

Audiological practices and findings post HPCSA position statement: Assessment of children aged 0 - 35 months

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Background. Early detection of hearing loss is important to ensure optimal development, and may be influenced by the audiological assessment process.

Objective. To describe the actual practices and audiological findings with regard to the assessment of 0 - 35-month-old children referred for a hearing assessment at a public hospital.

Methods. A retrospective record review was conducted. The study sample comprised 100 participant files.

Results. The mean age of initial hearing screening was 13.1 months. Of the participants, 99% received an initial hearing screening and 44% received a second hearing screening. Only four of the eight participants who were referred underwent auditory brainstem response testing and were diagnosed with hearing loss. These four participants were diagnosed after the age of 2 years. The audiological protocol differed from that recommended by the Health Professions Council of South Africa, resulting in limited diagnostic assessment results.

Conclusion. The study highlighted gaps in the practice of recommended, age-appropriate audiological protocols as well as the ages at which the initial hearing screenings were conducted, which affects early diagnosis of hearing loss.

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The professional board for speech, language and hearing professions of the Health Professions Council of South Africa (HPCSA) released a position statement that outlines the Early Hearing Detection and Intervention (EHDI) programme in South Africa (SA).^[1] The purpose of the EHDI programme is to detect, diagnose and treat newborns and infants with hearing loss at an early age. A recent survey suggested that 53% of private hospitals offer some form of newborn hearing screening, and only 15% offer true universal newborn hearing screening.^[2] In comparison, an earlier study revealed that only 7.5% of public hospitals in SA had implemented some form of newborn hearing screening.^[3]

Although EHDI has proven benefits, its implementation in SA is not yet a reality.^[4] A recent study by Swanepoel *et al.*^[5] in a university clinic setting indicated that of the 65 participants with bilateral sensorineural hearing loss within their study sample, 47% were diagnosed after 36 months, 20.4% before 18 months and 30.6% before 24 months. They also reported that 75% of the participants with unilateral hearing loss ($n=8$) had been diagnosed after 36 months. These ages for diagnosis and intervention are delayed when compared with the stipulated guidelines by the HPCSA position statement.^[1] There is limited published literature regarding the audiological practices to assess hearing in children within the SA public healthcare sector.

Late detection of hearing loss may also be influenced by the audiological assessment process, from initial assessment to final diagnosis. It is necessary for audiologists to use a test battery, so as to base the diagnosis on collective results.^[6] Hospitals are required to follow an inclusive audiological test battery when assessing neonates and infants.^[1] The HPCSA has recommended a test battery between the ages of 0 and 36 months to allow for accountable testing and diagnosis of hearing loss (Figs 1 and 2).^[1] Apart from the recommended electrophysiological measures, high-frequency tympanometry (using a 1 000-Hz probe tone) has also been recommended as a measure that should be made available at tertiary and secondary hospitals for differential diagnosis when a 'refer result' is obtained for otoacoustic emissions (OAEs).^[1]

Objective

To describe the actual practices and audiological findings with regard to the assessment of 0 - 35-month-old children referred for a hearing assessment at a public hospital.

Methods

Research design and site

The research study employed a descriptive, retrospective research design. The research site was a secondary hospital located in Johannesburg. The Audiology Department has two permanent audiologists and one community service audiologist, and is located near the Ear, Nose and Throat (ENT) Department. There is only one audiology booth with an audiometer, an OAE screener, an immittance machine using a 226-Hz probe tone and noise makers.

Sampling strategy and sample

A purposive sampling method was used. For the purposes of this study, patient files of children aged 0 - 35 months, assessed between January 2010 and December 2012, were utilised.

The sample comprised 100 participant files that met the inclusion criteria. The initial audiological assessment had to be of children within 0 - 35 months old, between 2010 and 2012. The participant files had to include information on at least the initial audiological assessment.

Data analysis

The data collected were analysed using descriptive statistics.

Ethical considerations

Ethical clearance was obtained from the Medical Human Research Ethics Committee of the University of the Witwatersrand (clearance certificate number: M130365) and permission was obtained from relevant personnel at the hospital prior to commencement of the study. Anonymity was ensured by using a participant code system instead of participant names.

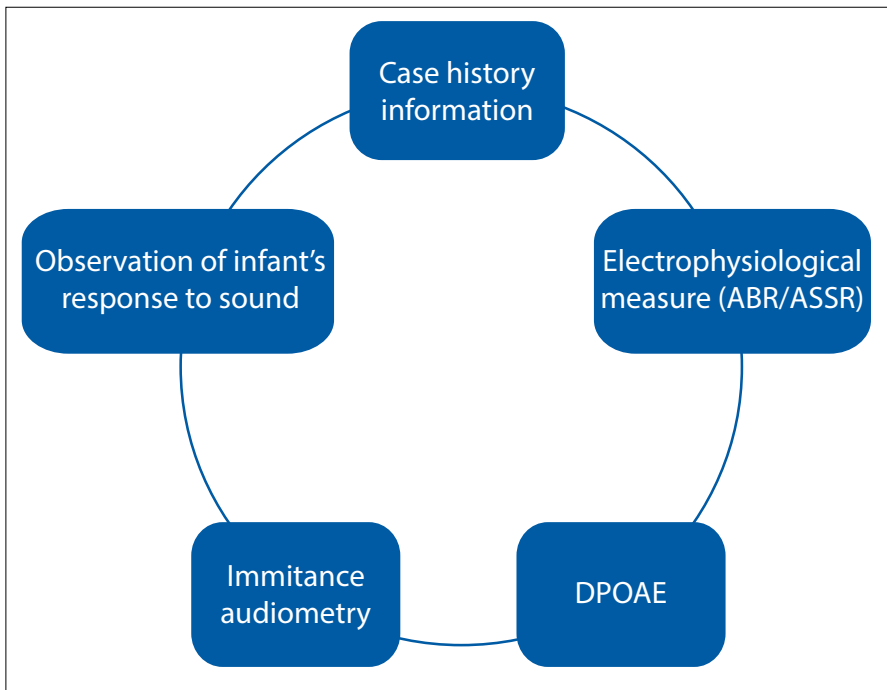


Fig. 1. Recommended audiological test battery for infants <6 months old.^[1]

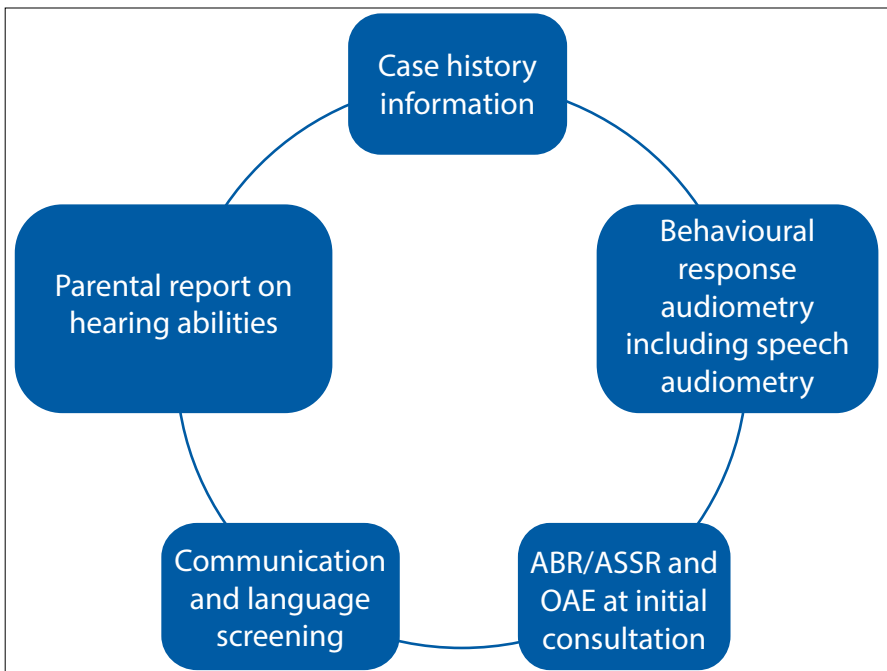


Fig. 2. Recommended audiological test battery for children aged 6 - 36 months.^[1]

Results

The age of participants at the time of initial audiological assessment ranged from 2 weeks to 32 months, with 34 participants being <6 months old. Of the 100 participants, 99 had an OAE refer result (9 for the left ear only, 17 for the right ear only and 73 bilaterally). One participant could not be screened using OAEs. Twenty-seven of the bilateral OAE refer results were accompanied by type A tympanograms bilaterally, 13 by type B tympanograms bilaterally, 19 by unilateral type

A and type B tympanograms, 8 by unilateral type A and type As tympanograms, and 6 by unilateral type B and type As tympanograms. Overall, 75 participant files indicated a need for a recheck, and 19 indicated the need for referral to the ENT specialist.

Age of initial audiological assessment

The mean age of initial audiological assessment was 13.5 months (range 2 weeks - 32 months). The age range for the initial

assessment was 31.5 months and the median age was 11 months. Results indicated that 44% (n=44) of the participants underwent a second hearing screening, four of which underwent diagnostic auditory brainstem response (ABR) from another nearby tertiary hospital. The mean age for the second hearing screening was 16 months, which was conducted ~3 months after the initial hearing screening. The four participants diagnosed with hearing loss were diagnosed at a mean age of 32.5 months.

Audiological evaluation of children following hearing screening

Very few participant files indicated referral for diagnostic audiological evaluation. Of the 100 participants, 6 of the 66 participants who were >6 months were referred for visual reinforcement audiometry, and 8 participants were referred for diagnostic ABR. Of these 14 participants, only 4 (4%) were clinically diagnosed with hearing loss, despite 35 having had an OAE referral without any suspected middle-ear pathology.

All four of the participants diagnosed with hearing loss presented with bilateral hearing loss. Three of the participants were diagnosed with sensorineural hearing loss, and one was diagnosed with conductive hearing loss. The initial age of hearing screening was after 2 years of age (range 25 - 32 months). Participants were diagnosed with hearing loss through diagnostic measures ~3.5 months after the initial audiological screening.

From the initial OAE screenings (N=100), 73% had a bilateral refer result and 26% had a unilateral refer result. Of the 44 participants who received a second screening, 11 presented with a unilateral refer, while 33 presented with a bilateral refer result.

Audiological protocol used for diagnosis of hearing loss

Case history interviews and immittance audiometry (tympanometry 226-Hz probe tone) were routine procedures conducted on all participants diagnosed with hearing loss. Tympanometry with a 226-Hz probe tone was routinely used, even though a 1 000-Hz probe tone is recommended for children between 0 and 6 months of age. OAE screening was also commonly conducted at the initial audiological evaluation, even when contraindicated by the presence of suspected conductive pathology. One participant was referred directly for an ABR assessment following a case history interview and tympanometry, without any assessment through behavioural audiometry. One participant received a diagnostic distortion product OAE (DPOAE) from a referral tertiary hospital. All four children diagnosed with hearing loss underwent a diagnostic ABR from a referral tertiary hospital.

Discussion

Four children were diagnosed with hearing loss between 2010 and 2012. It must be noted that this may be an underrepresentation, as these children were reportedly the only children who underwent a comprehensive audiological assessment; the remaining participants who did not receive complete assessments may include some children with undiagnosed hearing loss. The late diagnosis of hearing loss in developing countries is attributed to the reality that hearing diagnosis in developing countries relies highly on family concerns.^[7] Families often notice developmental delays when the child reaches the age of language acquisition, which is after 1 year of age.

Results showed that participants were receiving their initial hearing screening at an average age of 13.5 months. In contrast, a study conducted in Malaysia identified that children were receiving initial evaluation before 3 months of age, as a result of an early screening programme, with detection of hearing impairment through diagnostic ABR between 2.4 and 5.2 months of age.^[8] According to the HPCSA,^[1] hospital-based screening should involve screening of infants before the age of 1 month. Appropriate EHDI programmes have evidently not been successfully implemented. This was further noted in a study done by Van der Spuy *et al.*^[9] The implications of these results are that children with hearing loss are not receiving intervention at an appropriate age.

The four children diagnosed with hearing loss in the current study were diagnosed at a mean age of 32.5 months, following ABR assessment. Although the results of the diagnosed children in this study are not representative of the population, they correlate with results from other studies.^[5,10] However, it is recommended that hearing loss be diagnosed by 3 months of age to allow for optimal development.^[11]

The late age of diagnosis may be influenced by the audiological protocol used to assess children between 0 and 35 months of age and poor follow-up return rate. Results from the current study indicated that 55% of the participants did not have a follow-up screening, despite the initial *refer* result from OAE screening. According to the HPCSA,^[1] a rescreen after an OAE *refer* is critical to eliminate false positives, and screening should be monitored monthly to allow for hearing loss diagnosis to occur by 3 months of age. The follow-up screening in the current study occurred ~3 months after the initial screening, resulting in further delay with regard to diagnosis of hearing loss. Assessment using OAEs is not sufficient in isolation.^[11] Further testing, such as ABR, is necessary for this population in order to assist in decreasing false positives, which take up time and resources, and cost money. Therefore, a screening protocol should comprise a reliable test battery to eliminate high referral rates and false positives. The protocol documented in the sample population included case history taking, OAE screening, otoscopy, 226-Hz tympanometry and speech awareness thresholds.

The recommended protocol at hospital level includes an ABR/automated ABR, DPOAE, immittance audiometry, speech audiometry and case history.^[1] It is evident from the results that the protocol currently being implemented differs from the recommended guidelines in terms of electrophysiological measures. According to the HPCSA position statement,^[1] children <6 months require ABR/auditory steady state response (ASSR), DPOAE and/or high-frequency tympanometry (1 000-Hz probe tone) for appropriate diagnosis. These assessment measures were not available at the hospital in the current study. Children between the ages of 6 and 36 months require an ABR/ASSR and behavioural audiometry,^[1] which was not evident in the current study.

An unpublished study by Teixeira (Master's research report, University of the Witwatersrand, 2012) found that audiologists were overreliant on diagnostic electrophysiological measures for paediatric hearing assessment. The research site used in the current study was not equipped with diagnostic electrophysiological measures and needed to refer to a nearby tertiary hospital for ABR, diagnostic DPOAE or

ASSR testing. OAEs and ABRs are the only reliable tools in identifying hearing loss in infants,^[11] but a lack of equipment and staff has been identified as a challenge to screening and assessment in the SA context.^[3] The lack of appropriate audiological equipment may have contributed to only 4% of the sample population being diagnosed with a hearing loss.

Although a recheck is recommended by the HPCSA position statement^[1] in screening infants, no further records were available regarding the recheck results. This suggests that a significant number of participants were not followed up, possibly due to poor follow-up return rates and/or poor record keeping. Record keeping is essential as it allows for appropriate tracking of patients who have not returned for follow-up appointments, and further allows for continuation of care for those who return.^[12] Follow-up return rate is a growing concern in SA. The factors contributing to children being 'lost' before their follow-up include insufficient services, such as qualified audiologists and necessary equipment, a lack of professional knowledge involved in hearing screening, the difficulty parents face in bringing their children for screening and the gap in communication among professionals.^[13]

Conclusion

The number of participants with reported hearing loss may not be accurate, as very few participants underwent comprehensive, diagnostic assessment. The current study identified that infants are still not being diagnosed at the recommended age as stipulated by the HPCSA position statement, the implications of which are far reaching into the child's development and communication.

Results also showed gaps in age-appropriate assessment protocols, which has significant implications for the diagnosis of hearing loss in this age group. Findings may be further influenced by poor follow-up return rate, and challenges faced by audiologists working within the public healthcare sector context in terms of availability of equipment and resources, especially at tertiary and secondary levels of care.

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