

Protocols for early audiology intervention services: Views from early intervention practitioners in a developing country

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Objectives. To identify the protocols and practices for audiology early intervention (EI) in Gauteng government hospitals, and determine whether these protocols comply with the principles for effective EI in audiology.

Methods and materials. Self-administered questionnaires were hand-delivered and distributed to participants in government hospitals in Gauteng.

Participants. Eighty-six professionals consisting of speech therapists and audiologists ($N=20$), paediatricians ($N=33$), ear, nose and throat specialists (ENTs) ($N=7$), and nurses ($N=26$) working in EI were included in the study.

Analysis of results. Findings were analysed via thematic content analysis which made it possible to determine the predominant themes with regard to EI protocols in government hospital settings. Additional quantitative descriptive statistics were also utilised to handle the data.

Results. Findings indicate inconsistent perceptions among the EI practitioners regarding the protocols implemented and that these may influence referrals and early management of children with hearing impairment. Delay of identification and diagnosis (later than 2 years of age) as well as delayed amplification were identified by audiologists. Factors contributing to lack of provision of EI services in audiology included inadequate referrals by professionals, lack of neonatal screening, and poor parental knowledge. Although the medical team believed that identification occurs at less than 6 months of age, they reported intervention to occur much later than identification. Principles of EI tested were generally perceived to be applicable to the South African context and in agreement with best practice in EI.

Early intervention (EI) is used broadly to refer to intervention practices with children from birth to 3 years of age.^{1,2} This paper will focus on EI in terms of early identification and management of children in this age group who display, or are at risk of, communication delay.³ The fact that the first decade of life is the most crucial time for healthy development and maximum learning means that effective EI services should be provided at as young an age as possible.⁴

The need for EI has been well documented and it has been recognised that the development of communication skills begins in infancy, long before the emergence of the first words.⁵ Professionals also know that delays in identification of hearing impairment impact on a child's personal, social, academic and vocational growth, and comprehensive services to this population are therefore needed.⁶⁻⁹ Swanepoel *et al.*¹⁰ state that EI has dramatic benefits.

There continue to be variations in EI practices both locally and internationally. Beliefs and experiences of professionals involved in EI may influence the nature and adequacy of EI, especially in developing countries. For EI to be effective, a well-articulated system must be in place with EI professionals functioning within a multidisciplinary and interdisciplinary team to ensure that the principles of EI are practised and

observed. This system must include adequate screening and referral routes and intake assessments, continuous monitoring of the intervention, and intensive planning and programme evaluation.³ Reynolds⁴ maintains that for EI services to achieve maximum effectiveness, the services offered must be of high quality and regular frequency, and should aim at minimising the progressive problems often associated with disability.¹¹ The child's related impairments and environmental factors should be managed in order to ensure the most functional outcome is obtained.¹¹ Additionally, it is imperative that the importance of translation of policies into clinical practice is acknowledged and affirmed.¹²

The following principles have been suggested for EI in audiology¹³⁻¹⁵ and guided the questionnaires used in the current study:

1. Hearing loss should be diagnosed and amplification provided by 6 months of age.
2. Ongoing audiological follow-up at intervals not longer than 3 months.
3. Intervention provided directly by the professionals concerned.
4. Intensive programmes that are of regular occurrence.
5. Programmes that address the issues of hearing loss and associated communication and language development.

6. Family-based intervention that is designed to suit the child's individual needs and provides a broad spectrum of services.
7. Language and communication intervention in a mode chosen by parents.
8. Constant feedback to be given to the professionals by actively involved parents.

In spite of the existence of the above principles, substantial differences in practice have been found and documented in several studies.¹⁶⁻¹⁹ Furthermore, poor access to information and availability of resources in certain developing countries prevents successful implementation of services.² Variations in practice are also thought to result from lack of commitment to principles on the part of the professionals.²

Even in the USA, substantial delays were found between parental suspicion, audiological-medical diagnosis, fitting of acoustic amplification, and initiation of EI services;²⁰ however, the pattern of delay in children with known risk factors was different from that in children without.

Factors such as age of diagnosis, nature of intervention and habilitation have not been comprehensively examined in South Africa, where the nature of EI is affected by the country's being both a developed and a developing one.²¹ While extensive literature is available on the practices and models of EI in developed countries, including Australia, Europe and the USA, little information is available in developing countries where policies and practices are largely inadequate.²² There also appears to be a large discrepancy between what is known and what can be done, owing to a lack of resources.² In spite of these findings Kagitcibasi *et al.*¹⁷ and Guralnick² maintain that the principles of EI should be implemented worldwide, both in westernised countries and the developing world.

Although the prevalence of sensorineural hearing loss in South Africa has been reported to be as high as 10%,²³ limited research into the EI services provided in this population could be attributable to factors such as the low audiologist-to-patient ratio and heavy clinical service load, particularly in the public sector, since a majority of audiologists are reported to be working in the private health care sector, where only a small minority of the population is seen.²³

Methods

Primary aim

To investigate the current protocols and practices for early audiological intervention services in Gauteng government hospitals.

Secondary aims

- To investigate whether perceived existing protocols complied with the international principles of EI for audiology.¹³⁻¹⁵
- To identify factors that are perceived to impact on compliance with these EI principles.
- To determine the perceived applicability of the principles in the South African context.
- To determine whether participants could identify additional principles that could be used to enhance service delivery in the context of the study.

Design of the study

A randomised cross-sectional descriptive survey design was used.²⁴

Description of the participants

Eighty-six participants were recruited via purposive non-probability sampling from five government hospitals in Gauteng. The sample comprised speech therapists and

audiologists ($N=20$), paediatricians ($N=33$), ear, nose and throat specialists (ENTs) ($N=7$), and nurses working in the neonatal and paediatric wards ($N=26$). The length of time they had worked with paediatric patients ranged from 3.5 to 11 years (Table I).

TABLE I. PROFILE OF THE PARTICIPANTS (N=86)

Professional	Sample size	Mean length of experience (yrs)
Speech-language therapists and audiologists	20	4.9
Paediatricians	33	8.36
ENT specialists	7	3.58
Neonatal and paediatric nurses	26	10.93

Material

Two questionnaires were designed based on the principles of EI and pretested before the main study. The questionnaires consisted of a combination of open- and closed-ended questions. One questionnaire was distributed to the paediatricians, ENTs and nurses (medical team), and a different questionnaire was given to the speech-language therapists and audiologists.

Procedure

Ethical clearance was obtained from the Human Research Ethics Committee, University of the Witwatersrand. In accordance with ethical principles, informed consent was obtained from the relevant authorities and from participants, and all necessary ethical principles were observed during the study.

Data analysis and statistical procedure

Once collected, data were collated and tabulated nominally according to the following themes, based on the frequency with which the response occurred:

- The medical team's views on audiological EI practices, with specific reference to age of diagnosis and age at which a child should receive amplification, team management, and referral to an audiologist.
- Speech therapists' and audiologists' views on early audiological intervention, specifically age of diagnosis, and patient surveillance and follow-up.
- Applicability of EI principles in the South African context.

The dominant trends which emerged in relation to early audiological intervention were identified. Descriptive statistics were utilised to illustrate and make sense of the findings.

Results

Medical team's views on EI practices in audiology Ages of diagnosis and amplification

A large proportion of medical team members are aware that hearing loss is identifiable and diagnosable by an audiologist at a very young age (less than 6 months) (Fig. 1).

Concerning audiologists' ability to provide effective amplification in cases of infants with diagnosed hearing loss, on the other hand, there was a tendency towards the view that audiologists can successfully fit amplification devices only later than 6 months of age (Fig. 2). This is incongruent with the perceived time of identification and diagnosis. ENTs seemed to have the most knowledge regarding the audiologist's role in provision of early amplification. This finding was expected, considering their close working relationship with audiologists

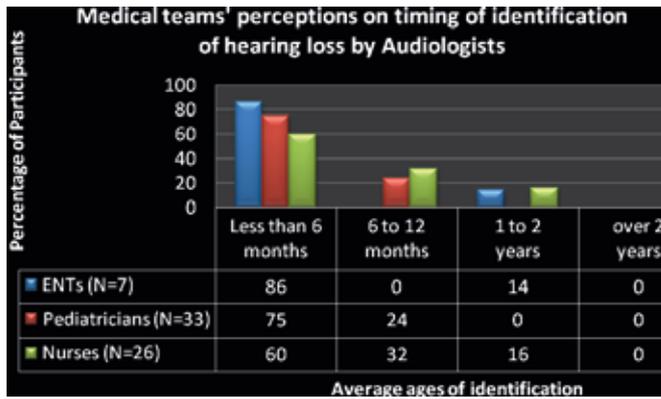


Fig. 1. Perceptions of medical team members on ability of an audiologist to identify and diagnose infant hearing loss.

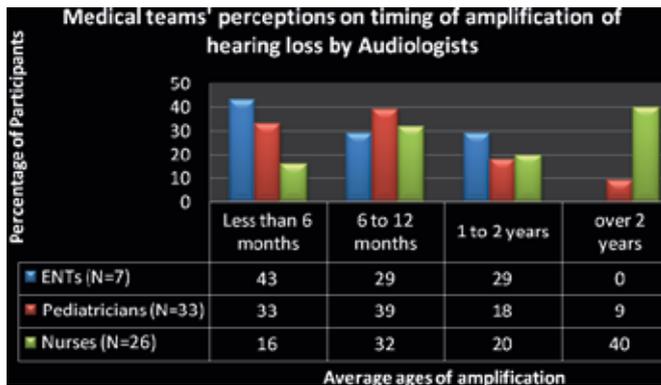


Fig. 2. Perceptions of medical team members on ability of an audiologist to provide intervention in the form of amplification for infant hearing loss.

in identification and management of ear and hearing problems.

Team management and referrals to an audiologist

With the exception of one nurse, all the professionals reported that they would refer to an audiologist when necessary. All the paediatricians, but remarkably not all ENTs in this small sample, viewed an audiologist as an integral part of the team (Table II).

Professionals	Yes (%)	No (%)
Paediatricians (N=33)	100	0
ENTs (N=7)	86	14
Nurses (N=26)	84	16

The most common reason for referral to an audiologist (Table III) was suspected hearing loss, with ototoxicity monitoring being the referral criterion least observed (with the exception of ENTs, whose least observed referral criterion was patients presenting with risk factors).

Audiologists' views on early audiological intervention practices

Ages of diagnosis

Fig. 3 reveals that most cases of paediatric hearing loss (63%) are diagnosed over the age of 2 years, contrary to the medical team's belief that they are diagnosed at less than 6 months of age. A majority of the respondents reported that amplification

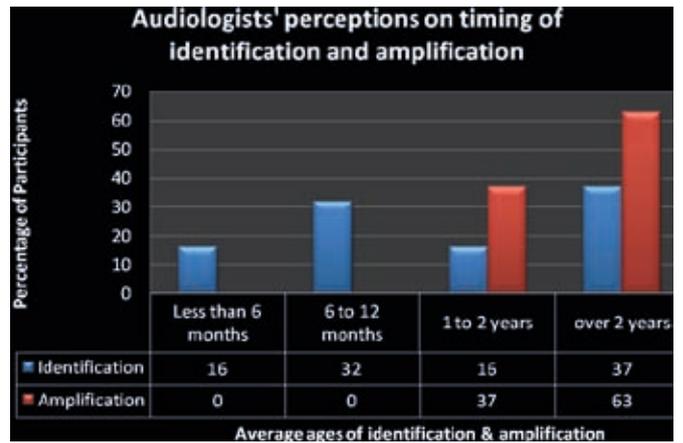


Fig. 3. Perceived ages of diagnosis and amplification of hearing loss as reported by audiologists (N=20).

is mostly provided only after the age of 2 years, consistent with the beliefs of the medical team.

A factor that may have contributed to delayed provision of habilitative services in the current study is lack of adequate resources, including audiological equipment, in many state hospitals. Audiologists in the current study also stated that this was the main reason for late diagnosis and delayed amplification.

Another possible factor contributing to late identification and intervention in the current study was lack of parental knowledge about EI services and the importance of such services (Fig. 4).

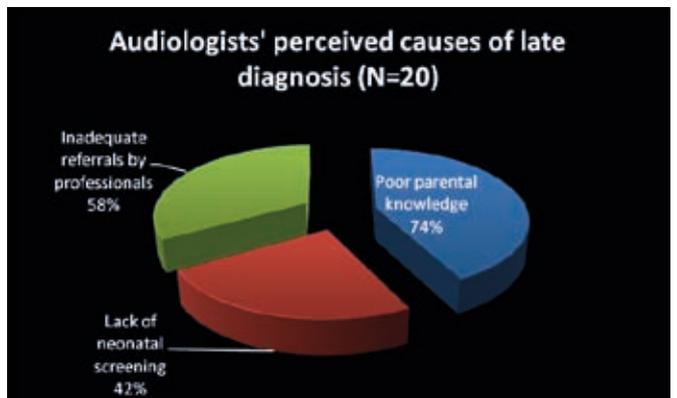


Fig. 4. Possible factors hindering early diagnosis of hearing loss as reported by audiologists.

Patient surveillance and follow-up

A large majority of the participants (74%) reported their follow-up intervals to be less than 3 months, while 5% were managing patients every 3 months. Intervention sessions for aural rehabilitation were reported to occur monthly in 58% of cases, with only 26% of professionals reporting weekly intervention.

Design of protocols and programmes

The principles of effective EI state that services should be provided directly by the professionals concerned, and within intensive programmes that include regular treatment sessions. Programmes should address the issues of hearing loss and associated communication and language development, and should be family based and designed to suit the child's individual needs. Furthermore, children should receive intervention in the language and communication mode chosen by parents, with constant feedback sought by the professionals

TABLE III. COMMONLY REPORTED REASONS FOR REFERRAL TO AN AUDIOLOGIST BY THE MEDICAL TEAM

Reasons for referral	Referring for condition (%)		
	Paediatricians (N=33)	ENTs (N=7)	Nurses (N=26)
Suspected hearing loss	100	100	72
Patient presents with risk factors	66	29	20
Infections of the ear	51	86	44
Any disease or infection where hearing loss is a possible complication	72	86	44
Prenatal, or postnatal infections	51	71	20
When ototoxic drugs are prescribed	42	71	4

from actively involved parents.¹³⁻¹⁵ Audiologists were asked to indicate whether the aforementioned principles were being followed when designing EI programmes.

Table IV indicates the audiologists' responses concerning the design and implementation of language and communication services. Only half reported that they continuously monitor the intervention progress. Only 26% of audiologists indicated that parents chose communication modes that their children were going to receive therapy in, and subsequently use. On the other hand, audiologists were in fact directly providing intervention themselves where necessary. Only 10% of the audiologists reported that personnel other than audiologists were involved in intervention. The vast majority stated that family-based intervention was the intervention of choice, 84% of the audiologists indicated that the child and his or her family were taken into account when deciding on intervention plans and procedures, and 11% of professionals reported that all possible attempts were made to implement family-based interventions.

Fig. 5 shows the audiologists' views of the team members essential for effective early audiology intervention. The fact that not all audiologists viewed an ENT as an important team member could indicate a broader lack of resources in government hospitals and may have implications for holistic management of children with hearing impairment.

TABLE IV. AUDIOLOGISTS' PERCEPTIONS ON PRACTICE OF EARLY INTERVENTION PRINCIPLES (N=20)

Questions	Yes (%)	No (%)
Is intervention provided by the audiologist at the hospital?	90	10
Do aural rehabilitation programmes occur on a regular basis?	80	20
Are family members involved in all decisions made in intervention?	84	16
Are cultural aspects taken into account when designing intervention?	100	0
Is progress in intervention continuously monitored?	53	47
Is feedback from parents continuously sought?	89	11
Is a team approach used in intervention?	89	11

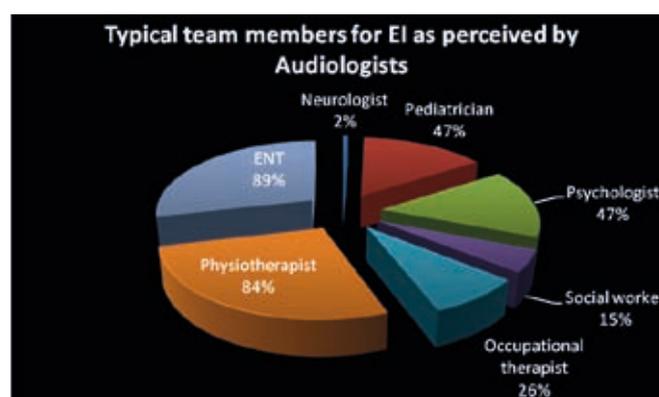


Fig. 5. What audiologists regard as essential members of a multidisciplinary EI team.

Applicability of the principles to the South African context

When the professionals were asked whether or not they viewed the principles of EI to be applicable to South Africa, 21% felt the principles were not applicable to the South African context owing to issues such as language barriers, cultural diversity, socio-economic factors, and lack of awareness and resources that affect provision of audiology services in South Africa.

Additional recommendations included research into the effects of HIV/AIDS and its treatments on hearing and communication development, and education of parents, particularly in informal settlements, with regard to developmental milestones as well as detection of warning signs of ear pathology and hearing impairment. Education campaigns aimed at promotion of the professions of speech-language therapy and audiology were also seen as an important recommendation.

Educational campaigns are essential given the fact that the current study revealed that limited parental knowledge may be a factor hampering effective EI services. ASHA²⁵ asserts that part of the role of an EI specialist is indeed to promote public awareness and public involvement through education.

Discussion

It is disconcerting to realise that although the medical team understands the audiologist's role in early diagnosis of hearing impairment, with regard to timing of intervention the audiologist is perceived as playing his or her part much later than in identification of hearing loss. This seemingly contrasting belief system could have a negative impact on referrals to audiologists for the provision of amplification devices, consequently delaying the age at which a child with hearing loss has access to amplification.



With regard to timing of intervention, the audiologist is perceived as playing his or her role much later than in identification of hearing loss.

This finding highlights the urgent need for a closer working relationship between the medical and audiology teams. Effective services can only be provided to this population when collaborative work ensures that reversible hearing impairment is managed early and that negative consequences of untreated hearing loss are mitigated.

The fact that the condition most commonly referred to audiologists is suspected hearing loss is a positive indication that professionals realise the necessity of referral to an audiologist to identify, diagnose and manage hearing loss. The low rate of referrals based on risk factors, exposure to ototoxic drugs and a history of pre- and postnatal infections is of concern, as the literature states that referrals should also be made on the basis of risk factors related to hearing loss^{26,27} and not only when actual hearing loss is present. This view may also imply a low awareness of the importance of prevention as an integral part of EI.²⁸ Moreover, the fact that only half of the paediatricians made referrals to an audiologist for infections of the ear is also of concern, since infections such as otitis media may result in speech and language impairments, especially if they are recurrent.²⁹

It is clear that there is no consistency between what the medical team perceives about EI in audiology and what audiologists report as actually occurring. However, discrepancies in reported times of identification and diagnosis could also result from parents being referred to audiologists early but only consulting much later owing to long waiting times. Not all hospitals have advanced audiological testing equipment, so paediatric patients who need such testing have to be referred to hospitals with the appropriate equipment, leading to long waiting lists.

Audiologists report that amplification is rarely provided before the age of 12 months, a situation far from the ideal standards set by the Joint Committee on Infant Hearing,²⁶ which state that evaluation procedures should be in place before the age of 3 months and intervention should be instituted by the age of 6 months.

Seventy-four per cent of audiologists believed that lack of parental knowledge was one of the prominent factors in delay of diagnosis and amplification. This finding is consistent with reports by Olusanya *et al.*,¹⁹ who assert that lack of parental knowledge has adverse effects on EI services, especially in developing countries.

Audiologists reported inadequate referrals by other professionals as another factor contributing to delayed intervention. Even though most members of the medical team in this study stated that hearing loss was identifiable at a young age, an apparent poor consistency between beliefs and practice implies that there is a gap between professionals' knowledge and what they do in practice.

Aural rehabilitation programmes should ideally address the issues of hearing loss and associated communication and language development.¹³⁻¹⁵ Hearing loss is inherently linked to significant language delays,⁸ hence the fact that the majority of audiologists reported to be addressing the associated communication and language development is to be expected,

and family involvement has been reported to be crucial in any efficacious intervention plan.¹³⁻¹⁵

The fact that only 26% of audiologists reported providing aural rehabilitation on a weekly basis could highlight a lack of resources (e.g. poor therapist/patient ratios, financial problems for patients, and so forth), which is common in developing countries. The majority of patients may not be receiving sufficiently intensive intervention, negatively influencing gains in communication and cognitive development. Failure to follow up has been reported to limit the effectiveness of early identification efforts.²⁷ Follow-up appointments are also crucial in children because of the progressive nature of many causes of paediatric hearing loss.³⁰ We acknowledge that even though one-to-one weekly intervention may not necessarily be the gold standard, and that even with sufficient resources it may not be the best intervention model for all clients, significantly less than regular contact with

patients may have more negative influence, particularly where home programmes are not efficiently employed.

Linguistic barriers may be the reason why parents are not given the opportunity to select the mode of communication, since the majority of audiologists in South Africa do not speak or understand languages other than English or Afrikaans.²⁵ Only 10% of the audiologists surveyed indicated that choice of communication mode was in fact a joint decision between parents and professionals – a disturbing finding, as the communication mode should be chosen by the parents after they have received full information from the audiologist about all the available options. This is recommended in the Joint Committee on Infant Hearing guidelines,²⁶ which state that informed choice on the part of parents is one of the pillars of successful EI.

Conclusion

Findings from the current study indicate that there are inconsistencies in perceptions of the various professionals involved in EI. Generally, the ages of diagnosis and implementation of intervention appear to be significantly delayed beyond the recommendations set in the literature – i.e. aiming for 6 months as the latest age of identification and treatment. In most cases this delay was attributable to lack of parental knowledge and inadequate referrals between professionals. Limited resources in the form of personnel, equipment and assistive devices may be other major factors contributing to South Africa's inability to comply fully with international standards of early audiological intervention services. Furthermore, the study revealed a less than optimal working relationship between ENTs and audiologists. Other principles tested revealed varied findings, but practices were generally perceived to be in line with recommendations for EI.

Factors specific to developing countries and the South African context, such as socio-economic difficulties, lack of resources and lack of trained personnel who are culturally and linguistically competent,³¹ were found to impede the provision of EI services. In spite of these difficulties and challenges, professionals working in this context still view the principles as relevant to the South African situation. Additional principles and considerations were also provided by the participating professionals, and these recommendations

all provide implications for further research. Campaigns to raise awareness among medical professionals and parents/caregivers about the role of audiologists in EI should be intensified, and audiologists should lobby government departments for improved resource allocation to enhance provision of efficacious EI services to the hearing-impaired population of this country.

Conflict of interest. The authors declare that they have no competing interests.

References

- Bowe FW. *Early Childhood Special Education: Birth to Eight*. New York: Delmar Learning, 2004.
- Guralnick MJ. *The Developmental Systems Approach to Early Intervention*. Baltimore, MD: Brookes Publishing Company, 2005.
- Rossetti LM. *Communication Intervention: Birth to Three*. 2nd ed. San Diego: Singular-Thompson-Learning, 2001.
- Reynolds AJ. Research on early childhood interventions in the confirmatory mode. *Children and Youth Services Review* 2004;26:15-38.
- American Speech-Language-Hearing Association. *Communication-based services for infants, toddlers, and their families*. Technical Report. ASHA, 1989. www.asha.org/docs/html/GL1991-00051.html (accessed 20 May 2010).
- Chiong C, Ostrea E Jr, Reyes A, Llanes EG, Uy ME. Correlation of hearing screening with developmental outcomes in infants over a two-year period. *Acta Otolaryngol* 2007;127:384-388.
- Horn DL, Pisoni DB, Miyamoto RT. Divergence of fine and gross motor skills in prelingually deaf children: Implications for cochlear implantation. *Laryngoscope* 2006;116:1500-1506.
- Kennedy CR, McCann DC, Campbell MJ, et al. Language ability after early detection of permanent childhood hearing impairment. *N Engl J Med* 2006;354:2131-2142.
- Olusanya BO. Priorities for early hearing detection and intervention in sub-Saharan Africa. *Int J Audiol* 2008;47(Suppl 1):S3-S13.
- Swanepoel DW, Hugo R, Louw B. Implementing infant hearing screening at maternal and child health clinics: context and interactional processes. *Health SA* 2005;10(4):3-15.
- Laughton B. Management of children with cerebral palsy. *CME* 2004;22(8):234-239.
- Dunst C. An integrated framework for practising early childhood intervention and family support. *Perspectives in Education* 2004;22(2):1-16.
- Johnson CE, Danhauer JL. *Handbook of Outcomes Measurement in Audiology*. Clifton Park, NY: Delmar Learning, 2002.
- Prendergast SG, Lartz MN, Fiedler BC. Ages of diagnosis, amplification, and early intervention of infants and young children. *Am Ann Deaf* 2002;147(1):24-30.
- Spivak L, Sokol H. Beyond newborn screening: Early diagnosis and management of hearing loss in infants. *Adv Neonatal Care* 2005;5(2):104-112.
- Calien R, Hugo R. Are parents of children with cochlear implants coping? *Health SA* 2002;7(2):68-73.
- Kagitcibasi C, Sunarb D, Seveda B. Long-term effects of early intervention: Turkish low-income mothers and children. *Appl Dev Psych* 2001;22:333-361.
- Maki-Torkko E, Sorri M, Jarvelin MR. More education in pediatric audiology needed for child welfare clinic nurses and doctors. *J Public Health Science Gen Pract* 1997;111:93-96.
- Olusanya BO, Luxon LM, Wirz CM. Maternal views on infant hearing loss in a developing country. *Int J Pediatr Otorhinolaryngol* 2006;70:619-623.
- Harrison M, Roush J. Age of suspicion, identification, and intervention for infants and young children with hearing loss: A national study. *J Am Audiol Soc* 1996;17(1):55-62.
- Noorbhai K. Early intervention services provided to families of deaf children. Unpublished MA Audiology thesis, Department of Speech Pathology and Audiology, University of the Witwatersrand, 2002.
- Gopal R, Hugo SR, Louw B. Identification and follow-up of children with hearing loss in Mauritius. *Int J Paediatr Otorhinolaryngol* 2001;57:99-113.
- Swanepoel DCD. Audiology in South Africa. *Int J Audiol* 2006;45:262-266.
- Schiavetti N, Metz DE. *Evaluating Research in Communicative Disorders*. 4th ed. Boston: Allyn & Bacon Publishers, 2002.
- American Speech-Language-Hearing Association. *Knowledge and skills needed by speech-language pathologists providing services to infants and families in the NICU Environment*. ASHA, 2004. www.asha.org/policy (accessed 18 November 2010).
- Joint Committee on Infant Hearing, American Academy of Audiology. (2000). *American detection and intervention programs*. *Pediatrics* 2000;106:798-817.
- Smith AD. *Early Hearing and Communication Development: Canadian Working Group on Childhood Hearing (CWGCH) Resource Document*. Minister of Public Works and Government Services, Canada, 2005.
- Olusanya BO, Swanepoel D, Chapchaj MJ, et al. Progress towards early detection services for infants with hearing loss in developing countries. *BMC Health Serv Res* 2007;7:14-28.
- Owens ER. *Language Disorders: A Functional Approach to Assessment and Intervention*. Boston: Pearson Education, 2004.
- Smith RJH, Bale JFB, White KR. Sensori-neural hearing loss in children. *Lancet* 2005;365:879-891.
- Khoza K, Ramma L, Mophosho M, Moroka D. Digit speech reception threshold testing in Tswana/English speakers. *S Afr J Commun Disord* 2008;55:20-28.