

Implementation of Universal Newborn Hearing Screening in the Philippines: A Survey of Registered Newborn Hearing Centers

Patrick John P. Labra, MD,¹ Olivia Agnes D. Mejia, MD,¹ Rosario R. Ricalde, MD,^{1,2} Jaymilyn V. Catangay-Ombao, MClinAud,^{1,2,3} Anna Pamela C. Dela Cruz, MD,¹ Giancarla Marie C. Ambrocio, MD,¹ Myra G. Capistrano, MClinAud¹ and Nelson O. Eugenio, RPh, MClinAud^{1,2}

¹*Philippine National Ear Institute, National Institutes of Health, University of the Philippines Manila*

²*Newborn Hearing Screening Reference Center, National Institutes of Health, University of the Philippines Manila*

³*Department of Speech Pathology, College of Allied Medical Professions, University of the Philippines Manila*

ABSTRACT

Background. Universal newborn hearing screening is mandated in the Philippines through the Universal Newborn Hearing Screening and Intervention Act of 2009 (RA 9709). Newborn hearing screening (NBHS) centers are required to perform screening tests, compile and submit data on screened newborns, and advise parents on the subsequent steps after NBHS.

Objective. The study aimed to conduct a survey of the implementation of the Universal Newborn Hearing Screening and Intervention Program (UNHSIP) in the different regions of the country; and assess the information technology (IT) capabilities of hearing centers.

Methods. Fifty-one NBHS centers across twelve regions were surveyed through on-site inspections in 2016. Data was gathered on the centers' testing capability, staffing, access to specialists, use of local protocols, connectivity, and IT capabilities.

Results. All surveyed centers followed the recommended protocols of the Manual of Operations of the Universal Newborn Hearing Screening and Intervention Act of 2009 (RA 9709). Among the 12 regions visited, only five (41.67%) had Category C centers with confirmatory testing and early amplification services as recommended. Majority of facilities (96.1%) were staffed by trained and certified personnel. A small percentage had access to subspecialists such as clinical audiologists (39.2%) and speech-language pathologists (23.5%). All facilities had computer access, but only 58.8% had internet access. Majority (94.1%) of the centers visited were not using the recommended data submission methods, specifically the use of registry cards and the online registry. Only 27.5% of centers had data on newborns who underwent confirmatory testing or early intervention.

Conclusion. Facilities were found to be compliant to NBHS screening protocols and majority complied with certification requirements for staff; but were found to be non-compliant with use of registry cards or the online registry. Majority of centers were able to contact the parents of neonates who did not pass newborn screening, but had no system to track outcomes. Lack of confirmatory and early intervention services in identified areas emphasize the need for development of regional centers. It is recommended that measures to improve the utilization of the online registry are taken.

Keywords: universal newborn hearing screening, newborn screening, early hearing detection and intervention, neonate



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Corresponding author: Patrick John P. Labra, MD
Philippine National Ear Institute
National Institutes of Health
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: patrick.labra@gmail.com
ORCID: <https://orcid.org/0000-0002-7193-1203>

INTRODUCTION

“No Filipino shall be deprived of a functioning sense of hearing and balance” is the vision statement of the Philippine National Ear Institute (PNEI). In response to the problem of newborn hearing loss, the PNEI formed a newborn hearing screening task force with the aim to prevent repercussions of delayed detection and intervention of hearing impairment in children.

Through the efforts of the PNEI, Republic Act 9709 or the Universal Newborn Hearing Screening and Intervention Act was signed into law. This mandates all newborns to undergo hearing screening prior to hospital discharge or within one month after birth.

The Manual of Operations of RA 9709¹ provides targets for the newborn with hearing impairment: screening at one month, confirmatory testing at three months, and initial intervention by six months of age similar to the 2007 recommendations of the Joint Committee on Infant Hearing². It also classified health facilities based on their capability of providing hearing screening, confirmatory, or interventional services for children with hearing problems. This classification is summarized in Table 1.

The classification system also recommends distribution of these centers based on the administrative divisions of the Philippines. At least one Category B Center capable of confirmatory testing is recommended for each province. At least one Category C Center is recommended for each region which should also serve as the regional referral center for the program.

The newborn hearing screening reference center (NHSRC) was charged with collation of national data on newborn hearing screening. An online national registry was established with a web-based portal. Category A Centers were responsible for submitting their data for newborn hearing screening for aggregation into a national registry. Data input was done online through two channels: direct entry into the web-based portal of the NHSRC registry, and spreadsheet submission via email to the NHSRC office. The spreadsheet submission via email was the alternative method

Table 1. Classification of Newborn Hearing Centers in the Philippines¹

Capability of Center	Center Category			
	A	B	C	D
Newborn Hearing Screening (i.e., OAE, AABR)	✓	✓	✓	✓
Preventive Aspect of Hearing Impairment	✓	✓	✓	✓
Confirmatory Testing (i.e., ABR, ASSR)		✓	✓	✓
Hearing Aid Fitting			✓	✓
Speech and Language Therapy				✓
Surgery for Implantable Hearing Devices				✓

OAE - otoacoustic emission; AABR - automated auditory brainstem response; ABR - auditory brainstem response; ASSR - auditory steady state response

of submission and was devised for centers in areas with limited connectivity.

OBJECTIVES

1. To conduct a survey on the implementation of the Universal Newborn Hearing Screening and Intervention Program in the different regions of the country; and
2. To assess the information technology (IT) capabilities of registered hearing centers.

METHODS

Five teams were assembled composed of one ENT specialist and one clinical audiologist to perform the survey among five identified geographic clusters. The clusters were North Luzon which included Regions I, II, III and the Cordillera Administrative Region (CAR); South Luzon which included Regions IV-A and V; Visayas which included Regions VI, VII, and VIII; Mindanao which included Regions X and XI; and the National Capital Region (NCR). Each team was accompanied by a representative of the Department of Health (DOH) Regional Office.

The selection of hearing facilities included in the survey were done through convenience sampling, prioritizing: (1) high-birth rate centers in the area as determined by the Department of Health (DOH), (2) centers with higher Category classification (B, C or D) and (3) accessibility and travel safety. Centers from Regions IX, XII, and ARMM were excluded from the survey due to security and safety concerns at the time. Selected health facilities were informed of the visit in advance both by the study team and the local DOH representatives.

Each facility was visited and inspected. A checklist and guided questionnaire were used to determine the category and capability of the facilities, equipment available, internet access, access to a clinical audiologist and speech-language pathologist, and method of tracking outcomes. Results were tabulated and recorded.

At the time of the survey, there was no existing formal certification process for Category B, C, and D hearing screening facilities. Centers were assessed during the on-site visit to confirm if they fit these categories based on the centers' existing equipment, services, and personnel.

RESULTS

The indicators for implementation of the UNHSIP as measured by this survey are summarized in Table 2.

Classification of Health Facilities

A total of 296 hearing facilities were identified nationwide and 51 were surveyed as determined by the aforementioned criteria. The number of hearing centers surveyed per cluster and per region are enumerated in Table 3.

Table 2. Indicators for Implementation of Universal Newborn Hearing Screening and Intervention Program (UNHSIP)

Indicator	% of Centers
Newborn Hearing Screening Procedure	
Use of RA 9709 Screening Protocols	100%
Performed by Certified Personnel	96.1%
Data Recording	
Available Census of Screened Babies	100%
Use of NHSRC Registry Card	5.9%
Uploading of Data into NHSRC Registry	3.9%
Patient Follow-Up	
Performs Follow-up of Screened Babies	60.8%
Available Census of Babies who Underwent Confirmatory Testing	27.5%
Access to Intervention Services	
Access to Clinical Audiologist	39.2%
Access to Speech-Language Pathologist	23.5%
Connectivity and IT Resources	
Computer Access	82.4%
Internet Access	58.8%

Among the 51 centers visited, 14 were public hospitals, 37 were private health facilities. The 37 private health facilities were composed of 16 stand-alone clinics or hearing centers, one cooperative, and 20 centers located within private hospitals.

Thirty-four centers were classified as Category A facilities capable of initial newborn hearing screening (NBHS) using otoacoustic emission (OAE). Nine were classified as Category B, which allowed both screening and initial audiologic diagnostic examination via ABR and/or ASSR. Eight were classified as Category C, which in addition to providing screening and diagnostic evaluation, also had hearing aid trial and fitting capabilities. None of those surveyed were classified as Category D, capable of surgical intervention for hearing loss and speech habilitation as well as subspecialty care under developmental pediatrics.

Distribution of Hearing Screening Facilities

Category A, B, C, and D centers were inspected on-site and confirmation was made if they were able to perform the necessary services needed for their classification. Among the 12 regions surveyed, only five (41.67%) regions had a Category C center that could provide hearing screening, confirmatory, and early intervention services. Six (50%) regions had Category B centers that could perform confirmatory tests among infants.

There were Category A centers who performed hearing aid fitting but did not have capability to do confirmatory testing. These centers were classified as Category A as they could not confirm hearing loss among infants.

Table 3. Breakdown of Health Facilities Surveyed (2016)

Cluster	Region	Total Number of Registered Facilities (2016)	Facilities Inspected			
			A	B	C	D
Northern Luzon	I	18	5	1	0	0
	II	7	1	0	0	0
	III	30	0	1	0	0
	CAR	1	1	0	0	0
Southern Luzon	IV-A	31	5	1	3	0
	IV-B	6	0	0	0	0
	V	16	3	0	1	0
NCR	NCR	88	0	4	2	0
Visayas	VI	20	3	1	1	0
	VII	13	4	0	0	0
	VIII	11	5	1	0	0
Mindanao	IX	10	0	0	0	0
	X	10	4	0	0	0
	XI	13	3	0	1	0
Total		296	34	9	8	0

Conduct of Hearing Screening

Majority (96.1%) of facilities had staff who were certified as Category A hearing screening personnel through an official NHSRC personnel certification course. These personnel included nurses, ENTs, pediatricians, audiometricians, and clinical audiologists who were conducting NBHS. Two (3.9%) centers had non-certified personnel.

All centers visited implemented the screening protocols stated in the Manual of Operations of RA 9709. Thirty (58.8%) centers provided NBHS to both in-patients and out-patients, 17 (33.3%) centers catered to out-patients only, and four (7.8%) centers catered to in-patients only. NBHS in all centers was performed at the neonatal intensive care unit (NICU) or a designated quiet room.

Patient Follow-up

The data available at the time of visit in all the centers was only from the previous year which was 2015. Only 12 (23.53%) centers were able to show data from more than one year prior to the visit - 2014 or earlier.

All centers were able to present their census of infants who underwent hearing screening in their facilities. However, only 14 (27.5%) centers had recorded data on the number of newborns referred for confirmatory testing. Similarly, only seven (13.7%) and four (7.8%) of the centers visited had recorded information on the number of newborns referred for hearing aid fitting and cochlear implantation, respectively. Only five (9.8%) had data on the number of patients referred for speech therapy.

Thirty-one (60.8%) centers reported that they were able to follow up their patients via text messaging, phone calls, or through the patients' pediatricians or ENTs.

Referral Systems

For access to confirmatory testing, six (50%) regions visited had a facility that provided confirmatory testing - centers classified as Category B or C performed confirmatory testing in the same facility. Most Category A facilities referred to other centers in their respective regions. Some facilities were unaware of which centers in their area offered such tests. This resulted in referral to hearing centers outside their region or cluster (i.e., to Manila) or patients were asked to inquire for themselves. For many centers, referral for further diagnostic evaluation or intervention was left to the discretion of attending pediatricians or ENTs.

Twenty (39.2%) of the 51 centers had access to an audiologist while two centers had to outsource them for ABR and ASSR interpretation. Only 12 (23.5%) centers had access to a certified speech and language pathologist. In lieu of this shortage, some centers referred to a developmental pediatrician or a special education teacher instead.

NHSRC Registry Cards and Submission of Data

At the time of the survey, 48 (94.1%) of the centers visited were not using the official Newborn Hearing Screening Reference Center registry cards. Only three (5.9%) centers were using them. Only two centers were encoding into the NHSRC web-based database. Few centers kept computer readable files of the data while the majority kept a manual, handwritten logbook.

The reasons cited were as follows: (1) process of ordering registry cards was not known, (2) inadequate number of cards available, (3) problems in procurement of registry cards, (4) no internet access to utilize the online web-based NHSRC registry, (5) no user access to the NHSRC registry, and (6) lack of personnel to process registry cards.

Connectivity and Information Technology Capabilities

Forty-two (82.4%) facilities had access to computers but only 30 (58.8%) had internet connection. Internet speed ranged from 2-60 Mbps with those with >50 Mbps mostly located in the National Capital Region (Metro Manila). Most (78.4%) centers had IT personnel and a budget for Information and Communications Technology (ICT).

Twenty-five (49%) centers utilized a form of electronic medical record (EMR) in their institution while 16 (31.4%) made use of computer-readable files such as Microsoft Word or Excel to keep records. Around half (52.9%) of the centers used ICT reporting systems or portals - such as PhilHealth eClaims, iHOMIS, Rabies Exposure Registry, and Kontra-Paputok Reporting System - to deliver reports on health services. Only 43.1% made use of Health Information Technology Providers (HITP) namely Bizbox and Segworks.

DISCUSSION

The survey results showed different degrees of compliance with the guidelines of UNHSIP in the Philippines of the surveyed hearing screening facilities, as documented in the Manual of Operations.

Centers were found to be highly compliant with the screening protocol of the MOP. The screener certification process of the NHSRC ensures that personnel are implementing the correct procedures when doing newborn hearing screening. It was notable that centers were highly compliant with both the certification of their personnel and in the implementation of the correct hearing screening protocols. Certification process ensures standards-of-care are followed.

The distribution of centers showed that there was lack of coverage for confirmatory testing, hearing aid fitting, and early intervention services. Only four regions outside Metro Manila had access to a Category C Center with complete services up to early intervention. The availability of specialists (clinical audiologists, speech and language pathologists) representing necessary steps in the UNHSIP process also suggests the lack of coverage.

This lack of local confirmatory services contributes to the fragmentation of the service delivery network for the UNHSIP where referral to a higher Category Center is often left to health professionals external to the hearing screening center, such as the pediatrician or ENT specialist. The need for personnel assigned to be a navigator-coordinator to guide parents through the different services has been demonstrated in studies³ and may be of benefit for the program.

Issues with accessibility of necessary services emphasize the need to map out the individualized UNHSIP service delivery network for Category A Centers. The registered hearing screening centers - and their certified screeners - should be able to pinpoint the most accessible referral centers for their patients. At present, there is no central resource for parents to search for Category B, C, and D Centers on their own.

The low utilization of the NHSRC online registry points to the problem of data management in the hearing screening centers. The low utilization (3.92%) does not match the rates of computer access (82.4%), internet access (58.8%), availability of IT personnel (78.4%), or use of other online reporting systems (52.9%) among the hearing centers.

A significant number of facilities had difficulty recording results with no standardized way to record data. There was no uniformity in data fields collected as well as in the form of data encoding with usage of multiple formats, both analog and digital. This results in data sets with compatibility issues making integration into the NHSRC registry difficult.

Facilities lacked mechanisms to follow-up screened newborns. Centers using the two-step OAE protocol reported issues with follow-up for re-screening. It was also unclear to centers who shoulders the responsibility of keeping track of the newborns that needed rescreening, confirmatory

testing, or intervention. Although some centers had records of those who were referred for further assessment, there was no mechanism to track how many actually sought confirmatory testing.

Regular data collection through regional or national databases for newborn hearing screening programs is vital in a functional UNHSIP.⁴ Appropriate data management systems are the most commonly used strategy to combat high lost-to-follow-up rates.⁵ The NHSRC registry should employ strategies to increase its utilization rate for the program to progress.

Some of the reasons extracted for low utilization of both the online registry and the registry cards are administrative in nature including: lack of personnel, difficulty in procurement of registry cards and other material. These could be addressed by enacting policy changes in the program to allocate the needed resources. Other reasons elicited were problems with the use of the online registry such as difficulty accessing or difficulty uploading into the web-based portal. These can be addressed by improving the end-user experience.

CONCLUSION

The performance of the newborn hearing screening procedure was found to be adherent to the RA 9709 MOP, but major deficiencies in the program were identified. Data reporting to the national registry is the main deficit with contributing factors identified. Lack of confirmatory and early intervention services in certain areas emphasize the need for development of regional centers.

Recommendations

Many issues have already been tackled by changes to the Manual of Operations of RA 9709 or by increasing awareness of proper protocols for the UNHSIP. Given the issues identified in the current implementation of the UNHSIP, the following are recommended:

1. For high birth rate centers, an adequate number of personnel must be allocated to the program, taking into account the time needed for both the screening of newborns as well as the process of advising the parents and data entry into the national registry. Additional personnel must be hired and additional equipment must be procured as needed in order to cater to the number of newborns. Further time and motion studies are needed to address these issues.
2. Certification should be conducted regularly to address the high turnover rate of the screeners of personnel. Other strategies may be explored such as decentralization where a local authority – such as the DOH Regional Office – may host certification or training courses based on the demand of the locality. The use of remote training and use of learning management systems is a viable option.
3. Certification of the institution separate from certification of the personnel should be considered.
4. The NHSRC registry should have multiple modes of entry (off-line, realtime, store-and-forward) to ensure that all users of the system are able to submit their center's data. Specific user experiences and special use case scenarios can be explored to ensure full utilization of the registry. Usability studies and comparative studies on these modes of entry should be done.
5. The process for procurement of registry cards should be streamlined. Considerations should be given to public health facilities which are governed by rules of procurement. Bulk orders of registry cards should also be considered for high birth rate centers, given the current limitations on the number of registry cards that can be ordered. The number of registry cards that can be ordered should be based on the number of births in that area.
6. The data points of the NHSRC registry card may be re-examined to eliminate any unnecessary data entries.
7. The UNHSIP would benefit from decentralization in order to efficiently check and organize the program. The NHSRC should delegate program managers on the regional level. The tasks that may be more efficiently performed by a regional point person include: (1) inspection of centers and audit of their implementation UNHSIP, (2) performing quality control studies, (3) identifying issues in program implementation, (4) mapping the service delivery network in the locality, and (5) coordinating with the NHSRC and DOH.
8. Pediatricians, obstetrician-gynecologists, midwives and even community health care workers called barangay health workers (BHWs) should be actively recruited to participate in this endeavor since they have the most interaction with the infants and their parents in the early stages of their development.

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Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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