

Case series study of nosocomial Legionnaires' disease in Apulia region (southern Italy): The role of different molecular methods in identifying the infection source: Infection source in nosocomial Legionnaires' disease

Home / Archives / Vol. 94 No. S3 (2023): Vol. 94 Suppl. 3 (2023): Public Health Challenges in The Post-Pandemic Era: Guest Editors: Carlo Signorelli, Cesira Pasquarella, Stefano Capolongo, Anna Odone

CASE SERIES

Case series study of nosocomial Legionnaires' disease in Apulia region (southern Italy): The role of different molecular methods in identifying the infection source: Infection source in nosocomial Legionnaires' disease

Download PDF

Published 30-08-2023

Issue Vol. 94 No. S3 (2023): Vol. 94 Suppl. 3 (2023): Public Health Challenges in The Post-Pandemic Era: Guest Editors: Carlo Signorelli, Cesira Pasquarella, Stefano Capolongo, Anna Odone

Section CASE SERIES

License Copyright (c) 2023 Osvalda De Giglio, Marielena D'Ambrosio, Carla Callia, Valentina Spagnuolo, Marta Oliva, Marco Lopuzzo, Francesca Apollonio, Francesco Triggiano, Giusy Diella, Maria Scaturro, Maria Luisa Ricci, Maria Elena Caringella, Carla Maria Leone, Federica Romanelli, Stefania Stoffa, Adriana Mosca, Carlo Pazzani, Maria Teresa Montagna

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by-nc/4.0) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Transfer of Copyright and Permission to Reproduce Parts of Published Papers. Authors retain the copyright for their published work. No formal permission will be required to reproduce parts (tables or illustrations) of published papers, provided the source is quoted appropriately and reproduction has no commercial intent. Reproductions with commercial intent will require written permission and payment of royalties.

How to Cite De Giglio O, D'Ambrosio M, Callia C, Spagnuolo V, Oliva M, Lopuzzo M, et al. Case series study of nosocomial Legionnaires' disease in Apulia region (southern Italy): The role of different molecular methods in identifying the infection source: Infection source in nosocomial Legionnaires' disease. Acta Biomed [Internet]. 2023 Aug; 30 [cited 2024 Oct. 11];94(S3):e2023217. Available from: https://www.mattioli1885journals.com/index.php/actabiomedica/article/view/15048

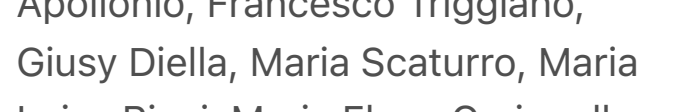
More Citation Formats

Journal Information:

Editor-in-Chief: Maurizio Vanelli
 Language: English
 Frequency: 6 issues/year
 ISSN: 0392-4203 | eISSN: 2531-6745
 CiteScore (Scopus): 4.3 (2023) (81st centile)
 Indexed in: Google Scholar, Scopus, SJR, EMBASE, Elsevier Biobase, Bibliovigilance, Biosis, Europe PMC
 Acceptance Rate 2023: 33%



Publons Reviewer Recognition Service



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by-nc/4.0) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Transfer of Copyright and Permission to Reproduce Parts of Published Papers. Authors retain the copyright for their published work. No formal permission will be required to reproduce parts (tables or illustrations) of published papers, provided the source is quoted appropriately and reproduction has no commercial intent. Reproductions with commercial intent will require written permission and payment of royalties.

How to Cite De Giglio O, D'Ambrosio M, Callia C, Spagnuolo V, Oliva M, Lopuzzo M, et al. Case series study of nosocomial Legionnaires' disease in Apulia region (southern Italy): The role of different molecular methods in identifying the infection source: Infection source in nosocomial Legionnaires' disease. Acta Biomed [Internet]. 2023 Aug; 30 [cited 2024 Oct. 11];94(S3):e2023217. Available from: https://www.mattioli1885journals.com/index.php/actabiomedica/article/view/15048

More Citation Formats



DOI: https://doi.org/10.23750/abm.v94iS3.15048

Keywords: Legionella, Legionnaires' disease, nosocomial infection, molecular epidemiology, molecular typing, PFGE, SBT

Abstract Background and aim: Legionnaires' disease is a severe form of pneumonia caused by the inhalation or aspiration of water droplets contaminated with Legionella pneumophila and other Legionella species. These bacteria are commonly found in natural habitats and man-made water systems. Legionnaires' disease is a significant public health problem, especially in healthcare settings where patients may be exposed to contaminated environmental sources. Nosocomial outbreaks have been reported worldwide, leading to high morbidity and mortality rates, and increased healthcare costs. This study aimed to compare, the clonal relationship of clinical L. pneumophila strains from two different hospitals with the L. pneumophila strains isolated from the water supply. Methods: In the period from 2019 to 2021, clinical and environmental strains involved in three cases of legionellosis were compared by means of pulsed field gel electrophoresis and sequence based typing techniques. Results: Our findings highlight the persistence of clonally distinct strains within each hospital examined. Furthermore, the L. pneumophila strains detected from hospital environmental sources were related to the clinical strains isolated, demonstrating the nosocomial origin of these cases. Conclusions: Therefore, it is important to implement more accurate surveillance systems both for epidemiological studies and to check the effectiveness of remediation procedures. (www.actabiomedica.it)

References van Heijnsbergen E, de Roda Husman AM, Lodder WJ, et al. Viable Legionella pneumophila bacteria in natural soil and rainwater puddles. J Appl Microbiol. 2014;117(3):882-90. doi: 10.1111/jam.12559. Cunha BA, Burillo A, Bouza E. Legionnaires' disease. Lancet. 2016;387(10016):376-85. doi: 10.1016/S0140-6736(16)00708-2. Graells T, Hernández-García M, Pérez-Jové J, Guy L, Padilla E. Legionella pneumophila recurrently isolated in a Spanish hospital: Two years of antimicrobial resistance surveillance. Environ Res. 2018; 166:638-46. doi: 10.1016/j.envres.2018.06.045. De Giglio O, Fasano F, Diella G, et al. Legionella and legionellosis in touristic-recreational facilities: Influence of climate factors and geostatistical analysis in southern Italy (2001-2017). Environ Res. 2019; 178:108721. doi: 10.1016/j.envres.2019.108721. Ghorbani A, Hashemzadeh M, Amin M, Moosavian M, Nashibi R, Mehraban Z. Occurrence of the Legionella species in the respiratory samples of patients with pneumonia symptoms from Ahvaz, Iran; first detection of Legionella cherrii. Mol Biol Rep. 2021;48(11):7141-6. doi: 10.1007/s11033-021-06704-3. Boamah DK, Zhou G, Ensminger AW, O'Connor TJ. From many hosts, one accidental pathogen. The diverse protozoan hosts of Legionella. Front Cell Infect Microbiol. 2017; 7:477. doi: 10.3389/fcimb.2017.00477. List of Prokaryotic Names with Designation (LPSN) moves to the DSMZ. Available online: https://lpsn.dsmz.de/genus/legionella (Accessed July 12, 2023). European Centre for Disease Prevention and Control. Legionnaires' disease. In: ECDC. Annual Epidemiological Report for 2021. Stockholm: ECDC; 2023. Montagna MT, Cristina ML, De Giglio O, et al. Serological and molecular identification of Legionella spp. isolated from water and surrounding air samples in Italian healthcare facilities. Environ Res. 2016;146:47-50. doi: 10.1016/j.envres.2015.12.015. Montagna MT, De Giglio O, Napoli C, et al. Control and prevention measures for legionellosis in hospitals: A cross-sectional survey in Italy. Environ Res. 2018;166:65-60. doi: 10.1016/j.envres.2018.05.030. Napoli C, De Giglio O, Bertamino E, Montagna MT. Legionellosis in health care facilities: State of the art in control and prevention in Italy. Ann Ig. 2019;31(6):474-81. doi: 10.7416/ai.2019.2308. Beauté J, Plachouras D, Sandin S, Giesecke J, Sparén P. Healthcare-associated Legionnaires' disease, Europe, 2008-2017. Emerg Infect Dis. 2020;26(10):2309-18. doi: 10.3201/eid2610.181889. Rota MG, Caporali MG, Giannitelli S, Urcioli R, Scaturro M, Ricci ML. I risultati del sistema di sorveglianza della legionellosi nel 2021. Boll Epidemiol Naz 2023;41(1):25-32. [Italian]. doi: 10.53225/BEN_062. Legislative Decree 23 February 2023, n. 18 https://www.gazzettaufficiale.it/eli/ld/2023/03/06/23G00025/SG. (Accessed Aug 28, 2023). Istituto Superiore di Sanità - Rapporti ISTISAN 22/32 (in Italian). Guidelines for the assessment and management of risk associated to water safety in internal plumbing systems in priority and non-priority buildings and in certain vessel according to Directive (EU) 2020/2184. Ad hoc working group on water safety in internal water distribution systems in buildings and certain ships 2022, xiv, 161. Bianchi A, Pregliasco FE, Consonni M, Tesaro M. Genotypic diversity of Legionella pneumophila in environmental and clinical strains assessed by sequence-based typing, in association with retrospective clinical surveillance in northern Italy. Ann Agric Environ Med. 2016;23(2):248-53. doi: 10.5604/12321966.1203885. Girolamini L, Salaris S, Lizzadro J, et al. How molecular typing can support Legionella environmental surveillance in hot water distribution systems: A hospital experience. Int J Environ Res Public Health. 2020;17(22):8662. doi: 10.3390/ijerph17228662. Montagna MT, Ricci M, Napoli C, et al. Legionella pneumophila serogroup 5 infection in the presence of multiple environmental contamination. The importance of a bacteriological diagnosis. JPH. 2007; 4:71-74. doi:10.2427/5906. Gaia V, Fry NK, Afshar B, et al. Consensus sequence-based scheme for epidemiological typing of clinical and environmental isolates of Legionella pneumophila. J Clin Microbiol. 2005;43(5):2047-52. doi: 10.1128/JCM.43.5.2047-2052.2005. Ratzow S, Gaia V, Helbig JH, Fry NK, Lück PC. Addition of neuA, the gene encoding N-acetylneuraminase cytidylidyl transferase, increases the discriminatory ability of the consensus sequence-based scheme for typing Legionella pneumophila serogroup 1 strains. J Clin Microbiol. 2007;45(6):1965-8. doi: 10.1128/JCM.00261-07. Casini B, Valentini P, Baggiani A, et al. Comparison of two molecular methods used for subtyping of Legionella pneumophila 1 strains isolated from a hospital water supply. Water Sci Technol. 2008;58(3):693-8. doi: 10.2166/wst.2008.434. Quero S, García-Núñez M, Parraga-Niño N, et al. Discriminatory usefulness of pulsed-field gel electrophoresis and sequence-based typing in Legionella outbreaks. Future Microbiol. 2016;11:757-65. doi: 10.2217/fmb-2015-0030. Jiang L, Zhao S, Cai X, et al. Sequence-based typing of clinical and environmental Legionella pneumophila isolates in Shenyang, China. Enfermedades Infecciosas y Microbiología Clínica (English ed.) 2021 Oct; 39(8): 383-389. doi: 10.1016/j.eimc.2020.06.018. European Commission (EC). Case definitions of communicable diseases: Legionnaires' disease. Official Journal of the European Union. 2018 Jul; L 170/26. Available at: https://eurlex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32018D0945&from=EN. (Accessed Aug 28, 2023). ISO 11731:2017. Water quality-enumeration of Legionella. Available online: https://www.iso.org/standard/61782.html (Accessed May 4, 2023). Linee Guida per la Prevenzione e il Controllo della Legionellosi. (2015). Available online: http://www.legionellaonline.it (Accessed May 4, 2023). De Giglio O, D'Ambrosio M, Spagnuolo V, et al. Legionella anisa or Legionella bozemanii? Traditional and molecular techniques as support in the environmental surveillance of a hospital water network. Environ Monit Assess. 2023;195(4):496. doi:10.1007/s10661-023-11078-z. Heras J, Domínguez C, Mata E, et al. GeU—a tool for analyzing DNA fingerprint gel images. BMC Bioinformatics. 2015; 16:270. doi: 10.1186/s12859-015-0703-0. Martínez-Puchol S, Riveros M, Ruidias K, et al. Dissemination of a multidrug resistant CTX-M-65 producer Salmonella enterica serovar Infantis clone between marketed chicken meat and children. Int J Food Microbiol. 2021;344:109109. doi:10.1016/j.ijfoodmicro.2021.109109. Gaia V, Fry NK, Harrison TG, Peduzzi R. Sequence-based typing of Legionella pneumophila serogroup 1 offers the potential for true portability in legionellosis outbreak investigation. J Clin Microbiol. 2003;41(7):2932-9. doi: 10.1128/JCM.41.7.2932-2939.2003. Simar SR, Hanson MB, Arias CA. Techniques in bacterial genetic typing: Past, present, and future. Curr Opin Infect Dis. 2021;34(4):339-45. doi: 10.1093/cco/0000000000000743. Magalhães B, Valot B, Abdelbary MMH, et al. Combining molecular typing and whole genome sequencing to investigate Pseudomonas aeruginosa epidemiology in intensive care units. Front Public Health. 2020;8:3. doi: 10.3389/fpubh.2020.00003. Iatta R, Cuna T, De Giglio O, Montagna MT, Napoli C. Sequence based typing of Legionella pneumophila sg 1 isolated in nosocomial acquired infections in Apulia, Southern Italy. J Prev Med Hyg. 2013 Sep;54(3):167-9. PMID: 24783896. Al-Matawah. Distribution and genetic diversity of Legionella pneumophila serotype in Kuwait environment. Int J Clin Med Microbiol. 2018; 3:128. doi: 10.15344/2456-4028/2018/128 Ditommaso S, Giacominelli M, Rivera SR, Raso R, Ferrero P, Zotti CM. Virulence of Legionella pneumophila strains isolated from hospital water system and healthcare-associated Legionnaires' disease in northern Italy between 2004 and 2009. BMC Infect Dis. 2014; 14:483. doi:10.1186/1471-2334-14-483. Cassier P, Campese C, Le Strat Y, et al. Epidemiological characteristics associated with ST23 clones compared to ST1 and ST47 clones of Legionnaires' disease cases in France. New Microbes New Infect. 2014; 3:29-33. doi: 10.1016/j.nmi.2014.10.006. Velkens E, Soetens O, De Mendonça R, et al. Sequence-based typing of Legionella pneumophila serogroup 1 clinical isolates from Belgium between 2000 and 2010. Euro Surveill. 2012;17(43): pii=20302. PMID: 23137466. Amemura-Maekawa J, Kura F, Chang B, Watanabe H. Legionella pneumophila serogroup 1 isolates from cooling towers in Japan form a distinct genetic cluster. Microbiol Immunol. 2005;49(12):1027-33. doi: 10.1111/j.1348-0421.2005.tb03699.x. Torre I, Alfano R, Borriello T, et al. Environmental surveillance and in vitro activity of antimicrobial agents against Legionella pneumophila from hospital water systems in Campania, south Italy: A 5-year study. Environmental Research 2018;164:574-9. doi: 10.1016/j.envres.2018.02.030. De Giglio O, Napoli C, Lovero G, et al. Antibiotic susceptibility of Legionella pneumophila strains isolated from hospital water systems in southern Italy. Environmental Research 2015; 142:586-90. doi: 10.1016/j.envres.2015.08.013. Chiao TH, Clancy TM, Pinto A, Xi C, Raskin L. Differential resistance of drinking water bacterial populations to monochloramine disinfection. Environ Sci Technol. 2014;48(7):4038-47. doi: 10.1021/es405572s. Sciuto EL, Laganà P, Filice S, et al. Environmental management of Legionella in domestic water systems: Consolidated and innovative approaches for disinfection methods and risk assessment. Microorganisms. 2021;9(3):577. doi: 10.3390/microorganisms9030577. Coniglio MA, Ferrante M, Yassin MH. Preventing healthcare-associated legionellosis: Results after 3 years of continuous disinfection of hot water with monochloramine and an effective water safety plan. Int J Environ Res Public Health. 2018;15(8):1594. doi: 10.3390/ijerph15081594. McAdam PR, Vander Broek CW, Lindsay DS, et al. Gene flow in environmental Legionella pneumophila leads to genetic and pathogenic heterogeneity within a Legionnaires' disease outbreak. Genome Biol 2014;15(11):504. doi: 10.1186/PREACCEPT-167572368141690. David S, Mentasti M, Tewolde R, et al. Evaluation of an optimal epidemiological typing scheme for Legionella pneumophila with whole-genome sequence data using validation guidelines. J Clin Microbiol. 2016;54:2135-48. doi:10.1128/JCM.00432-16. Mitchell SL, Simmer PJ. Next-generation sequencing in clinical microbiology: Are we there yet? Clin Lab Med. 2019;39:405-18. doi: 10.1016/j.clm.2019.05.003. Ricci ML, Fillo S, Ciammaruconi A, et al. Genome analysis of Legionella pneumophila ST23 from various countries reveals highly similar strains. Life Sci Alliance. 2022;5(6):e20210117. doi: 10.26508/lsa.20210117.

MATTIOLI 1885 / MATTIOLI HEALTH | SCIENTIFIC PUBLISHING, COMMUNICATION AGENCY, CME PROVIDER
 Mattioli1885 has been at the forefront of research and scientific publishing since 1885. Today, Mattioli1885 continues to work with passion and consistency in the fields of communication, publishing, and scientific training.

JOURNALS
 Acta Biomedica
 Aesthetic Medicine
 European Journal of Oncology and Environmental Health
 Dermatology Practical & Conceptual
 Journal of Bioarchaeological Research
 La Medicina del Lavoro | Work, Environment and Health
 Medicina Historica
 Multidisciplinary Respiratory Medicine
 One Health and Bio-Ethics
 Perspectives in Pediatric Neurology
 Progress in Nutrition
 Sarcoidosis Vasculitis and Diffuse Lung Diseases

CONTACT
 Email: valeriaceci@mattiolihealth.com
 Phone: +039 0524 530383
 Website: www.mattioli1885.it - strada della Lodesana, 649 sx - 43036 Fidenza (PR) Italy
 P. IVA: 00579710344
 MATTIOLI HEALTH