



Paediatric diagnostic audiology testing in South Africa



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ABSTRACT

Introduction: With the increased emphasis on the importance of early identification of paediatric hearing loss within developing countries such as South Africa and Nigeria there has been a recognition of the ethical obligation to ensure access to timely diagnostic and intervention services for children identified with hearing loss; regardless of their geographic or socioeconomic status. There are limited studies on diagnosis of paediatric hearing loss in a developing world context.

Objectives: The objective of this study was to determine processes used for diagnosis of paediatric hearing loss in South Africa, across the private and public healthcare sectors, and to profile the age of testing for each component of the diagnostic test battery.

Methods: Diagnostic audiology testing data of 230 children enrolled in an early intervention programme was analysed to profile the reporting of diagnostic audiology testing as well as diagnostic audiology procedures employed. Results were analysed according to province as well as healthcare sector to compare diagnostic services across regions as well as healthcare sectors.

Results: The differences in audiology practice and tests employed with paediatric clients across the regions of Gauteng, Kwazulu Natal and Western Cape indicates that services across regions and across the public and private sector are not equitable. Each region is equally unlikely to complete a full, comprehensive diagnostic evaluation on paediatric clients. The age of testing highlights the increased age of diagnosis of hearing loss.

Conclusion: Paediatric diagnostic audiology is a section of Early Hearing Detection and Intervention services that requires attention in terms of the appropriateness of procedures as well as equity of services. Further studies on diagnostic practice and resources in South Africa will provide information on factors that are preventing adherence to international best practice guidelines for paediatric diagnostic audiology.

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1. Introduction

The prevalence of hearing loss in newborns has been recorded as 2 to 4 per 1000 live births in developed countries and 6 per 1000 in developing countries [1]. These statistics indicate an estimated 17 babies born with hearing loss daily in South Africa [2]. In order to ensure that hearing loss is identified as soon as possible after birth, with referral and intervention shortly thereafter, the Early Hearing Detection and Intervention (EHDI) pathway was instituted, with many international countries adopting the Joint Committee on Infant Hearing (JCIH) [3] recommendation of screening for hearing loss by 1 month of age, diagnosis of hearing loss by 3 months and referral to early intervention services by 6 months. The EHDI system ensures that the transition from screening to diagnosis to intervention is

managed effectively. This drive towards early identification and subsequent early intervention has as its goal typical developmental outcomes for children with hearing loss.

Within the EHDI pathway internationally, the primary focus to date has been on the implementation of newborn screening programmes and the statistics relating to number of children screened, screening procedures and data management within screening programmes [4–8]. However, beyond this screening process, where USA is reporting a 96% coverage rate for screening of all newborns [9], few studies relating to the diagnosis of paediatric hearing loss have been published [10–13]. A systematic review of research related to the EHDI pathway in South Africa indicates a mirroring of this international trend [14]. Research focussing on the procedures followed for diagnosis of paediatric hearing loss in a developing country context is an area that is lacking in evidence-based research. Also lacking are studies related to data management and sharing of results from screening and diagnostic audiology testing [14].

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The goal of a diagnostic assessment is to determine the type, degree and configuration of hearing loss in each ear [15]. Internationally, specific protocols and guidelines exist for both the screening process [3] and for the diagnostic testing of children within specific paediatric age groups [15]. In this regard South Africa has the Health Professions Council of South Africa (HPCSA) document on guidelines for screening [16], drawn primarily from the international protocols. However protocols for diagnostics within the paediatric population in South Africa have not yet been fully explored. South Africa has (through the Health Professions Council of South Africa) released a draft document on diagnostic guidelines for the paediatric population, for comment by audiologists [17]. This is an indication of the impetus to move forward in establishing guidelines for ensuring consistency and accuracy in diagnosis of paediatric hearing loss, as the next step in the EHDI pathway. With the increased emphasis on the importance of early identification of paediatric hearing loss within developing countries such as South Africa and Nigeria [18–24], there has been a recognition of the ethical obligation to ensure access to diagnostic and intervention services for children identified with hearing loss, regardless of their geographic or socioeconomic status [25].

International best practice for diagnosis of paediatric hearing loss includes the JCIH [2] guidelines relating to paediatric diagnostic testing for the 0–5 year age group. South Africa lacks a nationally agreed upon battery of tests and protocols for diagnosing hearing loss for infants and babies and a lack of comprehensive studies relating to the practice of paediatric diagnostic audiology.

The current study aims to describe the documented audiology procedures used for diagnosis of paediatric hearing loss for children enrolled in an early intervention programme in Gauteng, Kwazulu Natal and Western Cape. The objectives of the study are to:

- (1) document the reporting procedures employed by audiologists for recording and reporting on diagnostic testing of paediatric clients, and
- (2) document the tests used for diagnosis of paediatric hearing loss including evaluation of the middle ear, and use of behavioural testing and electrophysiology testing (including the ages at which these tests are used).

2. Methods

A retrospective record review of the patient files of 711 children referred to the HI HOPES Early Intervention programme from September 2006 to December 2011 was conducted. Children identified with hearing loss are referred to the programme to receive home-based, family-centred early intervention. All identifying information from the paediatric audiology records have already been removed by the early intervention programme and a coding system for tracking and storage of information for data analysis is used. This ensures privacy and confidentiality of data. Parents have signed consent forms providing permission for accessing all data, including paediatric audiology records, to be used for research purposes. University of the Witwatersrand Ethical Clearance (Medical) Board provided ethical clearance for a comprehensive survey study and the University of the Witwatersrand Ethical Clearance (Education) Board provided permission for the study of all data and records relating to the early intervention programme.

2.1. Study population

The research population recruited through nonprobability convenience sampling comprises of 711 deaf and hard of hearing

children enrolled in an early intervention programme in South Africa, who had diagnostic audiology testing conducted in one of three provinces (Gauteng, Kwazulu Natal and Western Cape) in South Africa. This research forms part of a longitudinal study of 160 variables profiling children with hearing loss enrolled in the HI HOPES early intervention programme during this period [26]. The sample comprised of 131 males (57%) and 99 (43%) females. The average age of initial testing for 167 children where age is provided is 36.5 months ($SD \pm 23.6$, range 1–142 months). For the remaining 67 children the age at which initial diagnostic testing was conducted is not available due to this information not being included in the reports or diagnostic testing information included with the referral documents.

2.2. Procedures

The files of the children enrolled in the early intervention programme between September 2006 and December 2011 were examined to obtain audiology records. Audiology records were drawn from the files and reviewed. Information pertaining to diagnostic audiology testing was logged onto a data collection sheet specially designed to collate and facilitate analysis of the diagnostic audiology data. Variables included reporting format, middle ear assessment (tympanometry and acoustic reflex testing), behavioural testing method and age (air and bone conduction), and electrophysiology testing method and age (air and bone conduction). Demographic data included province in which testing was conducted and healthcare sector (public or private health).

Collated data from the data collection sheet was transferred to an excel sheet to electronically capture all details included in the reports so as to systematically document and analyse the information.

2.3. Data analysis

Data analysis techniques included basic descriptive statistics (average values, standard deviation, frequencies and percentages). Data was grouped and analysed according to the variables of private vs. public practice and the province in which the practice is located to determine the variation in diagnostic practice with respect to these variables.

Hypothesis testing (chi-square) using a significance level of 5% allowed the determination of whether there is a statistically significant difference between the private and public sector for specific variables [27].

3. Results

Of the 711 children referred to the early intervention programme between September 2006 and December 2011, audiology reports of 230 children (32% of the total referrals) were available. Reports were obtained either from parent records or directly from the referring audiologist. With logging of references to previous testing included in the reports, as well as reports from additional testing sessions for some children, audiological data includes reference to 390 audiology testing sessions.

3.1. Reports

Of the 230 children where there is some reference to diagnostic testing in the early intervention programme records, 121 children had a single assessment session only, 76 children had 2 assessment sessions, 23 had 3 assessment sessions and 7 had 4 assessment sessions. Three children each had 5, 6 and 9 assessment sessions

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