

Challenges and Solutions in Implementing Hearing Screening Program in India

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Abstract

Hearing is the key to learning spoken language, performing academically, and engaging socially for children. Degree of hearing loss quantifies the hearing ability from mild to profound, based on the audiometric findings for an individual across certain frequencies or pitches. Early identification and appropriate intervention is the prime need. A probable strategy is to ensure that every newborn is screened for possible hearing loss at the birth in the hospital. In India, hearing screening facility is mostly available to newborns brought into tertiary hospitals. Some of the key issues in the implementation of the program identified are lack of human resources, inadequate infrastructure, equipment-related shortcomings, and low priority for hearing impairment (HI) prevention. The Government of India initiated efforts toward prevention and control of HI, i.e., National Program for Prevention and Control of deafness and Rashtriya Bal Swasthya Karyakram which are significant milestones in the implementation of systematic nationwide hearing screening programs.

Keywords: Degree of hearing loss, hearing impairment, hearing screening

INTRODUCTION

Hearing is the key to learning spoken language, performing academically, and engaging socially for children. Hearing loss poses an obstacle to education and social integration. It can have profound effects not only on interpersonal communication but also on health, independence, well-being, quality of life, and daily function. Persons with hearing impairment (HI) are likely to have lower family incomes, less educated, and unemployed.^[1]

The WHO estimates that over 5% of the world's population or 466 million people have a disabling hearing loss (432 million adults and 34 million children). It is estimated that by 2050, over 900 million people or one in every 10 people will have disabling hearing loss. In children under 15 years of age, 60% of hearing loss is attributable to preventable causes.^[2] Sixty-three million people (6.3%) suffer from a significant auditory loss in India; 4 in every 1000 children suffer from severe to profound hearing loss. Every year, over 100,000 babies are born with HI in India. The estimated prevalence of adult-onset HI in India was found to be 7.6% and childhood-onset HI as 2%.^[3] Rural areas have a high prevalence of hearing loss than that of urban areas.^[4] Hearing disability has a higher prevalence in children aged 0–4 years (0.60%) and 5–9 years (0.28%) than all other

disabilities (0.32%).^[5] Hearing loss has been ranked as the fifth leading cause of years lived with disability which is higher than many other chronic diseases such as diabetes, dementia, and chronic obstructive pulmonary disease.^[6]

ENT disorders are one of the prime reasons for a visit to a primary care doctor in both rural and urban communities across the world.^[7] However, hearing loss receives limited research funding and public awareness. Global multidisciplinary and collaborative efforts are urgently needed to address the health needs of the child and adult with hearing loss.

SIGNIFICANCE OF MILD AND MODERATE DEGREE OF HEARING IMPAIRMENT

Degree of hearing loss quantifies the hearing ability from mild to profound, based on the audiometric findings for an individual across certain frequencies or pitches. It is measured

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in decibel (dB). Mild degree of hearing loss refers to 26–40 dB loss, followed by moderate (41–60 dB), severe (61–80 dB), and 81 dB and above loss is said to be profound. The disabling hearing loss refers to hearing loss >40 dB in the better hearing ear in adults and >30 dB in the better hearing ear in children.^[8] Data regarding the magnitude of HI in the urban and rural population in our country are limited. In mild hearing loss, the most difficult sounds of speech consonant sounds such as “f,” “th,” “k,” and “p” can be lost during a conversation, thereby implying difficulty to clearly distinguish between the words. This reflects that even the milder form of HI can make listening unclear and difficult.

WHY EARLY DETECTION AND IDENTIFICATION IS REQUIRED?

Auditory stimuli during the first 6 months of life are critical for the development of speech and language skills. The critical period for language learning is within the first 36 months of life.^[9] The factors predicted to be influential in normal development of speech and language skills which ultimately also will be predictor for cognitive development in children includes hearing ability, degree of HI (mild to profound), age of identification of hearing loss, age of intervention, aided audibility, duration, consistency of hearing aid use, and characteristics of the child’s language environment. Early identification of HI followed by a timely and effective intervention is necessary to minimize its negative effects on the development of cognition, psychological, and verbal communication skills.^[10] Several studies have shown that infants who receive intervention before the age of 6 months have better school outcomes, improved language, and communication skills by ages 2–5 years.^[11]

However, the disturbing fact is that the average age at which a child who has a profound, bilateral sensorineural hearing loss is identified at around 24 months, while HI of lesser degrees often is identified at an average age of 48 months of age,^[12] especially in rural areas due to the poor awareness about HI and its relation with speech and language development as well as scarcity of infrastructure. Thus, unnoticed or late detection of significant HI in infants and young children results in permanent disability. Thereby, early detection, identification, and earliest appropriate intervention are the prime needs.

STRATEGY FOR EARLY DETECTION AND IDENTIFICATION OF HEARING IMPAIRMENT

A probable strategy to ensure that children with hearing

loss are identified and treated early is to ensure that every newborn is screened for possible hearing loss at the birth in the hospital.

Ideal time for hearing screening

The core goals of the early detection and intervention program under Universal Newborn Hearing Screening (NHS) program are described as “1-3-6” goals. This implies that newborns be screened before 1 month of age, confirm the diagnosis of hearing loss, fit hearing aid before 3 months, and enrolls the child for early intervention before 6 months of age.^[13] The Joint Committee on Infant Hearing 2007 recommends that all infants should be screened no later than 1 month of age. This recommendation is extensively recognized and has been institutionalized as a standard of care by hospitals nationwide.^[14]

Available screening techniques

The auditory function is tested either peripheral (cochlear) or central (brainstem). Screening can be performed using two methods, i.e., objective and subjective. In the objective method, screening is performed by otoacoustic emissions (OAE) or automated auditory brainstem response (ABR) testing. OAE is technically easier and faster to perform. The subjective method, i.e., behavioral screening tests, involves behavioral observation audiometry, especially in the case of NHS [Table 1].

At present, ENT surgeons, audiologist, and speech-language pathologists are actively involved in the early detection and intervention programs.

CHALLENGES TO EARLY DETECTION AND INTERVENTION OF HEARING IMPAIRMENT

Implementation of early detection and intervention program in India

Lack of infrastructure

Especially in rural areas where majority of the population resides, of the 350 government-run hospitals with tertiary care facilities, 120 have diagnostic and rehabilitation facilities for the early detection of hearing loss.^[19]

Lack of availability of expertise

There is a strong contrast in the demand for human resource versus capacity, as the ratio of the combined number of audiologists and audiometricians to the population has been reported to be 1: 500,000. Private centers do offer facilities for audiological evaluation; however, they are not uniformly distributed across the country.^[20]

Table 1: Details of tests used in hearing screening

Modality	Tests	Specificity (%)	Sensitivity (%)	False positive (%)	False negative (%)	Reference number
Objective	OAE	70-82	-	15	-	[15]
	BERA	68	70	24	6	[16-18]
Subjective	Behavioural response	86.9	66.7	5.6	99.6	[17]

OAE: Otoacoustic emissions, BERA: Brainstem-evoked response audiometry

Lack of knowledge of hearing screening program among primary care providers

False-positive rates

It is well-documented that OAE testing has a high false-positive rate (up to 15.6%) in the first 24 h of life, falling to about 4% by 72 h.^[21] The main concern is of “falsepositives” which can have undesired effects and anxiety among family members. This can be reduced significantly if one uses brainstem-evoked response audiometry (BERA) instead of OAE.

Cross-infection risk

Improper reuse of probes while administering OAE carries the risk of cross-infection. Adopting a pragmatic approach with re-useable probes and cleaning between patients can be useful.

Cost-effectiveness

The equipment costs around 2.5 lakh rupees to 5.3 lakh rupees depending on one would use OAE or BERA for the screening program. If the same equipment are shared between two and three hospitals, along with the staff, it could be even more beneficial cost-wise.

Policy and legislative issues

Legislation helps in ensuring that hearing screening is available to all, but those standards are yet to be met, especially in a country like India. The program of early detection and intervention has not been adopted uniformly in all the available setups. Professional associations can be used to help accomplish this goal, and this will require ongoing work.

Technical and other obstacles

This includes frequent breakdown of machines, unavailability of probes in good time, and uneven distribution of machines. These issues not only delay the processing but also there are chances of missing the cases for that duration and this will ultimately reduce the effectiveness of the program.

Lack of standardized screening programs

Due to large diversity in the implementation of early detection and identification program for HI, the outcomes look more scattered and not targeted.

Identification of late-onset hearing impairment in childhood is often missed

Loss of Patient in Follow-up

The lost to follow-up rate for newborns with a failed screen is nearly 50%.^[22]

Postscreening parent psychological impact

A further concern, which applies to all neonatal screening programs, is that of adverse psychological effects on parents caused by the screening process itself. This is particularly so if false-positive or negative results are obtained.

EARLY DETECTION AND INTERVENTION PROGRAM IN INDIA

Based on studies citations, in India, generally hearing screening facility is available to newborns brought into tertiary hospitals.

A centralized hearing screening facility for universal screening program was conceptualized and established in Cochin.^[23] The program initiated by the Indian Academy of Pediatrics in 2003 is one of the largest programs with a unique centralized screening facility. It includes 20 major hospitals in Cochin, Kerala (South India), with maternity units.^[24,25]

In 2006, the Government of India initiated efforts toward prevention and control of HI, in which neonatal hearing screening at a grass-roots level was envisioned as National Program for Prevention and Control of deafness (NPPCD). Under the NPPCD, funds for the execution of the program are given to the state health society, and the program committee is to function as a supervisory and monitoring authority for smooth conduct of the strategies to prevent and control HI.^[26] Under this program, both institution-based screening and community-based screening are being implemented in various districts. The institution-based screening was modeled after hospital-based programs, and community-based screening was targeted toward babies not born in hospitals. Community-based screening is being conducted using a brief questionnaire and behavioral testing by a trained health-care worker during immunization. Any infant who did not pass the screening is to be followed up at the district hospital for OAE and ABR testing, and if required, for rehabilitation.^[27]

In 2013, the Government of India launched Rashtriya Bal Swasthya Karyakram (RBSK). This initiative involved child-health screening and early intervention services for children 0–18 years of age, for defects at birth (including congenital hearing loss), disease, deficiencies, development delays, and disabilities. Under RBSK, children undergo community-level screening by mobile health team comprising a medical officer, paramedics, and nurses at Anganwadis. Screening is also conducted at government-aided schools and at public health facilities such as primary/composite health centers and district hospitals, by existing health personnel such as medical officers, nurses, and auxiliary nurses. Children diagnosed with illnesses receive follow-up services at tertiary level at no cost. NPPCD and RBSK are significant milestones in the implementation of systematic nationwide hearing screening programs.^[28]

Furthermore, the 70th World Health Assembly adopted a resolution on the prevention of HI and hearing loss in 2017.^[29] This resolution has called upon member states to integrate strategies for ear and hearing care within the framework of their primary health care systems, under the umbrella of universal health coverage.^[30]

CONCLUSION AND RECOMMENDATIONS

Uniform structured NHS program needs to be designed in India and implemented effectively by ensuring human resources as well as infrastructure and resources for both screening and management. The accomplishment of NHS programs lies in the timely identification, diagnosis, and management of children with hearing loss accomplished via

a multidisciplinary NHS team who act as decision-makers as well as facilitators for different stages in the screening process. Primary health-care providers such as ENTs, audiologists, family medicine practitioners, pediatricians, gynecologists, and nursing staffs are in a key position to educate families about the importance of early diagnosis and follow-up if they themselves are well informed. Newborns and parents are observed regularly by the primary health-care providers, and parents often seek inputs from them on the infants' medical and developmental needs. This provides an ideal opportunity to promote follow-up and make appropriate referrals. However, for this to happen in actual, it requires that primary healthcare providers should be educated about the importance of early NHS. Implications of these will result in best practice in the medical and educational treatment for infants with permanent hearing loss. Unfortunately, there is very little information about what primary care providers know about this topic and what needs to be explored more.

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Conflicts of interest

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