

## Screening for childhood hearing impairment in resource-constrained settings: Opportunities and possibilities



Hearing impairment is viewed as the silent epidemic, because of its invisible nature and because routine clinical examinations often fail to detect it. It is the most prevalent sensory disorder in developed countries such as the USA and UK, with at least 1 in every 500 newborns having bilateral permanent hearing impairment.<sup>[1]</sup> Data on the prevalence of childhood hearing impairment in developing countries are scarce. However, estimates based on pilot studies suggest that childhood hearing impairment may be more prevalent in developing than developed countries. For instance, the prevalence of hearing impairment among neonates was found to be 5.3 - 28/1 000 in Nigeria and 5.0 - 5.6/1 000 in India.<sup>[2]</sup> In South Africa (SA) it is estimated that at least 6 116 babies are born with permanent bilateral hearing impairment every year.<sup>[3]</sup> Up to 75% of prelingual hearing impairment has some genetic origin.<sup>[1]</sup>

Untreated hearing impairment can lead to delays in speech, language, and cognitive and social development that may have a devastating impact on a child's life with regard to academic achievement, employment and social integration in later life.<sup>[4]</sup> This negative impact may be even greater in developing countries that have limited support services for individuals with hearing impairment. From a societal perspective, failure to detect hearing impairment and provide intervention early in a child's life means that the child will require special schooling, which is likely to be more expensive than mainstream schools. In addition, an individual with late/non-diagnosed hearing loss is likely to be reliant on social programmes.<sup>[4]</sup>

In contrast, if permanent congenital hearing loss is detected and managed early in life, outcomes are better than when it is detected and managed after 6 months of age.<sup>[5]</sup> In the USA it was shown that the use of neonatal and infant hearing screening programmes lowers the age of hearing loss identification and intervention.<sup>[6]</sup> The value of early detection of hearing loss in children is only tangible if appropriate intervention is put in place timeously.<sup>[7]</sup>

Methods of detecting childhood hearing impairment have developed tremendously over the years. Modern technology and refinements in procedures for early childhood hearing screening have now made it possible to screen for hearing impairment in neonates within the first 12 - 24 hours of life. Quick, reliable and non-invasive hearing screening tests such as otoacoustic emissions and automated auditory brainstem responses now enable healthcare workers to screen a newborn's hearing in less than 2 minutes. Furthermore, such tests can be performed effectively by well-trained non-audiologists without compromising their sensitivity.

Neonatal hearing screening is now a routine exercise in most developed countries such as the USA and the UK. For instance, in the USA at least 95% of neonates are screened for hearing loss shortly after birth, and at least 77% of neonates with confirmed hearing loss are enrolled in intervention programmes by 6 months of age. In the UK, 99% of parents opt for neonatal hearing screening, conducted either in hospital or during a home visit by the health visitor nurse.<sup>[8]</sup>

This is in contrast to SA, where only a few healthcare facilities offer limited neonatal hearing screening, i.e. 7.5% of public healthcare institutions<sup>[9]</sup> and 53% of private.<sup>[10]</sup> Universal screening takes place at 1% of public institutions<sup>[9]</sup> and 14% of private facilities.<sup>[10]</sup> As a result children are often diagnosed late, with the reported age of diagnosis ranging from 2 years<sup>[11]</sup> to almost 4 years.<sup>[12]</sup> In addition,

intervention often takes place at least 8 months after diagnosis of the hearing impairment,<sup>[11]</sup> thereby missing out on the period for optimal development.

One lesson that can be drawn from countries that have successfully implemented programmes for early childhood hearing screening is that there has to be support from a policy/legislation perspective. For instance, in the USA universal neonatal hearing screening is legislated and mandatory in at least 43 states. Furthermore, these countries have also adopted efficient and effective means of testing using non-audiology personnel.

Most developing countries do not have legislation that mandates universal neonatal hearing screening,<sup>[8]</sup> and the majority of these countries still use risk-based screening for hearing impairment (risk-based screening is ineffective, as it fails to detect congenital hearing impairment in 50% of those who are screened). However, most of these countries do have successful expanded immunisation programmes or some form of neonatal screening initiatives that could be used to implement neonatal hearing screening programmes. For instance, in SA neonates are supposed to have some subjective developmental screening that includes hearing during routine immunisation visits, while in Egypt there is a national screening programme for metabolic conditions such as hypothyroidism among children.<sup>[7]</sup> These are all platforms that can be used to implement neonatal hearing screening as part of a comprehensive neonatal care package of services.

Resource constraints such as lack of equipment and trained personnel, poor follow-up of babies in whom screening picks up a problem, and the high proportions of babies who are not born in hospital have been cited as some of the challenges encountered when implementing neonatal screening in most developing countries. However, the technology used in developed countries is now available in most developing countries, and there is a need to explore how this technology can be sourced and to ensure that neonatal hearing screening is offered as part of the package of services for postnatal care. There is also a need to integrate services for neonatal hearing screening into existing postnatal services (instead of setting them up as parallel programmes) to ensure efficient use of resources.

Specific to SA, while there is no national legislation/policy *per se* that mandates neonatal hearing screening, there are some initiatives in the form of existing policies and guidelines that provide an excellent launch pad from which neonatal hearing screening can be implemented across the country. The National Department of Health developmental screening (as part of the Road to Health) includes a requirement for screening for hearing impairment (albeit using very ineffective methods), as does the Health Professions Council of South Africa position statement on neonatal screening,<sup>[13]</sup> which advocates such services (among others).

At present, the few hearing screening programmes in SA operate from hospitals, which is not ideal. However, our primary healthcare (PHC) facilities have been identified as viable platforms through which hearing screening can be implemented, and a pilot study has demonstrated the feasibility of introducing neonatal hearing screening at PHC level in SA.<sup>[14]</sup> Moreover, SA is one of the few countries in sub-Saharan Africa with relatively well-developed audiology services in respect of infrastructure, available technology and specialist audiology personnel to design PHC-based hearing screening programmes.

Acknowledging the shortage of audiologists in SA and also the uncomplicated nature of the screening technology, there is a need for a change in mindset and an opportunity to have hearing screening undertaken by well-trained non-audiologists. Standardised training programmes to ensure competence to conduct hearing screening on the part of non-audiologists need to be developed, with the aim of building capacity within neonatal healthcare teams. Clearly, the acquired skills of these screeners would need to be recognised by the relevant authorities.

Audiologists would manage the hearing screening training programmes, but be free to focus on confirmation of the diagnosis of hearing impairment in infants who screen positive, and then to undertake subsequent appropriate intervention(s).

Given the successful implementation of universal neonatal hearing screening and the value of such services in developed countries, we in developing countries should be asking ourselves 'how', and not 'whether', such services should be delivered in our contexts.<sup>[4]</sup>

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