to achieve their full potential in their work, home, and community. Thriving from Work consists of six domains: experience of work, work-life, basic needs, psychological/emotional, social, and health-related well-being.

Methods: The Thriving from Work Questionnaire was developed using a clinometric phased iterative approach, including a systematic scoping review, external review with multidisciplinary experts, and 4 rounds of cognitive testing across a diverse sample of workers. 3 waves of U.S. workers were surveyed in an online panel to conduct item reduction and evaluate its psychometric properties.

Results: We first fit a bifactor confirmatory factor analysis model to identify a final set of 30 items that measures specific factors for each of our domains as well as thriving overall and derive an 8-item short-form. The final 30-item version had good model fit and excellent reliability for “thriving”. The short-form included at least one item from each specific factor, captured 94% of the variance of general thriving from the long form, and had a similarly good model fit. This factor structure was confirmed in our second sample. Criterion validity was established using Cantril’s Ladder for a person’s perception of their overall well-being.

Conclusion: Thriving from Work Questionnaire appears to be a robust measure of work-related well-being.

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Preventing Sexual Harassment with organizational interventions in the context of Occupational Health and Safety

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We will present an organizational intervention aimed at preventing sexual harassment in a Brazilian port authority. The occupational health department approached us and since 2016 we have performed together four interventions. The first one was an initial 40-minute lecture for 40 men and women workers in which we explained official and legal concepts about sexual harassment, as well as sociological conceptualizations. This same year, 500 information booklets about sexual harassment were distributed in the annual week of prevention of work accidents, an event all companies must hold as a legal obligation. The following intervention: a 3-hour workshop, discussing the sexual division of labor, the organizational culture and statistics on the labor market and gender segregation in Brazil. We highlighted which actions companies may take to tackle sexual harassment behaviors. Third intervention: the occupational health officials displayed all the content of the booklet on a mural in the Human Resources department, a mandatory space for all workers heading to this department. Fourth intervention: a focus group with women workers, but no managers, devoting more time to active listening to their stories related to the sexual harassment dynamics, in order to establish with them a circle of trust and empathy. The occupational health department reported that men’s harassing behaviors diminished, and there was a formalized way to report harassment. We believe that interventions recognizing gender oppression and violence as an occupational health issue may

significantly improve the well-being of employees and prevent sexual harassment.

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The determinants of violence in health care sector

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Aim: To assess the prevalence of workplace violence and its determinants among health care workers in two public hospitals in the central-eastern region of Tunisia.

Methods: This was a cross-sectional bi-centric study conducted in healthcare workers of two public hospitals during eight months. A self-administered questionnaire related to the workers' socio-demographic and professional characteristics, self-esteem issues and mood disorders was used.

Results: A total of 546 healthcare workers completed the questionnaire giving a response rate of 19%. About 96% of them reported being a victim of at least one violent incident throughout their entire career in public health settings. Non-physical violence (95.8%) was more frequent than physical violence (26.4%). Perpetrators of both physical and non-physical violent incidents were mainly patients, their relatives or visitors (external violence). However, violence perpetrated by colleagues (internal violence) was not uncommon. Miscommunication, limited resources and inadequate dealing with previous violent incidents were the three main causes of external violence perceived by the healthcare workers. Multiple logistic regression showed that workers aged above 35 years, nurses, doctors and workers with a self-esteem issues of worthlessness and helplessness were more likely to be exposed to physical violence. It has also showed that doctors, nurses and technicians were more likely to experience non-physical violence.

Conclusion: Targeted preventive strategies should be developed to cope effectively with violent incidents in workplace.

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Health Related Quality of life among female office workers

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This study aimed to evaluate health related quality of life (HRQoL) among female office workers.

Patients and methods: A cross-sectional multicentric study was conducted among medical secretaries (MS) working in three public hospitals. The study was based on a structured self-administered questionnaire related to socio-professional characteristics with a french validated version of the Nordic Questionnaire (to assess musculoskeletal diseases (MSDs), the Numerical Pain Rating Scale and the SF12 (with its two components Mental and physical Component Summary (MCS) (PSC)).

Results: The study population was entirely female, mean aged 43.75 ± 8.9 years and working for 15.65 ± 9.18 years. Moreover, 52 secretaries had an altered physical HRQoL (PCS <50.11) and 55 secretaries

had an altered mental HRQoL (MCS <47.96). No significant association between MCS score and socio-professional characteristics was found. Physical HRQoL was found to be significantly associated with MSDs of the neck and the shoulder (p=0.024, p=0.043), quality of sleep (p=0.035), job tenure (p=0.045), the number of sites of MSDs (p=0.022), the level of pain (p=0.021). Participants working extra hours were significantly worse physical quality of life (p=0.05). MCS score was significantly associated with higher job tenure (p=0.024). After binary logistic regression modeling, MSDs of the back were risk factors for the physical HRQoL. Similarly, MSDs of the knees were a risk factor for mental HRQoL.

Conclusion: Programs of promotion of health and safety at work mainly among office workers should be incorporated within a wider ergonomic approach.

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Immigration projects among young doctors in Tunisia: Prevalence, destinations and causes

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Introduction: The shortage of doctors has become a worrying problem in Tunisia. It is influenced by the phenomenon of immigration which remains poorly studied despite its magnitude. Our study aims to describe the migration intentions of Tunisian young doctors and to identify the associated factors that influence their decisions.

Methods: This is a cross-sectional, analytical survey conducted between January and June 2019. It included all young doctors practicing in academic hospitals of Sousse (Tunisia). Data collection was based on a standardized self-administered questionnaire.

Results: A total of 182 valid questionnaires were collected. The median age was 26.9±2.5 years and the sex-ratio was 0.47. Immigration projects were reported by 38.5% of participants. The main destination was France (36.3%). The main contributing factors were marital status (p<10-3), resident status (p=0.002), surgical specialty (p<10-3), personal dissatisfaction (p=0.003), underpayment (p<10-3), workload and difficult work conditions (p<10-3), lack of appropriate training (p<10-3), financial crisis and economic instability (p<10-3), lack of a clear strategy for the healthcare system (p=0.005) and the impression by the model of other doctors who left Tunisia (p=0.01). **Conclusion:** The rate of migration intentions expressed in this study highlights the emergent need of interventions emanating from the Tunisian health-care system's problems in order to stop the flow of young doctors towards developed countries in quest of better conditions.

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Benefits, concerns, and perceptions of knowledge workers regarding a video Stress Detection software

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Introduction: Stress is not only highly destructive, causing various mental health disorders (anxiety, insomnia, depression), cardiovascular diseases, poor immune function, and presenteeism, as it is costly. While concerns about occupational stress have increased, new solutions for its management have emerged. Systems based on the use of facial recognition, posture, eye movements, video monitoring, and behavioral stress detection have shown good results. Their drawback has mainly been the recording of the said video feed and privacy threats proceeding. This Focus Groups aimed to raise the opinions, perceptions, and concerns of end users regarding the system under development.

Material and Methods: With a new solution in mind, we gathered two groups of knowledge workers, one group of team leaders, and a group of consulting psychologists to gather their perceptions. A Focus Groups was conducted online via Microsoft Teams, as COVID-19 restrictions were applied during that period.

Results: Against previous reports, knowledge workers showed that privacy threats were not their major concern. Both groups showed that Mental Health was their main focus as the follow-up structure regarding stress detection was the most prevalent topic being close to information sharing and software adaptation.

Conclusions: The results highly contribute to the development of future stress detection applications/software and the importance of a detailed and thorough explanation regarding the software framework.

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An unobtrusive stress detection software: Protocol design to assess the reliability of video plethysmography

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Introduction: Software solutions for stress detection have been emerging. Existing solutions still largely rely on supervised learning methods, requiring extremely large sets of labeled data for each situation. Stress assessment using video plethysmography is a recent method that needs further investigation. The room lighting conditions and the person's movement have been identified as the main barriers to the software progression. Thus, it is necessary to build a laboratory pilot that will take into account these difficulties. We present an in-depth protocol on how to assess the reliability of a video facial recognition software on collecting physiological data (heart rate and blinking).

Experimental Protocol: We constructed a laboratory pilot where we could compare the software outputs to an electrocardiogram. The pilot contains two separate phases of data collection. In both phases, the participants will have two separate cameras: one front-facing, and the other at 45 degrees. The main difference in the phases are lightning scenarios, face positioning (through task vs resting), and low/high-resolution cameras.

Results: The laboratory pilots clearly report the limitations of video plethysmography software and their reliability.

Conclusions: This research and its methodology contributes to the development of future stress detection applications/software. Our technology strives to make a step forward in stress detection software.

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Work-Life Balance of Secondary School Teachers in Ibadan, South-West Nigeria

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Introduction: Work life balance (WLB) is an important contributor to mental health and well-being of workers. This study therefore aimed to determine and compare WLB of rural and urban secondary school teachers in Oyo State, Nigeria.

Materials and Methods: This study utilised a comparative cross-sectional design and studied 1178 public and private school teachers across urban and rural local government areas (LGAs) of Oyo State using a multistage sampling design. WLB was assessed using three dimensions [work interference with personal life (WIPL), personal life interference with work (PLIW), and work/personal life enhancement (WPLE)] and summarized as scores. Total WLB score was obtained using the three dimensions.

Results: females had a total work life balance score that was about two points significantly higher than that of the males [$\beta = 1.99$ (95%CI: 0.734-3.252)]. Teachers in Public schools had a total WLB score that was 1.8points significantly higher than those in private schools [$\beta = 1.77$ (95%CI: 0.165-3.385)]. Total WLB score was four points significantly higher among those who taught ≤ 5 subjects than those who taught >5 subjects [$\beta = 4.17$ (95%CI: 1.897-6.45)]. Those with > 50 students in a class had a total WLB score four points significantly higher than those < 50 students. [$\beta = 4.91$ (95%CI: 3.483-6.354)]

Conclusion: Secondary school teachers experienced work life balance issues.

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Presenting with work-related mental ill health in Great Britain: Exploring key contributors

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Introduction: Mental ill health continues to be a pervasive element of the work environment, with ongoing research on the causes and consequences of the conditions. Despite the prevalence of research, limited data are generated on an annual basis that provide context to those consistent factors that adversely impact on workers' mental health. This paper explores occupational health data gained from workers who present to occupational physicians (OPs) and general practitioners (GPs) in Great Britain (GB) with symptoms.

Material and Methods: The data are drawn from The Health and Occupation Research Network (THOR) database, which OPs report to the Occupational Physicians Reporting Activity (OPRA) and by GPs to THOR-GP. They reflect cases over the 2009-2020 period, with diagnoses of stress, anxiety, depression or sleep problems using

ICD10 codes. Nine broad work factors (and sub-factors) define the cases, e.g., factors intrinsic to the job; changes at work; and the physical working environment.

Results and Conclusions: The results show that of the OPRA cases (N = 3730), those most affected were subjected to workload/over demand/pressure of work (29%), organisational factors (18%) and bullying/sexual harassment (12%). The THOR-GP data (N = 897) show a similar pattern of workload/over demand/pressure of work (32%), bullying/sexual harassment (16%) and interpersonal difficulties with manager/foreman (15%). Mental ill-health continues to be one the most important work-related health conditions in GB. Although most contributing factors have been known for some time, further efforts are required to mitigate against workplace risks.

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Barriers and Facilitators for Participation in Workplace Health Promotion Programs: Peer-to-Peer Interviews among Employees

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Introduction: Workplace health promotion (WHP) programs have shown to be effective in improving the lifestyle and perceived health of employees. Despite the potential benefits for employees, participation rates are often low (10-64%). The objective of this study was to gain deeper insight in the barriers and facilitators for participation in WHP programs from the employee perspective.

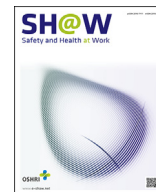
Materials and Methods: Peer-to-peer interviewing, a method derived from citizen science, was used to actively involve employees. 14 Employees working in the cleaning-, ICT- and facility-sector were trained to conduct interviews with co-workers. Interviews were recorded and transcribed verbatim. The Consolidated Framework for Implementation Research (CFIR) was used to create an initial codebook, complemented with the constructs 'interpersonal' and 'intrapersonal factors' from the Social Ecological Model. Data was coded deductively and inductively, and ranked by two researchers independently.

Results and Conclusions: 62 Peer-to-peer interviews were conducted. The main barriers for participation in WHP programs are an organizational culture where vitality is not yet a topic to discuss and the lack of clear communication about WHP programs. Taking into account the needs and resources of employees and available organizational resources such as time and financial compensation are facilitating factors for participation. Our findings on the barriers and facilitators for participation in WHP according to employees will be used to develop a tailored implementation plan. This may lead to more successful implementation and higher participation rates.



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Materials and methods should contain detailed procedure of the experiment including investigation period, methods of subject selection, and information on subjects such as age, gender, and other significant features, in order to enable the experiment to be repeated. The procedure which has been already published or standardized shall be described only briefly using literature citations. Clinical trials or experiments involving laboratory animals or pathogens must elaborate animal care and use and experimental protocols, in addition to mentioning the approval from the relevant committees. The sources of special equipment and chemicals must be stated with the name and location of the manufacturer (city and country). All statistical procedures used in the study and criteria for determining significance levels must be described.

The Theory / Calculation should extend, not repeat, the background to the article already dealt with in the Introduction and provide the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

The Results should be presented in logical sequence. Only the most important observation should be emphasized or summarized, where the main or the most important findings should be mentioned first. Table and figures must be numbered in the order they are cited in the text, kept to minimum, and should not be repeated. Supplementary materials and other details can be separately sited in an appendix. State the statistical method used to analyze the results (statistical significance of differences) with the probability values given in parentheses.

The Discussion should contain interpretation and explanation of the results and important aspects of the study, followed by the conclusion drawn from them. The information already mentioned

in Introduction or Results sections should not be repeated and the main conclusions of the study may be presented in the discussion. The conclusion must be linked with the purpose of the study stated in the abstract, clearly supported by the data produced in the study. New hypotheses may be stated when warranted, but must be clearly labeled.

Typical length: Up to 5,000 words including Abstract, References, and Figure/Table Legends.

2.3. Review Articles

Review articles provide concise reviews of subjects important to SHAW researchers, and can be written by an invited SHAW expert. These have the same format as the original articles but the details may be more flexible depending on the contents.

Typical length: One paragraph with maximum of 200 words for the abstract; maximum of 6,500 words from introduction to conclusion; maximum of 100 references, 10 figures and 10 tables.

2.4. Special Articles

Special articles are invited with an intention of special introduction of SHAW information. These have the same format as the original articles but the details may be more flexible depending on the contents.

Typical length: One paragraph with maximum of 200 words for the abstract; maximum of 6,500 words from introduction to conclusion; maximum of 100 references, 10 figures and 10 tables.

2.5. Short Communications

Short communications are short original research articles on issues important to SHAW researchers. The contents should be in the following sequence: title page; abstract and key words; text without section titles; acknowledgements; references; and figures or tables.

Typical length: Unstructured, single paragraph abstract with maximum of 150 words; maximum of 3,000 words from introduction to conclusion, 20 references, 3 figures and 2 tables.

2.6. Case Reports

Case reports deal with epidemiological surveys, methods for accident investigation and analyses of occupational health and safety interests or innovations. The contents should be in the following sequence: title page; abstract and key words; introduction; case report; discussion; acknowledgments; references; figures; and figure legends.

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The Editorial Office of SH@W receives and reviews all submitted manuscripts, and all submitted manuscripts are considered confidential. The journal operates a double blind review process in which the authors, investigators, and peer-review referees are kept anonymous during editorial and peer-review process. The submitted manuscripts are initially screened for the format. Once the manuscript is provisionally accepted, it is sent to the three most relevant referees for review. The referees are selected by the editor from the Editorial Board's database or the board members' recommendation. The referees are then requested to evaluate based on originality, validity, presentation, and importance and interest, and, when considered necessary, statistics.

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When the final decision on the acceptance of the manuscript is made, the Editorial Office notifies the corresponding author. The peer-review process takes approximately 4-8 weeks.

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The title page should include: 1) the title of the article (less than 50 words); 2) name of the authors (first name, middle initial, last name in capital) and institutional affiliation including name of department(s) and institution(s) of each author; 3) name, highest academic degree, full address (including the postal code) of the institutional affiliation, telephone and fax numbers, and email address of the corresponding author; 4) A running title, 50 characters or less including blank and; 5) any disclaimers.

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An abstract and 3-5 relevant keywords (in alphabetical order) are required for the following article categories: Review Article, Original Article, and Case Report.

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The text for Original Articles, for example, should include the following sections: Introduction, Materials and Methods, Results, and Discussion. The Introduction should be as concise as possible, without subheadings. The Methods section should be sufficiently detailed. Subheadings may be used to organize the Results and Discussion. Each section should begin on a new page.

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Where a term/definition is continually referred to (i.e. ≥ 3 times in the text), it is written in full when it first appears, followed by the subsequent abbreviation in parentheses (even if it was previously defined in the abstract); thereafter, the abbreviation is used.

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Current standard international nomenclature for genes should be adhered to. Genes should be typed in italic font and include the accession number. For human genes, use genetic notation and symbols approved by the HUGO Gene Nomenclature

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Present simple formulae in the line of normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

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A footnote appears at the bottom of the first page of the article, and includes the received date of the manuscript, date of acceptance for publication, and the e-mail address of the corresponding author. Any changed affiliation of authors should be noted.

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If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on.

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The corresponding author must inform the editor of any potential conflicts of interest that could influence the author's interpretation of the data. Examples of potential conflicts of interest are financial support from or connections to pharmaceutical companies, political pressure from interest groups, and academically related issues. Conflicts of interest statements will be published at the end of the text of the article, before the 'References' section. Please consult the COPE guidelines (<http://www.publicationethics.org/>) on conflicts of interest. Even when there is no conflicts of interest, it should also be stated. When the manuscript is accepted for publication, SH@W will decide whether the disclosure will be communicated in the published paper (after consulting with the corresponding author).

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Example

In Republic of Korea, the industrial revolution began in the 1970s, and the first occupational cancer was mesothelioma due to asbestos, reported in 1993 [5].

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Journal Articles

Author(s) – Family name and initials. Title of article. Title of journal – abbreviated Publication year, month, day (month & day only if available); volume:pages.

- Petitti DB, Crooks VC, Buckwalter JG, Chiu V. Blood pressure levels before dementia. *Arch Neurol* 2005;132:429-34.
- Kim EA, Lee HE, Kang SK. Occupational burden of cancer in Korea. *Saf Health Work* 2010;1:61-8.

- Shim JJ. Study on Blood-born Diseases of Healthcare Workers. *OSH Res Brief* 2009;19:36-43. [in Korean].
- Polgreen PM, Diekema DJ, Vandenberg J, Wiblin RT, Chen YY, David S, Rasmus D, Gerds N, Ross A, Katz L, Herwaldt LA. Risk factors for groin wound infection after femoral artery catheterization: a case-control study. *Infect Control Hosp Epidemiol* [Internet]. 2006 [cited 2007 Jan 5];27:34-7. Available from: <http://www.journals.uchicago.edu/ICHE/journal/issues/v27n1/2004069/2004069.web.pdf>

Books

Author(s) – Family name and initials, Multiple authors separated by a comma. Title of book. Edition of book if later than 1st ed. Place of Publication: Publisher Name; Year of Publication. Pages.

- Belitz HD, Grosch W, Schieberle P. *Food chemistry*. 3rd rev. ed. Burghagen MM, translator. Berlin: Springer; 2004. 1070 p.
- Riffenburgh RH. *Statistics in medicine*. 2nd ed. Amsterdam (Netherlands): Elsevier Academic Press; 2006. p. 447-86.
- *Statistics on occupational injuries and illnesses, 2008*. Gwacheon (Republic of Korea): Ministry of Employment and Labor (KR); 2009. 1093 p.

Reports

Author(s). Title of report. Place of publication: Publisher; Date of publication – year month if applicable. Report No.: (if applicable). Total number of pages if applicable eg. 24 p.

- Page E, Harney JM. Health hazard evaluation report. Cincinnati (OH): National Institute for Occupational Safety and Health (US); 2001. Report No.: HETA2000-0139-2824. 24 p.
- Lee KO, Kim CO, Ryu BH, Lee SY, Jung KR, Lee EJ. Ideas for applying different inspection period varying with risk level hazardous machinery & equipment. Incheon (Republic of Korea): Occupational Safety and Health Research Institute; 2005. Report No.: OSHRI2005-96-568. 241 p. [in Korean].

Web Sites

Author(s). Title of publication [type of medium – Internet]. Place of publication (if available): Publisher (if available). Date of publication – year month day (supply year if month and day not available) [updated year month day; cited year month day]. Available from: web address.

- PeriStats [Internet]. White Plains (NY): March of Dimes Perinatal Data Center. 2007 [cited 2007 Feb 1]. Available from: <http://www.marchofdimes.com/peristats/>.

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