



## Early detection of infant hearing loss in the private health care sector of South Africa

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### ABSTRACT

**Objective:** A national survey of early hearing detection services was undertaken to describe the demographics, protocols and performance of early hearing detection, referral, follow-up and data management practices in the private health care sector of South Africa.

**Methods:** All private hospitals with obstetric units ( $n = 166$ ) in South Africa were surveyed telephonically. This data was incorporated with data collected from self-administered questionnaires subsequently distributed nationally to audiology private practices providing hearing screening at the respective hospitals reporting hearing screening services ( $n = 87$ ). Data was analyzed descriptively to yield national percentages and frequency distributions and possible statistical associations between variables were explored.

**Results:** Newborn hearing screening was available in 53% of private health care obstetric units in South Africa of which only 14% provided universal screening. Most (81%) of the healthy baby screening programs used only otoacoustic emission screening. Auditory brainstem response screening was employed by 24% of neonatal intensive care unit screening programs with only 16% repeating auditory brainstem response screening during the follow-up screen. Consequently 84% of neonatal intensive care unit hearing screening programs will not identify auditory neuropathy. A referral rate of less than 5% for diagnostic assessments was reported by 80% of universal programs. Follow-up return rates were reported to exceed 70% by only 28% of programs. Using multiple methods of reminding parents did not significantly increase reported follow-up return rates. Data management was mainly paper based with only 10% of programs using an electronic database primarily to manage screening data.

**Conclusions:** A shortage of programs and suboptimal and variable protocols for early hearing detection, follow-up and data management in existing programs mean the majority of babies with hearing loss in the South African private health care sector will not be identified early. Newborn hearing screening must be integrated with hospital-based birthing services, ideally with centralized data management and quality control.

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## 1. Introduction

All children have the basic human right to have access to human communication, regardless of where they are born, their race, their nationality, their family's income, or the level of education of their parents [1]. Every year more than 800 000 infants globally are estimated to be born with, or acquire permanent bilateral hearing loss (>40 dBHL) within the first few weeks of life [2,3]. This estimate is even higher if unilateral, fluctuating and/or minimal hearing losses are also included [2,3]. More than 90% of these

infants reside in developing countries such as South Africa, where a scarcity of quality data describing the epidemiology of hearing impairment exists as a result of limited systematic or routine screening programs [3–6].

The South African health care system is divided into the public and private sectors. The majority of South Africans rely on the public health care sector for health services [7,8]. Recent South African reports evidence some progress in the initiation of pilot early hearing detection and intervention (EHDI) programs in public and private health care settings, but no mandated systematic hearing screening programs are available [6,7]. At present the prevalence of infant hearing loss has been estimated at 6/1000 live births in the public health care sector and 3/1000 live births in the private health care sector [6]. These infants can only be detected early enough for optimal intervention outcomes

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through widespread newborn and infant hearing screening programs using objective screening technologies such as otoacoustic emission and auditory brainstem response screeners [6,9–13].

Late detection of hearing loss impedes language, psychosocial, emotional and cognitive development in early childhood, which in turn undermines later educational and vocational attainment [1,3,9–14]. The negative effects of hearing loss are exacerbated by the poor socio-economic conditions and burdened health care system in South Africa [14]. The longer the hearing impairment goes undetected, the poorer the language and speech outcomes are likely to be with higher associated costs [1,9–11,14]. In South Africa, various studies report average age of diagnosis to be well over 18 months due to the absence of a systematic effort to screen infants [5,6]. This can be attributed to the poor status of current EHDI services in South Africa. In the public health care sector, which serves approximately 85% of the population, only 7.5% of hospitals provide some form of neonatal and infant hearing screening and virtually no (<1%) universal screening is provided [7]. As a result more than 90% of babies born in South Africa are left without the prospect of early detection of hearing loss [7].

Although the principles of EHDI programs are supported by the Integrated National Disability Strategy White Paper [15] and the Position Statement produced by the Health Professions Council of South Africa [12] it is not mandated by hospital management or universally included as part of maternal birthing services [6]. Consequently, efforts to implement EHDI programs remain mostly unsystematic and only available in certain hospitals with the exact status unknown [6]. National surveys on current screening services and available resources (including financial, equipment, facilities and trained personnel resources) have been recommended as an important priority to establish the current status and capacity of EHDI programs [6,12]. In response, a survey of newborn screening services in the public health care sector was completed in 2008 [7].

Until recently, however, there has been no survey of EHDI services in the private health care sector. The current study is part of the first national survey on early hearing detection services in the private health care sector where approximately 150 000 babies are born annually [16]. Screening, referral, follow-up, and data management protocols in early detection services across the private health care sector of South Africa are reported in this study.

## 2. Method

The national survey was conducted in South Africa's private health care sector and institutional ethics committee approval was obtained before data collection was initiated.

### 2.1. Study population

The total population included all private health care institutions that offer obstetric services and the private practice audiologists (registered with the Health Professions Council of South Africa) who provide infant hearing screening services at these units. Every private health care (non government funded) sector institution in South Africa was contacted telephonically by the first author to determine whether the respective institution rendered obstetric services. A total of 304 private health care sector institutions, including hospitals, clinics or private practices listed on a national registry ([www.medpages.co.za](http://www.medpages.co.za)) [17] were identified for potential inclusion in the sample. After removing duplicate listings, the remaining 298 hospitals were contacted. Eight of these hospitals were not eligible for the current study since they were partly government funded whilst four others no longer exist. Of the remaining 286 eligible private health care institutions, 120 (42%) did not render obstetric services. Ward matrons at the remaining

166 institutions with obstetric units were subsequently surveyed regarding newborn hearing services.

### 2.2. Procedures

Data on the existence of and type of newborn hearing screening program were collected from matrons at private hospital maternity wards by means of a telephonic survey along with information on the responsible audiologist. Subsequently questionnaires were distributed nationally to audiologists providing hearing screening at the respective private sector institutions who reported hearing screening services ( $n = 87$ ). Questionnaires were sent out in July 2010 and all data was collected by the end of August 2010. Participants who rendered services at more than one private institution were asked to complete separate questionnaires for each institution to ensure that data was representative of the respective hospitals or clinics. The self-administered questionnaire was distributed by email or fax and consisted of sections including biographical information, work context and hearing screening practices. Subsequent sections covered information on data management and quality control, diagnostic protocols and intervention practices. A high return rate of 89% (77/87) was obtained for the questionnaires across all nine provinces of South Africa, providing data of early detection programs in the private health care sector nationally.

This study reports on the following aspects of the private health care sector survey: (1) early hearing detection program demographics and protocols used; (2) performance and protocols related to referral and follow-up; (3) data management practices.

### 2.3. Data management and analysis

Data collected from a telephonic survey made to private hospital maternity wards were incorporated with data from the questionnaires completed by audiologists at the respective private health care institutions. The data were analyzed descriptively to yield percentages and frequency distributions nationally. In addition, Chi-Squared and, where appropriate, Fisher's Exact tests were used to investigate a possible statistically significant association between variables.

## 3. Results

### 3.1. Early hearing detection program demographics and protocols

Of the 166 private health care institutions nationally with obstetric units, only 53% (87/166) reported some form of newborn hearing screening service. Of the 87 units reporting hearing screening, 77 (89%) returned the questionnaires. Universal hearing screening was only reported by 14% of institutions with obstetric units and a further 18% reporting universal screening on most days but not 7 days a week. The remaining units indicated using a risk-based newborn hearing screening approach (3%) and offering screening on request from parents or other health care providers (18%). All audiologist respondents indicated that they work in towns and cities and none in rural contexts.

Table 1 represents the combinations of screening tests used for the initial hearing screening regardless of the screening program employed. In the healthy baby ward, the vast majority of programs (91%; 70/77) used automated otoacoustic emission (AOAE) screening as a single test or in combination with other procedures as part of their protocol, whilst only 2 programs (3%) employed automated auditory brainstem response (AABR) testing (Table 1). Most (81%; 62/77) of the screening programs used only AOAE screening for healthy babies, and a single screening program reported utilizing AOAE in conjunction with AABR. In the neonatal

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