Guidelines:
Newborn Hearing Screening
Introduction

The purpose of this document is to outline standards for audiologists who provide newborn hearing screening in hospitals or clinics, and to provide information about the requirements for ethical and professional conduct and service provision. The overall aim is to promote standards of practice excellence and respectful conduct with clients and professionals alike.

Responsibilities, tasks and specific issues are set out to guide professional judgement and ethical decision-making in private practice. Audiologists shall observe these requirements as affirmative obligations and duties for practice.

Background Context

Early detection and intervention programs for hearing impairment are internationally becoming a standard component of neonatal risk assessment. The following factors are presented in support of the principle of universal newborn hearing screening (UNHS):

- The high incidence of hearing impairment, relative to other birth defects.
- Early intervention (before 6 months) maximises the potential for development of normal language abilities, cognitive skills, and social emotional development.
- Early detection and intervention benefits society by reducing the costs of specialised education requirements, and by increasing the potential of the hearing impaired adult to be economically self-sufficient in adulthood.
- While there are serious challenges for an effective UNHS and intervention program in a developing country, these very challenges reflect the need for the implementation of the program. Early detection and intervention may be the only opportunity for those with geographic and financial constraints, to be identified and provided with treatment options.

Over the past decade consensus has been reached that the potential benefit of NHS outweighs the harm of screening and justifies the cost of a NHS program. (Diefendorf, 1997)

1 The terms ‘client’ and ‘patient’ are used interchangeably.
In a developing country, financial and social constraints may require adjustments to the implementation of such a program, to ensure that the goals of the program are contextually relevant and achievable. One such option is targeted neo-natal hearing screening (TNHS) (Kriek, 2006.) This approach focuses on high risk groups in the neonatal population, specifically those born in neonatal ICU’s and high care facilities. In their 2007 Position Statement, The Professional Board for Speech, Language Hearing Professionals, advocates universal newborn hearing screening, on the basis that: “... while a risk based approach may have significant initial savings, the long-term benefits of early identification of hearing loss will be severely compromised if a universal screening model is not applied.” (Yoshinaga -Itano & Gravel.2001).

SASHLA recognises that while this is the gold standard to which the profession aspires, the economic realities in South Africa constrain the implementation of UHS, making TNHS the more affordable and therefore likely program to succeed, in the short and medium term, in this country.

**Principles**

The Professional Board for Speech, Language and Hearing Professions of the Health Professions Council of South Africa, concurring with the Joint Committee for Infant Hearing (JCIH) 2000 Position statement, endorses the development of Early Hearing Detection Intervention (EHDI) programs that are family-centered and community based. Consequently, the following six principles from the JCIH 2000 Position statement have been accepted as the foundation for effective and accountable EHDI systems in South Africa.

1. All infants are afforded access to hearing screening using physiological measures.
2. All infants are afforded access to an effective referral system if they do not pass the initial screen and/or any rescreen.
3. All infants with confirmed permanent hearing loss receive intervention services before 6 months of age inclusive of full diagnosis and rehabilitation.
4. All infants who demonstrate risk indicators for progressive, late-onset bilateral hearing loss or other auditory disorders and/or speech and language delay, receive ongoing monitoring.
5. Infant and family rights are upheld by the ethical practice of informed choice and consent.

Information should be captured and held on a dedicated data base.
Key concepts and definitions

- **EHDI**: Early Hearing Detection Intervention programs incorporate early screening, diagnosis, and intervention for hearing loss. The screening should be done by one month of age. The infants who fail the screening should be followed up diagnostically by three months, and be enrolled in an appropriate intervention program by 6 months of age. (JCIH 2000).

- **NHS**: Newborn Hearing Screening refers to hearing screening which is done soon after birth.

- **TNHS**: Target-based Newborn Hearing Screening applies the hearing screening to a select target population.

- **UNHS**: Universal Newborn Hearing Screening refers to the identification of hearing loss and is based on the principle that all neonates and infants should have access to objective screening to allow for early intervention. (JCIH 2000).

Relevant legislation

- Joint Committee on Infant Hearing Year 2000 Position Statement (USA)
- Modernization of Audiology Services, Provincial Government of the Western Cape

Contexts of practice

Private and public sector, including:

- Hospitals
  - Neonatal Intensive Care Unit
  - High Care Unit
- Community
  - District Hospitals
  - Health Centers
  - Clinics
Role and responsibility

An effective NHS program requires co-operation at various levels, including government, institutions, professionals and families. Such co-operation is reliant on clear delineation of the roles and responsibilities of everyone involved.

Government:

Allocation of adequate dedicated funding for effective manpower and appropriate technology, as well as provision of facilities and infrastructure.

Public sector initiatives to implement Newborn Hearing Screening (of infants from well baby nurseries or Maternal Obstetric Units in the community) as a component of Developmental Screening should be preceded by training of a cadre of screeners according to a programme/curriculum that has been accredited by the Professional Board for Speech Language and Hearing of the HPCSA.

A response plan, for infants who fail and are referred for diagnostic assessment must be in place: the referral pathway must be clearly identified; the name of the department and responsible Audiologist must be provided, relevant documentation prepared (refer to Addendum).

Additionally, budgets for hearing aids at the Regional and Central hospitals must be adjusted to reflect the likely pick up rate (2.1/1000 infants) and provide amplification within one month of diagnosis.

A further component of a response plan is the development of early intervention programmes, based in the community, for parents and their infants, to develop age appropriate communication skills.

Institutions:

In the private sector, the hospital administrators will decide whether to implement a NHS program, based on a motivation provided by the audiologists.

In the public sector, neonatology departments will implement a NHS program in consultation with audiologists.

In community health centers and clinics, implementation of a NHS program should take place on the instruction of the chief director.

Professionals:

The audiologist is the motivator for the establishment of the NHS program in all contexts. This motivation will be strongly linked to the fiscal and social benefits of early identification of hearing impairment.
Audiologists should hold a supervisory role in developing a ‘context appropriate’ screening program in both the public and private sectors. This role incorporates management, quality assurance, training, and a clinical audit of performance and outcome of the NHS program. The audiologist may be involved in the technical role of hearing screening, but she must retain an important clinical role with respect to patients’ feedback and the making of referrals for follow up and intervention.

Audiologists should motivate strongly to all levels of management that an interdisciplinary team should be established to implement the entire NHS program. The family is an integral part of the team. Members of this team, and their roles, may be the following persons:

I. Pediatricians and/or general practitioners who retain responsibility for the child’s medical welfare: in providing a reliable referral system; in determining risk factors for progressive hearing loss; and in monitoring developmental milestones.

II. Otolaryngologists, who provide specialized medical and surgical intervention, will frequently be involved in the long-term management of the child, and may also be involved in pre-assessment for cochlear implantation.

III. Speech-Language Therapists, who may be required for the evaluation and management of the child’s speech and language development.

IV. Additional medical specialists including geneticists, developmental specialists, and ophthalmologists who may be required to conduct additional diagnostic assessments.

V. Screening personnel with appropriate training may provide assistance in implementing the program.

Tasks

1) Establishing and evaluating high risk status of the new born infant:

The traditional high risk register has been replaced by a set of risk indicators. The list drawn up by JCIH 2007, and set out below, is recommended. Any risk factors for hearing impairment should be noted in the infant’s file.

(Risk indicators that are marked with * are of greater concern for delayed-onset hearing loss)
1. Caregiver concerns regarding hearing, speech language, or developmental delay. Family history of permanent childhood hearing loss.*
2. Neonatal intensive care of more than 5 days or any of the following regardless of length of stay: ECMO*, assisted ventilation, exposure to ototoxic medication (gentimycin and tobramycin) or loop diuretics (furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion.
3. In utero infections, such as CMV*, herpes, rubella, syphilis, and toxoplasmosis.
4. Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits and temporal bone anomalies.
5. Physical findings, such as white forelock, that are associated with a syndrome known to include a sensory-neural or permanent conductive hearing loss.
6. Syndromes associated with hearing loss or progressive or late-onset hearing loss*, such as neurofibromatosis, osteopetrosis, and Usher's syndrome; other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson.
7. Neurodegenerative disorders* such as Hunter syndrome, or sensory motor neuropathies such as Friedrich ataxia and Charcot-Marie-Tooth syndrome.
8. Culture-positive postnatal infections associated with sensory-neural hearing loss including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis.
9. Head trauma, especially basal skull/ temporal bone fracture that requires hospitalization.
10. Chemotherapy*

2) Establishing and evaluating hearing screening protocols and procedures:

The design of a NHSP will depend on factors unique to each setting. While a wide variety of protocols may be used successfully, TEOAE are recommended for the testing of well babies, while AABR assessment is recommended for those babies who are at risk for hearing loss, for infants from NICU or Special High Care Wards.

The following referral charts are recommended as a protocol for the two referral groups:
Flow Chart of a universal newborn hearing screening program using a transient evoked otoacoustic emission (TEOAE) screening procedure. (according to Spivak, 1998)
Flow chart of a universal newborn hearing screening program using an automated auditory brainstem response (AABR) screening procedure (according to Spivak, 1998).
3) Training and supervision of screening personnel:

Screening personnel who assist in delivering the NHS program should first undergo formal training which has been approved and accredited by the Professional Board of Speech Language Hearing Professionals of the HPCSA. All screening activities by assistants must be under direct supervision of the audiologist. Practical training under the guidance of the audiologist, who is running the program, must be ongoing.

4) Setting screener schedules:

The schedule is necessary to maximize the possibility of screening the highest number of infants. It should take into account factors such as the average hospital stay for a newborn, and the schedule of the specific maternity ward. Timing of staff changes, doctor’s rounds, visiting hours, etc should be considered. The final schedule needs to be drawn up in consultation with, and be approved by, the ward manager/sister.

5) Obtaining parental consent

The onus is on the audiologist to obtain consent from the parents to perform the hearing screening. Consultation with the attending medical specialist prior to testing is advisable, especially in the case of high risk infants, as this can assist in getting the parents to accept the test which is not usually included in the maternity delivery package of care of the hospitals.

6) Interpreting screening results:

The audiologist should always analyze the results and give a verbal report to the parents.

7) Feedback of results to physicians or parents:

This is one of the most important aspects of the hearing screening program. Parents need to be informed when their child does not pass the screening. This should be done without evoking unnecessary alarm, while emphasizing the need to adhere to follow-up recommendations.
Feedback to Parents:
- It is highly recommended that feedback is always given to the parents by the audiologist, even when screening may have been done by an assistant.
- A quiet and private room should be set aside in which feedback can be given
- Any reports to third parties should be with the parent’s knowledge and consent, in order to preserve their right to confidentiality.
- Language and cultural differences should be taken into account when giving feedback.
- It is valuable to provide the parents with written information regarding the screening program and recommendations for follow up appointments.

Feedback to Physicians:
- The attending medical specialists are normally given the screening results by means of entries in the hospital files, or in the infant’s "Road To Health Card" (RTHC)
- When the screening test has not been passed, additional information should be provided regarding recommendations and referrals.
- Standardised report forms will facilitate ongoing communication with the physician with regard to the status of the hearing screening and intervention with his patient.

In order to move toward a uniform approach to feedback and reporting, sample templates are provided in the annexure of this document.

8) **Monitoring and evaluating follow up**

Effective methods for tracking and following up referrals for diagnostic assessment must be in place.

There must be an explicit referral pathway providing identifying names of contact persons in the departments at the facilities where diagnostic assessment will take place. Appropriate documentation must accompany the referral. It is necessary to establish communication networks between the providers of the screening service, and local paediatric audiology services, to ensure that those children who have been diagnosed with a hearing impairment receive rapid intervention and support. A copy of the diagnostic report should be returned to the referring audiologist.

Diagnostic assessment of infants who failed NHS should be completed by age 3 months; intervention should have commenced before the age of 6 months.
9) Record Keeping:

Results and recommendations should be documented in the infant’s hospital folder. The audiologist should store the electronic test data and a copy of all written documents.

10) Infection Control

Anyone working in the neonatal nursery should be free of transmittable diseases. The most effective way to prevent the spread of infection is by frequent and thorough hand washing with an anti-septic agent. The use of disposable equipment, such as ear tips, is recommended to further reduce the chance of spreading infection.

11) Record keeping

All results and recommendations should be documented in the hospital records, and where possible, be linked to the national database.

12) Quality assurance (QA):

A QA system to track performance of the NHS should be in place. Key Performance Indicators should be explicit and desired outcomes should be identified for screening, the referral process, and for tracking access to follow up services.

1) Screening indicators:
   i. eligible infants- total number of infants in the target population.
   ii. screening rate - percentage of eligible infants that receive a stage 1 bilateral screen.
   iii. rescreen return rate - percentage of initially failed infants who return for a stage 2 rescreen.
   iv. fail rate - number of failed infants at each stage of the screening.
   v. missed rate - percentage of infants who were not screened in the hospital or at a later stage.
   vi. lost rate - percentage of infants with whom the program has lost contact usually due to poor demographic information.
   vii. parent refusal rate - percentage of parents who refuse to participate in the program
   viii. invalid screen rate - percentage of infants whose screen is invalid, usually due to technical failure.
   ix. billing charge per screened infant - average cost of screening per infant.
   x. probe consumption index - provides information regarding cost of consumables, as well as being an indicator of efficiency of equipment usage.
   xi. patient feedback - this relates to complaints and compliments obtained from the families involved in the program.
2) Referral indicators:
   i. total referral rate;
   ii. referral rate per reason
      - failed screen
      - medical risk (children who are at risk for progressive hearing loss)
      - incomplete screen
   iii. ABR referral rate
   iv. VRA referral rate
   v. medical risk factor monitoring - use of hospital records to identify infants who become at risk for progressive hearing loss, subsequent to discharge from the neonatal unit.
   vi. early intervention referral rate - number of infants referred to EHDI programs.

3) Hit Rate .v. False Alarm Rate:
   The number of infants referred who are confirmed to have hearing loss (hit rate), versus the number referred who have normal hearing.

13) Educating the community and providers of follow-up services:

Audiologists’ should contribute to community based education programs that emphasize the value of early detection of hearing loss. Target groups may include: pregnant women and their partners; developmental screening nurses; ICU nurses; community rehabilitation workers; mid level workers; therapy assistants; crèche workers and supervisors.

Minimum requirements to perform the tasks
(facility, equipment, information technology, infrastructure)

Equipment:

The objective physiologic measurement systems for NHS are:
   - Oto -Acoustic Emissions (OAE/TEOAE) system
     (WBN - well-baby nursery)
   - Automated Auditory Brainstem Response (AABR) system
     (NICU - neo-natal intensive care unit)
   - Otoscope

Human Resources:

Supervisor and co-ordinator - audiologist.
Screeners - any health professional on the NHS team provided they have received accredited training; volunteers who have attended accredited training may also participate, under direct supervision of a registered health professional.

Nursing personnel - especially ward and clinic managers.

Infrastructure:

Basic requirements include:

- A quiet darkened test area
- Wash basin
- Basic furniture (desk, chair)
- Electrical outlet

Other relevant issues

In South Africa to date, no formally recognized training programs are in place for support personnel. As a result, in present time, **only those persons whose training includes hearing screening as part of their training are permitted to conduct neo-natal hearing screening (presently Speech-Language Therapists and Audiologists) and neonatologists. There is an urgent need to develop and accredit training programmes for screeners in other health related groups. This will facilitate the development of ‘teams’ of screeners.**

Resources


Key references


Kriek, F: A Hearing Screening Program For Infants from a Neo-natal Intensive Care Unit in a South African Provincial Hospital.


http://www.jcih.org/posstatemts.htm

http://www.ehdi.co.za/
Annexure

COMMUNICATION TEMPLATES (adapted from Spivak, 1998)

I. Verbal report to parents of a newborn infant who did not pass the NHS:

“We did not get a good response on the hearing screening. This does not mean that your baby has a hearing loss, but it does mean that your baby’s hearing needs to be retested. You need to make an appointment for / will be contacted about the retest.”

(If the screening was not done by an audiologist, further discussion or questions should be referred to the audiologist.)

II. Written report to parents of infants in the NICU who passed the NHS test:

Dear Parents,

Date:

Hearing loss is much more common in infants who have been in a Neonatal Intensive Care Unit (NICU), than it is for full term healthy babies. Your baby passed the hearing screening at this time, but it is recommended that babies who have been in an NICU have follow up hearing tests. You will be contacted regarding follow up hearing tests. If you at any time have any concerns about your baby’s hearing, please call your doctor or the Audiologist.

(Contact name, address and phone number)

III. Written report to parents of infants in the NICU who failed the NHS test:

Dear Parents,

Date:

Hearing loss is much more common in infants who have been in a Neonatal Intensive Care Unit (NICU), than it is for full term healthy infants. Your baby did not pass this first screening test. This does not mean that your baby has a hearing loss, but the hearing test will need to be repeated. We will attempt to repeat the test before your baby leaves the hospital, but if the hearing test has not been passed by the time your baby leaves the hospital your baby should be tested at a practice near you. Once the test has been passed, follow up hearing testing may be recommended. If you at any time have any concerns about your baby’s hearing, please call your doctor or the Audiologist.

(Contact name, address and phone number)

IV. Recall letter for infants needing ABR testing

Dear Parents,

Your infant’s hearing was tested as part of a routine hearing screening service at the hospital. It is recommended that a follow up hearing test, called an auditory brainstem response (ABR) test, be done for your
infant. (See enclosed parent information *)
Please call the Audiologist to make an appointment for this follow up test.

(Contact name, address and phone number)

* Parent Information
An Auditory Brainstem Response (ABR) Test is an accurate hearing test that can be done on infants and young children. It must be done while the infant is sleeping, and therefore a sedative is usually given under prescription of your doctor. The sedative is given by mouth and works best on an empty stomach, and therefore it is recommended that baby not have anything to drink for 2 hours before the test. It is also best to keep your baby awake prior to the appointment so that he/she is tired and more likely to fall asleep.

Best practice requires that a baby who receives sedation should be admitted to the hospital so that sedation can be administered by the day ward staff, who will take the sleeping baby to the audiology rooms/office or to theatre. The appointment including recovery time will take 2 – 3 hours. The test results will be sent to your referring doctor, who will contact you directly.

V. Inpatient newborn hearing screening test report for hospital chart or physician

Result of OAE (OtoAcoustic Emission) Hearing Screening

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Date:......................................................
Signature:......................................................

VI. Feedback letter to doctor regarding failure of an infant to keep an appointment for a follow up assessment

Date:

Dear Dr,
Your patient .................... was recently discharged from the well baby nursery/neonatal intensive care unit. At the time of discharge follow up audiological assessment was recommended, because he/she did not pass the OAE/AABR screening. This follow up appointment was not kept. We have made several attempts to arrange a recall, but have been unsuccessful in getting him/her back for the follow up testing. Would you please notify us if ...............has been tested elsewhere. If he/she has not received follow-up testing, we will be happy to see him/her on your referral.

Audiologist
(Contact name, address and phone number)
VII. Parental Consent

I........................................................................................................................... hereby request and authorise a hearing screening test for ...........................................

Name :..............................................................................................................( Parent / Guardian)
Signature...........................................................................................................
Date.....................................................................................................................