

**Table 1:**  
**Check list for the quality of Universal Newborn Hearing Screening programs**

**PLANNING PHASE - TARGET AND PROTOCOL DESCRIPTION**

DEFINITION OF THE TARGET

- ✓ Classification of severity of HL based on (see Table 1 of Additional file 1 for details):
  - Primary Ear And Hearing Care Training Resource. Advanced Level. Geneva: WHO; 2006;[1]*
  - BIAP Recommendation 02/1 bis; 1996;[2]*
  - Clark JG. Uses and abuses of hearing loss classification. ASHA. 1981 Jul;23(7):493-500;*
  - Other, specify either*
    - Source: \_\_\_\_\_ or \_\_\_\_\_
    - Details

Hearing impairment level <sup>1</sup>	Hearing levels dB HL
Normal Hearing	0 - ...
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- ✓ Uni- vs. Bilateral hearing loss:
  - Unilateral*
  - Bilateral*
- ✓ Criteria used for the evaluation of audiological risks:
  - JCIH, 2007
  - Admission to NICU for at least \_\_\_\_ days
  - Other \_\_\_\_\_

DEFINITION OF THE PROTOCOL

✓ Screening Steps for neonates with and without audiological risk factors

Step n.	Protocol for general population	Protocol for special cases (as per previous point)
1	Test <sup>a</sup> _____ Age <sup>b</sup> _____	Test <sup>a</sup> _____ Age <sup>b</sup> _____
	After discharge	After discharge

<sup>1</sup> e.g. Slight, Mild, Moderate, Moderately severe, Severe, Profound

2	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>
3	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>
4	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>	Test <sup>a</sup> _____ Age <sup>b</sup> _____	<input type="checkbox"/>

<sup>a</sup> e.g. TOAE, aABR or other

<sup>b</sup> correct age for preterm

- ✓ Testing environment conditions (more than one choice allowed)
  - NICU
  - Silent room [report the acceptable noise level in dB \_\_\_\_\_]
  - Mother's bed
  - Other \_\_\_\_\_
  
- ✓ Full audiological evaluation (check all the applied tests)
  - Otoscopic inspection,
  - Child and family history,
  - Impedance,
  - OAE
  - ABR
  - Frequency-specific tone burst
  - Air and bone conduction
  - Sedation capability
  - \_\_\_\_\_
  
- ✓ Methods used to inform parents about the importance of screening, procedures, costs, potential risks of hearing loss, and the benefits of early detection and intervention (check all that apply)
  - Discussion with specialized personnel
  - Flyers/Posters
  - Other \_\_\_\_\_
  
- ✓ Specific actions to contact parents of newborns who missed a step or were lost to follow-up (check all that apply)
  - Telephone call
  - Letter from hospital
  - Contact pediatrician
  - Other \_\_\_\_\_
  - None
  
- ✓ Developmental surveillance:
  - Used Tests[3]: \_\_\_\_\_; Timing: \_\_\_\_\_
  - (in alternative) Free description: \_\_\_\_\_
  - Potential false negatives (neonates with hearing loss but negative to previous screening tests) are detected. In case, the following method is used
    - Follow-up with pediatricians
    - Follow-up with services responsible for assigning hearing aids
    - Recall of all the investigated neonates after a certain period of time
    - Other \_\_\_\_\_
  
- ✓ Professionals involved in each screening step (excluding the final audiological evaluation)

<b>Personnel</b>					
<b>Role</b>	<b>Physician</b>	<b>Trained nurse</b>	<b>Audiologist</b>	<b>Family pediatrician</b>	<b>Other</b>
Screening program responsible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with parents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evaluation of risk factors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neonate wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Test execution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Test interpretation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with other services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contacts with family for missing neonates/infants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reporting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## MONITORING, VERIFYING AND REPORTING PHASE

### Universality

- ✓ Observation period: from \_\_\_\_\_ [MM/YYYY] to \_\_\_\_\_ [MM/YYYY]
- ✓ \_\_\_\_\_ [Number - #] newborns screened by 1 month of age out of \_\_\_\_\_ [#] newborns (\_\_\_\_%);
- ✓ Reports from steps:

Step / Phase	Indicator	Higher risk [#]	Low risk [#]
<b>1</b>	Tested	_____	_____
	Referred/positive	_____	_____
<b>2</b>	Tested	_____	_____
	Of which, number tested coming from home birth / missed or incomplete at the previous step	_____	_____
	Referred/positive	_____	_____
<b>3</b>	Tested	_____	_____
	Of which, number tested coming from home birth / missed or incomplete at the previous steps	_____	_____
	Referred/positive	_____	_____
<b>4</b>	Tested	_____	_____
	Of which, number tested coming from home birth / missed or incomplete at the previous steps	_____	_____
	Referred/positive	_____	_____
<b>Full Audiological evaluation</b>	Total Tested	_____	_____
	Of which, number of tested coming from home birth / missed or incomplete at the previous steps	_____	_____

### Timely detection

- ✓ \_\_\_\_\_ [#] Infants identified with HL by 3 months of age out of \_\_\_\_\_ [#] screened neonates (\_\_\_\_%);

✓ Full Audiological evaluation	Number of children assessed who falls within one of the following intervals	0 - 10 db HL	_____	_____
		11 - 20 db HL	_____	_____
		21 - 30 db HL	_____	_____

31 - 40 db HL	_____	_____
41 - 50 db HL	_____	_____
51 - 60 db HL	_____	_____
61 - 70 db HL	_____	_____
71 - 80 db HL	_____	_____
81 - 90 db HL	_____	_____
91+ db HL	_____	_____
TOT	_____	_____

- ✓ Number of infants not having any screening exam (**not enrolled**) found to have hearing loss during Surveillance (excluded late onset cases): \_\_\_\_\_;
- ✓ Number of infants not completing the screening protocol (**lost to follow-up**) found to have hearing loss during the Surveillance (exclude late onset cases): \_\_\_\_\_;
- ✓ \_\_\_\_\_ [#] Infants found to have hearing loss during the Surveillance (excluded late onset cases) out of \_\_\_\_\_ [#] screened neonates not referred to full audiological evaluation as passed at the screening tests (\_\_\_\_%) – *False negative*.

### Overreferral<sup>2</sup>

- ✓ Population without risk factors for HL: \_\_\_\_\_ [#] referred at discharge as eligible for further screening steps out of \_\_\_\_\_ [#] screened (\_\_\_\_%)
- ✓ Population with risk factors for HL: \_\_\_\_\_ [#] referred at discharge as eligible for further screening steps out of \_\_\_\_\_ [#] screened (\_\_\_\_%)
- ✓ Population without risk factors for HL: \_\_\_\_\_ [#] Newborns/Infants failed screening and rescreening before comprehensive audiological evaluation out of \_\_\_\_\_ [#] screened neonates (\_\_\_\_%);
- ✓ Population with risk factors for HL: \_\_\_\_\_ [#] Newborns/Infants failed screening and rescreening before comprehensive audiological evaluation out of \_\_\_\_\_ [#] screened neonates (\_\_\_\_%)

### References

1. World Health Organization. Primary Ear And Hearing Care Training Resource. Advanced Level., Geneva. 2006. <https://www.entnet.org/sites/default/files/Community/public/upload/WHO-Advanced-Ear-Care.pdf>. Accessed 11/07/2014.
2. Bureau International d'Audiophonologie. BIAP Recommendation 02/1 bis. 1996. [http://www.biap.org/index.php?option=com\\_content&view=article&id=5%3Arecommandation-biap-021-bis&catid=65%3Act-2-classification-des-surdites&Itemid=19&lang=en](http://www.biap.org/index.php?option=com_content&view=article&id=5%3Arecommandation-biap-021-bis&catid=65%3Act-2-classification-des-surdites&Itemid=19&lang=en). Accessed 11/07/2014.
3. Council on Children Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, Medical Home Initiatives for Children With Special Needs Project Advisory Committee. Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening (vol 118, pg 405, 2006). Pediatrics. 2006;118(4):1808-9. doi:10.1542/peds.2006-2405.

<sup>2</sup> The False positive indicators are not reported as calculable from data in the two previous sections