INTRODUCTION

The goal of the Tennessee Department of Health Universal Newborn Hearing Screening Program (NHS) for Early Hearing Detection and Intervention (EHDI) is to promote early screening, identification, and intervention of hearing loss utilizing existing Tennessee providers, agencies and organizations, and to:

- Assure all newborns receive hearing screening using physiologic measures prior to discharge after birth or before 1 month of age.
- Assure all infants referred for further hearing testing receive audiologic evaluation prior to 3 months of age.
- Assure all infants identified with a hearing loss receive appropriate and necessary intervention prior to 6 months of age.

The program is committed to assuring families have access to audiology providers that demonstrate the knowledge and skill necessary to provide current pediatric hearing assessment methods.

The following recommended guidelines were developed by the Tennessee Pediatric Audiology Guideline Committee convened by the Tennessee Newborn Hearing Screening Task Force. Members of the working group responsible for the development of the guidelines included the following pediatric audiologists: Barbara Nicodemus, Carol Runyan, Karen Clinton Brown, Helen Hallenback, Whitney Mauldin, Patricia Chase, Linda Gemayel, Laura Gifford, Cindy Brown Gore, Susan Lytle, Erin Plyler, Susie Robertson, Carol Thiele, Anne Marie Tharpe, and Kelly Yeager. Members representing other fields included: Jacque Cundall, Tennessee Department of Health Newborn Hearing, Teresa Blake, Genetic Counselor, U.T. Knoxville Developmental and Genetics Center, and Jamie Castle, Tennessee Department of Education, Early Intervention System. (Appendix 1-Tennessee Audiology Guideline Committee).

These guidelines were developed for the purpose of advancing an effective statewide system for assessing the hearing of infants and young children, birth to five years of age. In addition, these guidelines are meant to facilitate the diagnosis of hearing loss, obtain medical clearance for amplification, and implement amplification, prior to 3 months of age for infants, and for young children who are deaf and hard of hearing. The guidelines are informational only and are not intended or designed as a substitute for the reasonable exercise of independent clinical judgment by audiologists, physicians and other medical providers. They can be used to create an approach to care that is unique to the need of each individual patient.

The Tennessee Department of Health Universal Newborn Hearing Screening Program (NHS) for Early Hearing Detection and Intervention (EHDI) is supported by funding through the Health Resources Services Administration (HRSA) grant for Universal Newborn Infant Hearing and Intervention (CFDA 93.251) and through the Centers for Disease Control and Prevention (CDC) grant for Early Hearing Detection and Intervention (EHDI) (CFDA93.283).

PEDIATRIC AUDIOLOGIC ASSESSMENT GUIDELINES

The following Pediatric Audiologic Assessment Guidelines were based largely upon those developed by the American Speech-Language-Hearing Association (ASHA, 2004). A panel of nationally recognized experts in audiology developed the ASHA Guidelines for the Audiological Assessment of Children from Birth to 5 Years of Age. Any modifications to the original guidelines have been made in acknowledgement of changes in the knowledge base in the field of audiology and needs specific to the state of Tennessee.

Primary Purpose Statement:
Infants and young children suspected of having a hearing loss should receive appropriate medical and audiologic evaluations as well as intervention services in a timely, efficient manner. Suspicion of hearing loss may occur as a result of failure of newborn hearing screening (NHS), risk indicators for hearing loss (per the Joint Committee on Infant Hearing 2000; JCIH), parental, caregiver or family concern, or from the child's medical home provider. Additionally, any infant or young child demonstrating a delay in speech/language development, regardless of prior hearing result, should also be evaluated. All infants who do not pass the NHS and any subsequent re-screening should receive appropriate audiologic evaluations to confirm the presence of hearing loss by three months of age. (Appendix 2-Joint Commission on Infant Hearing 2000 Position Statement-Risk Indicators for Progressive and Delayed Onset or Acquired Hearing Loss).

When a hearing loss is diagnosed, family members should be notified and informed of intervention options. A family-centered and culturally-sensitive approach that advocates involvement of the family to the fullest extent they desire should be maintained throughout the diagnostic and intervention process.

This document should be regarded as best practice guidelines, not standards. Each child presents unique individual characteristics, shaped by familial roles and culture that may influence an approach to the assessment and intervention process.

Professional Competency:
These best practice guidelines are intended for audiologists who serve infants and young children suspected of having a hearing loss. Therefore, it is assumed that clinicians considering these guidelines are familiar with specific audiologic tests. The guidelines are not intended to be a tutorial on test method or to provide specific protocols for individual test procedures. Other professional documents, literature, and web materials are available for such purposes. Rather, these guidelines are intended to delineate the specific technologies, skills, and knowledge that are considered fundamental to the provision of comprehensive audiologic services to infants, toddlers, and young children birth to five years of age. Additionally, audiologists should be knowledgeable about federal and state laws and regulations impacting the identification, intervention and education of children who are deaf and hard of hearing.

Practitioners providing audiologic assessment and intervention services to this specialized pediatric population are expected to follow their professional code of ethics regarding their ability to provide such services. These audiologists must have the commensurate knowledge,

skill and instrumentation necessary for use with current pediatric hearing assessment methods. Pediatric audiologists should also be knowledgeable about resources available within their region and be able to make appropriate referrals for these patients.

Audiologists are the professionals singularly qualified to select and fit all forms of amplification for infants and young children. These include personal hearing aids, frequency-modulation (FM) systems, cochlear implants and other types of assistive listening devices.

Equipment/Facilities:
In order to obtain reliable and accurate measures of auditory function, the test facility should have all the proper equipment and personnel to provide comprehensive physiologic and behavioral audiologic evaluations, including sedated testing as needed. Facilities that lack appropriate equipment or personnel to perform the selected tests should establish consortial arrangements with those that do. (Pediatric Working Group, 1996).

American National Standards Institute (ANSI) Standards:
All measurements of auditory function (behavioral and physiologic) must be completed in a test environment that meets current ANSI standards for background noise levels. Equipment must be maintained according to the manufacturer's specifications and recommendations and calibrated to comply with current ANSI standards. Daily listening checks are particularly important when working with the pediatric population. Documentation of listening checks and periodic electroacoustic calibration should be consistently maintained. When national standards do not exist, as in the case with transient signals used in evoked potential testing or in sound field audiometry, calibration may be referenced to other published standards, to published data, or to values established by the clinic performing the audiologic tests. Appropriate sound field calibration is particularly critical in the behavioral audiologic assessment of children who cannot be tested under earphones or with insert phones (Morgan, Dirks, & Dower, 1979; Rochlin, 1990; Walker, Dillon, & Byrne, 1984).

Joint Commission on Accreditation of Healthcare Organizations:
Audiologists working in facilities accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) must adhere to the standards encompassing patient contact. (JCAHO, 2002).

Universal Precautions:
All procedures must ensure the safety of the patient and clinician, and adhere to universal health precautions (e.g., prevention of bodily injury and transmission of infectious disease). Decontamination, cleaning, disinfection, and sterilization of multiple-use equipment before reuse must be carried out according to facility-specific infection control policies and procedures and according to manufacturer’s instructions (ASHA, 1997; Centers for Disease Control, 1988).

Moderate Sedation:
To gain the cooperation of some infants and young children during physiologic assessments of auditory function, sedation may be required. Yet, sedation of pediatric patients has serious associated risks such as hypoventilation, apnea, airway obstruction, and cardiopulmonary impairment. As such, sedative medications should only be administered by or in the presence of individuals skilled in airway management and cardiopulmonary resuscitation.

Additionally, the over-sight by skilled medical personnel and the availability of age- and size-appropriate equipment, medications, and continuous monitoring are essential during procedures and in rescuing the child should an adverse sedation event occur.

The Joint Commission on Accreditation of Healthcare Organizations has adopted revisions to its anesthesia care standards (JCAHO, 2002), consistent with the American Society of Anesthesiologists (ASA) standards (2000). The most current terminology of the American Society of Anesthesiologists has replaced the term “conscious sedation” with the term “moderate sedation”.

AUDIOLOGIC ASSESSMENT PROCEDURES

Audiologic Assessment Procedures:
Audiologic assessment of infants and young children includes a thorough case history, otoscopy, behavioral, and physiologic measures. Because children undergo rapid sensory, motor, and cognitive development, and because some children will present with multiple developmental problems, it is vital that assessment tools are appropriate for the neurodevelopmental state of the child. In addition to the assessment of peripheral hearing status, it is essential for audiologists working with infants and young children to consider the functional implications of hearing loss. As is feasible within the time constraints of clinical practice, assessments of speech perception ability, and screening for communication skills, cognitive development, and social-emotional status should be included as part of the pediatric test battery. Such assessments and screenings are consistent with the objective of formulating recommendations and making additional referrals as needed.

A thorough assessment of hearing may require multiple sessions. As such, serial evaluations may be necessary to develop reliable profiles of hearing status and developmental abilities. Prolonged delays between assessments should be avoided. During the assessment process, the audiologist may be formulating a working diagnosis of the child's audiologic status while developing and perhaps, implementing initial management options.

Ear-specific assessment is the goal for both behavioral and physiologic procedures because a unilateral hearing loss, even in the presence of a normal-hearing ear, may place a child at significant developmental and/or educational risk (Bess, 1982; Bess, Klee, & Culbertson, 1988; Bovo et al., 1988; Oyler, Oyler, & Matkin, 1988). Therefore, determining hearing sensitivity for each ear is important for establishing supportive evidence for medical/surgical diagnosis and treatment, selecting amplification when appropriate, establishing baseline function, and monitoring auditory status when progressive, fluctuating, or late-onset hearing loss is suspected. When air conduction thresholds obtained by behavioral methods are found to be abnormal, estimates of bone conduction sensitivity should be completed. Effective masking of the non-test ear should be utilized as necessary. Insert phones are recommended unless contra-indicated when testing infants and young children.

Acoustic stimuli used for behavioral assessment should provide frequency-specific information regarding auditory sensitivity. Therefore, responses to pure tones, FM tones, or narrow bands of noise should be obtained in behavioral testing of children regardless of the response levels obtained to broadband signals (e.g., speech). When using narrowband noise, the bandwidth must be sufficiently narrow to ensure accurate determination of frequency-specific thresholds. Because high-frequency spectral energy above 1000 Hz is critical to speech perception, audiologic assessment of children should always include test stimuli that allow the clinician to evaluate hearing sensitivity within the high-frequency range. At a minimum, thresholds should be obtained at 500 Hz and 2000 Hz for each ear to allow for the selection of appropriate amplification (The Pediatric Working Group, 1996).

It also is recommended that frequency-specific stimuli be used when comprehensive auditory brainstem response (ABR) testing is undertaken. At a minimum, responses to low- and high-frequency stimuli should be obtained for each ear to estimate audiometric configuration. High-frequency assessment should be completed using a 2000 Hz tone burst (Pediatric Working Group, 1996) and low frequencies should be assessed using a 250 Hz or 500 Hz tone burst (Stapells, Gravel, & Martin, 1995; Stapells & Oates, 1997) The use of click stimuli alone is not sufficient for the estimation of audiometric configuration (Stapells, 1995; Stapells & Oates, 1997; Balfour, Pillion, & Gaskin, 1998).

When air conduction thresholds obtained by physiologic methods are found to be abnormal, estimates of bone conduction sensitivity should be completed (Mauldin & Jerger, 1979; Stapells, 1989; Stapells & Ruben, 1989; Yang, Rupert, & Moushegian, 1987; Ysunza & Cone-Wesson, 1987). However, there are output limitations using bone conduction and transient stimuli (approximately 50 dB maximum output for clicks). If bone conduction is not done and latency information only is used, precipitously sloping high-frequency losses can be confused with conductive losses. Generally, ABRs obtained by bone conduction have longer latencies (Gorga et al., 1993). It is important when doing bone conduction ABRs that attention is paid to ensure adequate pressure of the bone vibrator (Yang & Stewart, 1990) on the mastoid. Care also must be taken to separate the bone vibrator from the electrode due to electromagnetic leakage. Alternative electrode placements such as the earlobe or tragus or the use of tiptrodes should be considered.

Case History:
The case history is particularly important because it will often guide the selection of a strategy for the audiological evaluation. Moreover, accurate diagnosis of hearing loss relies on interpretation of a test battery within the context of the child's medical and/or developmental history. Case history information may suggest a need for modification of evaluation procedures. For example, the audiologist may want to include evaluation of the high-frequency region of the cochlea (above 4000 Hz) for a young child with a history of ototoxic drug exposure. Modification of routine assessment procedures also may be necessary when evaluating a child with multiple disabilities. The case history should be recorded using a standard form.

Otoscopy:
Several audiologic assessment procedures require the insertion of a probe into the external auditory canal. As such, a visual inspection of the outer ear canal should be conducted to verify that there is no contraindication to placing a probe in the ear canal (e.g., drainage, foreign objects, occluding cerumen, atresia).

Behavioral Assessment:
Behavioral assessment of hearing sensitivity in children is complicated by developmental and maturational factors. It is now known that unconditioned behavioral observation techniques with infants are confounded by poor test re-test reliability, and high inter- and intra-subject variability (Bench, Collyer, Mentz, & Wilson, 1976; Weber, 1969; Wilson & Thompson, 1984). Several studies have shown that once an infant reaches a developmental age of 5–6 months it is possible to elicit reliable conditioned auditory responses using an operant, visually reinforced behavioral response technique (Moore, Wilson & Thompson, 1977; Primus & Thompson, 1985; Thompson & Wilson, 1984; Thompson, Wilson, & Moore,

1979; Wilson, 1978; Widen, 1993). Typically-developing children as young as 5 months of age, may be conditioned to produce a motor response contingent upon the presence of an auditory stimulus (Wilson & Thompson, 1984). The behavior, usually a head turn, is reinforced by an appealing visual display. More recent studies confirm that frequency-specific thresholds may be obtained from infants at developmental levels of 5–6 months, enabling accurate evaluation of hearing sensitivity regardless of type, degree, or audiometric configuration (Bernstein & Gravel, 1990; Diefendorf, 1988; Gravel, 1989; Nozza & Wilson, 1984; Gravel & Wallace, 1999; Diefendorf, 2003; Widen et al., 2000). The basic paradigm used in the tangible reinforcement operant conditioning audiometry (TROCA) or visually reinforced operant conditioning audiometry (VROCA) procedure involves a bar press response coupled with either tangible or visual reinforcement. TROCA or VROCA has been shown to be most effective with children between 2 and 4 years of age developmentally, and also is effective with children with mental challenges (Wilson & Thompson, 1984; Diefendorf, 1988). In conditioned play audiometry (CPA), children learn to engage in an activity each time they hear the test signal. When children are taught to perform play audiometry, it is usually not difficult to select a response behavior that they are capable of performing. The challenge in play audiometry is teaching the child to wait, listen, and respond with the play activity only when the auditory signal is audible. From 25 to 30 months, CPA is sometimes possible within the time constraints of clinical activity (Thompson, Thompson, & Vethivelu, 1989). After the developmental age of 30 months, CPA is the method of choice. Because overlap exists among VRA, TROCA/VROCA, and CPA as suitable techniques with infants and young children, the successful evaluation of a child ultimately depends on the observational skills, interpersonal skills, and experience of the audiologist.

Physiologic Assessment:

Physiologic assessment procedures are of particular importance in the audiologic assessment of young children. Measurement of auditory evoked potentials, especially the ABR, can provide accurate estimates of threshold sensitivity. As such, ABR plays an important role in both identification and assessment, particularly with children too young or developmentally delayed for reliable assessment using conditioned behavioral techniques (Stein & Kraus, 1985).

Subject characteristics and recording parameters are known to influence the ABR. Under good recording conditions, visual detection levels of wave V are usually within 10 dB of behavioral audiometric thresholds for click stimuli. Data from several studies provide normative data for ABR latencies for infants and children to 3 years of age (Gorga, Reiland, Beauchaine, Worthington, & Jesteadt, 1987; Gorga, Kaminski, Beauchaine, Jesteadt, & Neely, 1989).

The Auditory Steady State Response (ASSR) is an auditory evoked potential test with emerging clinical applications. It holds promise as a method of estimating frequency specific hearing sensitivity in patients who cannot or will not provide reliable or valid behavioral thresholds (Cone-Wesson, Dowell, Tomlin, Rance, & Ming, 2002; Dimitrijevic et al., 2002; Vander Werff, Brown, Gienapp, & Schmidt-Clay, 2002). The accuracy of ASSR predictions of hearing sensitivity in infants and young children is an area of active interest at this time (Sininger, 2002). Some concerns about recording artifact under certain stimulus conditions have been expressed (Gorga et al., 2004; Small & Stapells, 2003); research in this area is

ongoing and improvements in methodology are expected. As with all developing clinical procedures, audiologists are expected to monitor the literature for methodological improvements in ASSR.

At this time, elimination of the click evoked ABR is not recommended as it can provide useful information regarding neural integrity. Assessment of interwave latencies, ear asymmetries, and morphology relative to age-appropriate norms may be completed as part of the ABR evaluation and the information used in the context of other clinical and/or medical findings. Children who present with abnormal ABR findings regardless of otoacoustic emissions (OAEs) should undergo further evaluation to differentiate between cochlear and neural dysfunction. When the ABR is absent or abnormal, response to both rarefaction and condensation click stimuli should be obtained to evaluate the presence of the cochlear microphonic (CM; Berlin et al., 1998). In these instances, precautions must be taken to distinguish the CM from stimulus artifact. For example, performing repeat measurements with the stimulus tube open vs. pinched should cause the CM waveform to disappear because no signal is reaching the cochlea to generate a CM. If the alternating current (AC) waveform remains, then it is stimulus artifact, which results from the electrical signal at the back of the transducer being picked-up by the recording electrodes and amplified. (Durrant & Ferraro, 1999).

Otoacoustic emissions (OAEs) also expand the pediatric audiology test battery by providing a physiologic means of assessing preneural auditory function (Kemp, Ryan, & Bray, 1990; Norton & Widen, 1990; Gorga et al., 1993). The presence of OAEs is with normal outer hair cell function which may be consistent with normal or near-normal hearing thresholds in a given frequency region. Although relations exist between OAEs and behavioral thresholds (Martin et al., 1990; Gorga et al., 1996; 2002) and there has been improvement in strategies for predicting thresholds using OAEs (Boege & Janssen, 2002; Gorga et al., 2003b), variability among individuals suggest that caution should be exercised when attempting to predict behavioral thresholds from OAEs. Because OAEs are generated in the cochlea, they provide information that further defines auditory system integrity and sensitivity. Used in conjunction with ABR, OAEs are not only useful in the differential diagnosis of cochlear hearing loss but also in the identification of children with neurological dysfunction.

Transient evoked OAEs (TEOAEs) are elicited either following a click/transient stimulus (TEOAE) while distortion product OAEs (DPOAEs) are elicited following stimulation with two tones. TEOAEs typically are measured in response to a click at approximately 80 dB pSPL (78-82 dB SPL). Although the click stimulus is a broad-band stimulus that is not frequency specific, the response is analyzed in the frequency domain, thus providing information across frequencies from 500 to 5000 Hz, although test performance is best for mid-to-high frequencies. Probe fit can affect the spectrum of the click stimulus in the ear canal. The stimulus spectrum, as measured in the ear canal, should have equal intensities across the frequency range. However, in neonates, this cannot be achieved and the stimulus typically has more high-frequency energy (Norton et al., 2000). In common clinical practice, TEOAEs need to be present above the noise floor by at least 6 dB, and/or have a reproducibility of greater than an established percentage at defined frequencies. For example, Kemp et al., (1990) recommended a minimum of 50% reproducibility for determining response presence while Prieve et al., (1993) found 70% to be a reasonable expectation when coupled with an overall minimum amplitude (wideband) of 6 dB SPL. For narrow frequency

bands, levels of 3 dB above background noise may give reasonable assurance of a TEOAE response for that frequency region alone (Norton et al., 2000). Hussain et al., (1998) provided an approach in which data from normal and from impaired ears were used to develop diagnostic criteria, thus explicitly taking into account the fact that responses from normal and impaired ears are not completely separated for any criterion value. It should be noted that in the presence of very low noise levels, a low-level TEOAE response could result in an OAE-to-noise ratio (SNR) that exceeds passing criteria. A diagnostic approach in which SNR is used to establish the reliability of the measurement, followed by a clinical decision based on response level might avoid diagnostic errors associated with very low noise levels.

DPOAEs are measured in response to two tones (primaries) that interact to produce non-linear distortions in the cochlea. DPOAEs are measured at the frequencies of the distortion product $2f_1 - f_2$ for each stimulus tone pair. The stimulus tones are designated by f_1 for the lower frequency tone, f_2 for the higher frequency tone, and L_1 and L_2 for the lower and higher frequency intensity levels, respectively. The two tones typically are selected so that the frequency ratio between the tones (f_2/f_1) is 1.22, which is known to produce the largest ($2f_1 - 2f_2$) distortion product at most test frequencies in humans. Data from several studies suggest that the primaries should be unequal and of a moderate level (e.g., L_1/L_2 = 65/55 dB SPL) to most accurately classify auditory status (e.g., Stover et al., 1996). Response presence can be determined by examining response level or by examining the response level relative to the noise floor (SNR). SNR has generally good performance for identifying ears with normal cochlear function, but because it depends on the level of the noise as well as OAE level, the same potential problem mentioned above regarding use of SNR with TEOAEs also exists for the DPOAE. Gorga et al., (1997) provided an interpretative approach for DPOAEs that is similar to the one described by Hussain et al., (1998) for TEOAEs. It recognizes the fact that there is no criterion value that will separate normal or impaired function without error. However, their approach provides a means for determining the level of confidence with which any measured response indicates normal or impaired hearing. In their application, SNR is used first to determine that a response was reliably measured. If the SNR indicates that a reliable response was measured, DPOAE level is then used to determine auditory status.

Schemes for trying to determine the degree of hearing loss and/or for predicting thresholds using DPOAEs have been investigated (Martin et al., 1990; Gorga et al., 1996; Dorn et al., 2001; Gorga et al., 2002; Boege & Janssen, 2002; Gorga et al., 2003a). Although some strategies have met with success, variability is such that threshold predictions should be viewed cautiously. In some approaches, predictions of behavioral thresholds from DPOAE thresholds require the measurement of DPOAE levels for several stimulus levels (i.e., DPOAE input/output functions). It may be difficult to obtain these data routinely under some clinical conditions.

Acoustic immittance measures are an integral part of the pediatric assessment battery. Clinical decisions should be made based on a quantitative assessment of the tympanogram, including consideration of equivalent ear canal volume, peak compensated static acoustic admittance, tympanometric width or gradient, and tympanometric peak pressure. The components of the immittance test battery, alone or in combination, have been used for many years to evaluate middle ear function and to screen for middle ear effusion (ASHA, 1997).

The acoustic reflex may provide supplemental information relevant to the functional status of the middle ear, cochlea, and brainstem pathway. Together, these measures are fundamental components of the pediatric audiology test battery. For neonates and young infants, however, optimal clinical procedures for application of tympanometric and acoustic reflex measurements are not well defined (ASHA, 1994; McMillan, Bennett, Marchant, & Shurin, 1985; Sprague, Wiley, & Goldstein, 1985). Under the age of approximately 4 months, interpretation of tympanograms and acoustic reflex findings may be compromised when a conventional low-frequency (220-Hz or 226-Hz) probe tone is used (Paradise, Smith, & Bluestone, 1976).

RECOMMENDED PEDIATRIC AUDIOLOGIC ASSESSMENT GUIDELINES FOR INFANTS, TODDLERS, PRESCHOOLERS BIRTH TO 60 MONTHS DEVELOPMENTAL AGE

Purpose Statement:

It is recommended that all infants who do not pass the newborn screen and any subsequent rescreening begin medical evaluation and receive a comprehensive pediatric audiologic assessment to confirm the presence of hearing loss and obtain medical clearance for amplification prior to 3 months of age. Comprehensive assessment should be completed on all young children referred for further hearing evaluation from other audiologic screening. Due to the complexity of the auditory mechanism and the fact that auditory dysfunction may result from pathology at one or more levels, a test battery approach is highly indicated. A test battery that includes physiologic, behavioral and developmental measures is recommended. The following guidelines include physiologic and behavioral assessment recommendations, by developmental age, supporting the use of a test battery approach. It is recommended that all infants confirmed with a hearing loss receive services prior to 6 months of age in interdisciplinary early intervention programs.

Introduction:

This document provides guidelines for the purpose of choosing developmentally-appropriate test measures for infants and young children ages 0-5 years. The child's neurodevelopmental age should be considered in the test battery selection. These guidelines are intended for use by qualified, experienced pediatric audiologists. The cross check principle is essential to confirm behavioral assessment findings and evaluate individual ear function, particularly when behavioral assessment is limited to sound field measures.

Equipment/Facilities:

In order to obtain reliable, accurate results, the test facility should have proper equipment and personnel to provide comprehensive physiologic and behavioral audiologic evaluations, including sedated testing as needed. Those facilities that lack appropriate equipment or personnel to perform the selected tests should establish consortial arrangements with those that do have appropriate equipment. (Pediatric Working Group, 1996)

The following best practice pediatric audiologic assessment guidelines are divided into three age groups:

1. **Guidelines for Infants 0-4 Months Developmenal Age**
2. **Guidelines for Infants 5-24 Months Developmental Age**
3. **Guidelines for Toddlers and Preschoolers 25-60 Months Developmental Age**

Guidelines for Infants 0-4 Months Developmental Age

Tennessee Recommended Pediatric Audiologic Assessment

I. Case History

- Review newborn hearing screening results
- Identify risk indicators for progressive and delayed onset or acquired hearing loss

II. Otoscopy

- The purpose of otoscopy in this population is to ensure that there are no contraindications to placing an insert earphone or probe in the ear canal.
- Visual inspection for obvious structural abnormalities (i.e., ear pits, ear tags, atresia, low set ears) of the pinna and/or ear canal should be included.
- Because of the size and anatomy of the newborn ear, identifying the tympanic membrane or any landmarks may be difficult.

III. Acoustic Immittance Measures

- Tympanograms should be obtained for both ears.
- Probe tones equal to or greater than 660 Hz should be used because of the poor validity of tympanometry when using a low-frequency probe tone with this population.
- Obtain ipsilateral acoustic reflexes at 1000, 500 and 2000 Hz.
- If ipsilateral reflexes are absent, obtain contralateral acoustic reflexes at 1000, 500 and 2000 Hz (no need for bone conduction [BC] auditory brainstem response [ABR] if acoustic reflexes within normal limits [WNL]).

IV. Evoked Otoacoustic Emissions (OAEs)

- Obtain distortion product otoacoustic emissions (DPOAE) or transient evoked otoacoustic emissions (TEOAE) or both to evaluate cochlear outer hair cell function.
- Attempt to get a good recording of evoked OAEs for each ear at 1000, 2000 and 4000Hz at a minimum (or per manufacturer's specifications in accordance with published norms [i.e., Gorga et al., 1993]).

V. Auditory Brainstem Response (ABR) Testing for Threshold Estimation

Many children in this age group can be tested during natural sleep, without sedation, using sleep deprivation with nap and feeding times coordinated around the test session. For infants requiring sedation for testing, appropriate moderate sedation protocols should be followed.

- Stimuli: Frequency specific stimuli (tone bursts of low, mid and high frequency)
- Transducer: Insert earphones are recommended for air conduction testing; bone conduction transducer will be needed if air conduction is elevated (i.e. if air conduction thresholds are greater than 20 dB nHL, bone conduction testing should be completed to assess the type of hearing loss).
- Protocol: Responses should be attempted down to 20 dB nHL. Definition of threshold should be attempted in 10 dB steps. Twenty to 25 ms. recording epochs

are necessary for adequate ABR threshold detection measures in infants, especially when tonal stimuli are used and hearing loss is present.
- Age appropriate normative values for wave latencies must be adhered to (i.e., Gorga et al., 1985; Hall, 1992; or own established norms).

VI. Auditory Brainstem Response (ABR) Testing for Measuring VIIIth Nerve Integrity

- Stimuli: Click stimuli at a high level (i.e., 70 dB nHL) will be adequate in most situations to identify waves I, III and V. If no response is obtained at the maximum output level, obtain one run of rarefaction clicks and one of condensation clicks to distinguish between cochlear and neural dysfunction. Use a catch trial (no signal) to rule out artifact that may be misinterpreted as the cochlear microphonic (CM).
- Transducer: Insert earphones
- Protocol: Compare interpeak latencies with corrected age norms
- Evaluate intra-aural latency differences and waveform morphology

VII. Auditory Steady State Response (ASSR)

- ASSR is an emerging auditory evoked potential test that holds promise as a method to estimate hearing sensitivity, however ASSR predictions of hearing sensitivity in infants and young children warrant further studies.
- When utilizing ASSR be aware that thresholds may be overestimated. Normative values for ASSR testing have not yet been specified. Caution should be exercised in interpretation.

VIII. Behavioral Audiologic Assessment

- **0-4 months**: Behavioral observation without reinforcement may be used to corroborate with parent/caregiver observation of child's auditory behavior, but is not recommended for threshold estimation.

IX. Speech/Language Screening

- Parental report and behavioral observation
- Screening for communication skills using age appropriate normed assessment such as but not limited to:
  - Early Language Milestone Scale (ELM; Coplan & Gleason, 1993)

X. Follow-up Schedule and Referral for Further Evaluation

- Infants diagnosed with hearing loss should receive ongoing hearing monitoring at least every three months, and should be referred for further evaluation and appropriate early intervention services as deemed appropriate by the intervention team and per Tennessee Department of Health Newborn Hearing Program Audiology Guidelines.
- Infants diagnosed with a sensorineural hearing loss should be referred immediately for consideration of amplification.
- ***Release of information forms*** should be signed by the parent/guardian to allow those evaluating the child to share information with other service providers.
- See Follow-Up section of the Pediatric Audiology Guidelines

XI. Parent Counseling and Resources

- The diagnosing audiologist needs to recognize the emotional impact the diagnosis of hearing loss can have on a family.
- The audiologist should provide the family with information about the type and degree of the hearing impairment, its potential impact on speech/language and cognitive development, the treatment and communication options available, and the positive impact of early intervention.
- Parent resources are available through the Tennessee Newborn Hearing Program. The "Information Packet for My Parents" was developed for families of children identified with hearing loss and may be obtained by calling 615-741-8530. The packet contains brochures and information regarding parent support, communication methods, hearing team members, helpful hints, web sites, and other local, state and national resources. (Appendix 3-Tennessee and National Hearing Resources).

Appendix 2 JCIH, (2000)-Risk Indicators for Progressive and Delayed Onset or Acquired Hearing Loss

Guidelines for Infants 5-24 Months Developmental Age

Tennessee Recommended Pediatric Audiologic Assessment

I. Case History

- Review newborn hearing screening results
- Identify risk indicators for progressive and delayed onset or acquired hearing loss

II. Otoscopy

- The purpose of otoscopy in this population is to ensure that there are no contraindications to placing an earphone or probe in the ear canal.
- Visual inspection for obvious structural abnormalities (i.e., ear pits, ear tags, atresia, low set ears) of the pinna and/or ear canal should be included.

III. Acoustic Immittance Measures

- Tympanograms should be obtained for both ears.
- Although a low-frequency (226 Hz) probe tone is appropriate for most of this age group, there is still a possibility of false negative tympanograms in ears with MEE according to some studies for infants in the 5-7 month age range (Paridise, et al.; 1976; Purdy & Williams, 2000). Therefore, probe tones equal to or greater than 660 Hz should be used with this sub-set.
- Obtain ipsilateral acoustic reflexes at 1000, 500 and 2000 Hz.
- If ipsilateral reflexes are absent, obtain contralateral acoustic reflexes at 1000, 500 and 2000 Hz (no need for bone conduction [BC] auditory brainstem response [ABR] if acoustic reflexes within normal limits [WNL]).

IV. Evoked Otoacoustic Emissions (OAEs)

- Obtain distortion product otoacoustic emissions (DPOAE) or transient evoked otoacoustic emissions (TEOAE) or both to evaluate cochlear outer hair cell function.
- Attempt to get a good recording of evoked OAEs for each ear at 1000, 2000 and 4000Hz at a minimum (or per manufacturer's specifications in accordance with published norms [i.e., Gorga et al, 1993]).

V. Auditory Brainstem Response (ABR) Testing for Threshold Estimation

In infants 5-24 months of age, ABR threshold testing will not be necessary in cases where acoustic immittance (including acoustic reflexes), OAE and behavioral audiologic assessments demonstrate consistent, replicable information with good reliability. The need for ABR threshold testing should be determined on an individual, case-by-case basis.

Many children in this age group can be tested during natural sleep, without sedation, using sleep deprivation with nap and feeding times coordinated around the test session. For infants requiring sedation for testing, appropriate moderate sedation protocols should be followed.

- Stimuli: Frequency specific stimuli (tone bursts of low, mid and high frequency)

- Transducer: Insert earphones are recommended for air conduction testing; bone conduction transducer will be needed if air conduction is elevated (i.e. if air conduction thresholds are greater than 20 dB nHL, bone conduction testing should be completed to assess the type of hearing loss).
- Protocol: Responses should be attempted down to 20 dB nHL. Definition of threshold should be attempted in 10 dB steps. Twenty to 25 ms. recording epochs are necessary for adequate ABR threshold detection measures in infants, especially when tonal stimuli are used and hearing loss is present.
- Age appropriate normative values for wave latencies must be adhered to (i.e., Gorga et al., 1985; Hall, 1992; or own established norms).

VI. Auditory Brainstem Response (ABR) Testing for Measuring VIIIth Nerve Integrity

- Stimuli: Click stimuli at a high level (i.e., 70 dB nHL) will be adequate in most situations to identify waves I, III and V. If no response is obtained at the maximum output level, obtain one run of rarefaction clicks and one of condensation clicks to distinguish between cochlear and neural dysfunction. Use a catch trial (no signal) to rule out stimulus artifact that may be misinterpreted as the cochlear microphonic (CM).
- Transducer: Insert earphones
- Protocol: Compare interpeak latencies with corrected age norms
- Evaluate intra-aural latency differences and waveform morphology.

VII. Auditory Steady State Response (ASSR)

- ASSR is an emerging auditory evoked potential test that holds promise as a method to estimate hearing sensitivity, however ASSR predictions of hearing sensitivity in infants and young children warrant further study.
- When utilizing ASSR be aware that thresholds may be overestimated. Normative values for ASSR testing have not yet been specified. Caution should be exercised in interpretation.

VIII. Behavioral Audiologic Assessment

- Visual Reinforcement Audiometry (VRA) preferred
- Ear specific testing. Alternate testing between ears to obtain some ear specific information from each ear prior to child's fatigue.
- Prioritize order of testing to obtain responses for low and high frequency stimuli
- Minimum response levels should be obtained for the following stimuli:
  - Speech – (Speech Awareness Threshold [SAT] vs. Speech Recognition Threshold [SRT] when possible)
  - 2000, 500, 1000 and 4000 Hz (the order of presentation will vary according to the focus of the audiologic assessment)
  - Numerous options for stimulus start-level, step-size and start-stop rules are available.

IX. Speech/Language Screening

- Screening for communication skills using age appropriate normed assessment such as but not limited to:
  - Early Language Milestone Scale-2 (ELM-2; Coplan & Gleason, 1993).
  - Receptive-Expressive Emergent Language Test-3rd Edition (REEL-3; Broch, League, & Brown, 2003).

X. Follow-up Schedule and Referral for Further Evaluation

- Infants diagnosed with hearing loss or auditory deficit should receive ongoing hearing monitoring at least every three months, and should be referred for further evaluation and appropriate early intervention services as deemed appropriate by the intervention team and per Tennessee Department of Health Newborn Hearing Program Audiology Guidelines.
- Infants diagnosed with a sensorineural hearing loss should be referred immediately for amplification.
- ***Release of information forms*** should be signed by the parent/guardian to allow those evaluating the child to share information with the school and other service providers.
- See Follow-Up section of the Pediatric Audiology Guidelines

XI. Parent Counseling and Resources

- The diagnosing audiologist needs to recognize the emotional impact the diagnosis of hearing loss can have on a family.
- The audiologist should provide the family with information about the type and degree of the hearing impairment, its potential impact on speech/language and cognitive development, the treatment and communication options available, and the positive impact of early intervention.
- Parent resources are available through the Tennessee Newborn Hearing Program. The "Information Packet for My Parents" was developed for families of children identified with hearing loss and may be obtained by calling 615-741-8530. The packet contains brochures and information regarding parent support, communication methods, hearing team members, helpful hints, web sites, and other local, state and national resources. (Appendix 3-Tennessee and National Hearing Resources).

Appendix 2 JCIH, (2000)-Risk Indicators for Progressive and Delayed Onset or Acquired Hearing Loss

Guidelines for Toddlers and Preschoolers 25-60 Months Developmental Age

Tennessee Recommended Pediatric Audiologic Assessment

I. Case History

- Review newborn hearing screening results
- Identify risk indicators for progressive and delayed onset or acquired hearing loss

II. Otoscopy

- The purpose of otoscopic examination is to ensure there are no contraindications for placing an earphone or probe in the ear canal.
- Visual inspection for obvious structural abnormalities (i.e., ear pits, ear tags, atresia, low set ears) of the pinna and/or ear canal should be included.

III. Acoustic Immittance Measures

- Obtain 226 Hz probe tone tympanometry
- Obtain ipsilateral acoustic reflexes at 1000, 500, 2000 and 4000 Hz.
- Obtain contralateral acoustic reflexes at 1000, 500, 2000 and 4000 Hz (no need for bone conduction [BC] auditory brainstem response [ABR] if acoustic reflexes are within normal limits [WNL]).

IV. Evoked Otoacoustic Emissions (OAEs)

- Obtain Distortion Product Otoacoustic Emissions (DPOAE), Transient Evoked Otoacoustic Emissions (TEOAE), or both to evaluate cochlear outer hair cell function.
- Attempt to get a good, repeatable recording of evoked OAE's for each ear at 1000, 1500, 2000, 3000, 4000 and 6000 Hz (or the standard protocol with norms per manufacturer's specifications).

V. Auditory Brainstem Response (ABR) Testing for Threshold Estimation

If audiologic results are unreliable or unobtainable, ABR testing should be completed. For children requiring sedation for testing, appropriate moderate sedation protocols should be followed.

- Stimulus: Frequency specific tonebursts of low, mid and high frequency
- Transducer: Insert earphones for air conduction testing. Bone vibrator for bone conduction testing (needed if air conduction thresholds greater than 20 dB nHL).
- Responses should be attempted down to 20 dB nHL. Definition of threshold should be attempted in 10 dB steps.
- Age appropriate normative values for wave latencies must be adhered to (i.e., Gorga et al., 1985; Hall, 1992; or own established norms).
- Follow-up testing should occur for all infants with risk factors per Tennessee Newborn Hearing Program Audiology Guidelines for follow-up.

VI. Auditory Brainstem Response (ABR)Testing for Measuring VIIIth Nerve Integrity

Conduct assessment **if**:

- ABR is abnormal with present OAEs
- ABR is abnormal regardless of OAE results
  - Stimulus: a click stimulus at a high intensity level (i.e., 70 dB – 80 dB nHL) will be adequate in most cases to identify waves I, III and V.
  - If no response is obtained at the maximum output level, obtain one run of rarefaction clicks and one of condensation clicks to distinguish between cochlear and neural dysfunction. Use a catch trial (no signal) to rule out artifact that may be misinterpreted as the cochlear microphonic (CM).
  - Transducer: Insert earphones
  - Protocol: Compare interpeak latencies with age appropriate norms
  - Evaluate intra-aural latency differences and waveform morphology.

VII. Auditory Steady State Response (ASSR)

- ASSR is an emerging auditory evoked potential test that holds promise as a method to estimate hearing sensitivity, however ASSR predictions of hearing sensitivity in infants and young children warrant further study.
- When utilizing ASSR be aware that thresholds may be overestimated. Normative values for ASSR testing have not yet been specified. Caution should be exercised in interpretation.

VIII. Behavioral Audiologic Assessment

- Assessments used should be determined based on the child's chronological age with respect to his or her developmental age, and adjusted for prematurity.
- Alternate between ears in order to obtain some ear specific information from each ear prior to the child's fatigue
- Utilize the following, as appropriate:
  - Air and bone conduction testing via insert phones
    - Fill in octave frequencies for 250-8000 Hz
    - Prioritize order of testing to obtain responses for low frequency and high frequency stimuli
- Conduct Conditioned Play Audiometry (CPA) or Visual Reinforcement Audiometry (VRA)
- Tangible (TROCA) or Visual Reinforcement Operant-Conditioning Audiometry (VROCA)
- Speech Reception Threshold (SRT)
  - spondee pictures if needed
  - point to body parts

Although word recognition testing may not be possible with some young children because of their age, degree of hearing loss, or language skills, it is possible to assess speech perception skills in very young children.

- Speech Perception Skills: The ability of audiologists to determine if a child's auditory development is at the detection. discrimination, or comprehension stage is important for management purposes.

- Detection (e.g., Early Speech Perception Test [ESP; Moog & Geers, 1990]; Ling 6-Sound Test [Ling, 1986])
- Discrimination (e.g., Screening Inventory of Perception Skills [SCIPS; Osberger et al., 1991]; Low-Verbal ESP [Moog & Geers, 1990])

Comprehension (e.g., SPICE Curriculum [Moog, Biedenstein, & Davidson, 1995]; Mr. Potato Head [Robbins, 1994]; or, following simple commands [Makins, 1979; Olsen & Matkin, 1979]).

IX. Speech/Language Screening

- Screening for communication skills using age appropriate normed assessment such as but not limited to:
  - Early Language Milestone Scale-2 (ELM-2; Coplan & Gleason, 1993)
  - The Fluharty. (Fluarty, N.B. 1978)
- Referral for comprehensive speech/language evaluation may be necessary

X. Follow-up Schedule and Referral for Further Evaluation

- Children diagnosed with hearing loss should be monitored and referred for further evaluation and appropriate intervention services as deemed necessary by the intervention team and per TN Department of Health Guidelines.
- Children diagnosed with a sensorineural hearing loss should be referred immediately for amplification.
- ***Release of information forms*** should be signed by the parent/guardian to allow those evaluating the child to share information with the school and other service providers.
- See Follow-Up section of the Pediatric Audiology Guidelines

XI. Parent Counseling and Resources

- The diagnosing audiologist needs to recognize the emotional impact the diagnosis of hearing loss can have on a family.
- The audiologist should provide the family with information about the type and degree of the hearing impairment, its potential impact on speech/language and cognitive development, the treatment and communication options available, and the positive impact of early intervention.
- Parent resources are available through the Tennessee Newborn Hearing Program. The "Information Packet for My Parents" was developed for families of children identified with hearing loss and may be obtained by calling 615-741-8530. The packet contains brochures and information regarding parent support, communication methods, hearing team members, helpful hints, web sites, and other local, state and national resources. (Appendix 3-Tennessee and National Hearing Resources).

Appendix 2 JCIH, (2000)-Risk Indicators for Progressive and Delayed Onset or Acquired Hearing Loss

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AUDIOLOGIC FOLLOW-UP GUIDELINES

FOR THE PEDIATRIC POPULATION

To assure best practice in the follow-up of pediatric patients identified with a hearing loss or identified with a risk indicator for hearing loss, the audiologist or other health care provider should provide the family information regarding the child's diagnosis and need for ongoing care. In addition, the family should be informed of the services provided by agencies and organizations such as the Tennessee Early Intervention System (TEIS), Tennessee Infant Parent Services (TIPS), Children's Special Services (CSS), Tennessee Genetics System and other medical specialists as outlined below:

Informed Consent for Referral:
The individual's privacy must be protected. The referring practitioner is responsible for obtaining/confirming informed consent or informed parental/legal guardian permission. Written and electronic records, documentation and communication must follow recommended laws and standards such as:

- Health Insurance Portability and Accountability Act (HIPAA)
- Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
- Family Educational Rights and Privacy Act (FERPA)
- State statutes, regulations, or institutional policies may supersede some recommendations.

Medical/Genetic Evaluation:
Each child identified with hearing loss should be referred to an otolaryngologist or otologist for medical evaluation to determine if medical intervention or genetic counseling is appropriate, and to obtain medical clearance for amplification.

The medical team serving infants and children who are deaf and hard of hearing may consist of many professionals.

- The physician (primary care provider/medical home) has the primary responsibility for medical care, including referrals for the infant or child.
- The audiologist who identifies the infant or child with a hearing loss maintains an obligation to include the medical home or primary care provider in any decision-making processes that involve further referrals to otolaryngologists, geneticists, ophthalmologists or others. According to the ***ASHA Guidelines for Follow-Up Recommendations (2004).*** "In consultation with the infant's primary care provider, refer the infant/family to an otolaryngologist for medical assessment. As appropriate, discuss additional specialty evaluations, such as genetics, ophthalmology, child development with parents/caregivers and the infant's primary care provider."
- Genetic consultation is important in determining genetic hearing loss from non-genetic hearing loss. Hearing loss may be only one of a number of conditions associated with a genetic syndrome. Therefore, genetic evaluation may be significant in the identification of other medical and developmental diagnoses or conditions to be considered in the infant or child's plan of care. Genetic hearing loss is diagnosed by otologic, audiologic and physical examination, family history, ancillary testing (e.g.,

CT scan of temporal bone) and DNA-based testing. The genetic consultation provides the individual and family with information on the nature, inheritance and implications of a genetic condition and a review of available options to help families make informed decisions. Genetic counseling provides information in a culturally-sensitive manner. (Appendix 4-Tennessee Genetic Resources and Recommendations).

Vision Screening/Diagnostic:
Children with sensorineural (SNHL) hearing loss should be referred to an ophthalmologist for assessing any ocular deficits or vision problems.

Children diagnosed with hearing loss and vision loss should be referred to:

- The Tennessee Early Intervention System (TEIS).
- The Tennessee Infant Parent's Services (TIPS; Referral to be made through TEIS)
- The Tennessee Technical Assistance and Resources for Enhancing Deaf/Blind Supports (TREDS) program for parent, provider and teacher education and support services. (Appendix 3-Tennessee and National Hearing Resources)

Early Intervention Services:
Infants and children age birth to three years identified with a condition that has a high probability of resulting in developmental delay need to be referred to the Tennessee Early Intervention System (TEIS) within two working days of the diagnosis. Parents should be advised of the availability of intervention services through TEIS.

Tennessee Early Intervention System (TEIS):
The Tennessee Department of Education, Tennessee Early Intervention System (TEIS) is responsible for the Federal, Individual with Disabilities Education Act (IDEA), Part C, Child Find and for planning, implementation, supervision, monitoring, and technical assistance for the statewide early intervention system for infants and toddlers (birth to age three) with developmental delays. TEIS provides service coordination to families of children with hearing loss age's birth to three years. There are no financial guidelines for eligibility. Families and providers can contact 1-800-852-7157.

Tennessee Infant Parent Services (TIPS):
TIPS is a statewide early intervention home visiting program for families of infants and toddlers with hearing loss, vision loss, hearing/vision loss, and/or developmental delays. TIPS provides parent/caregiver education and support using the SKI-HI Institute Model and Curricula. TIPS has a loaner hearing aid bank for audiologists to utilize until the child can be fitted with his/her own hearing aids.

Children's Special Services (CSS):
CSS provides medical and care coordination services for children birth to 21 years. The program is available for children with disabilities who meet medical and financial guidelines. The provider should refer parent(s) to their local County Health Department to schedule an appointment with the CSS coordinator to be evaluated for eligibility for enrollment.

School System:
Children identified with hearing loss who are three years and older should be referred to the Local Education Agency (LEA) in compliance with Tennessee Department of Education,

Federal, Individual with Disabilities Education Act (IDEA), Part B, Child Find and Special Education recommendations.

Aural/Audiologic Rehabilitation Programs:
Auditory/Oral, Total Communication, sign languages, and Cued Speech are some of the communication approaches available to children and families. Parents should be counseled on the different communication approaches and be informed of the programs available in their community to allow them to make the best decision based on the needs of their child and family. Parent and caregiver education should be integrated into all aspects of the child's audiologic and early intervention services.

Speech and Languages Services:
All children with hearing loss should be seen by a speech-language pathologist who is designated to provide assessment and management of infants and children with hearing loss and has the commensurate knowledge and skills to do so.

Risk Indicators for Progressive and Delayed Onset or Acquired Hearing Loss and the Need for Re-screening and Re-evaluation:
The Joint Committee on Infant Hearing 2000 Position Statement (JCIH, 2000) outlines risk indicators for **birth through age 28 days** where universal hearing screening is not yet available and risk indicators for use with **neonates or infants (29 days through 2 years)**. The indicators that place an infant at risk for progressive or delayed-onset sensorineural hearing loss and/or conductive hearing loss can be found in Appendix 2. Any infant with these risk indicators for progressive or delayed-onset hearing loss who has passed the birth screen should, nonetheless, receive audiologic monitoring every 6 months until age 3 years. (Appendix 2-JCIH Risk Indicators for Progressive and Delayed Onset or Aquired hearing Loss)

Therefore, it is recommended that the audiologist, as well other hearing providers, report infants with a risk indicator to the State Newborn Hearing Screening (NHS) program on the appropriate form to enable NHS to assist the provider to monitor and track children to ensure receipt of timely and appropriate services.

Developmental Screening:
Pediatric patients identified with hearing loss should be monitored to ensure that developmental milestones are being met in order to rule out any other possible developmental delays or deficits.

Audiological Monitoring:
All children with identified hearing loss (i.e., hearing loss less than or equal to 25dB HL, unilateral or bilateral, permanent or fluctuating) should receive periodic audiological monitoring. An immediate audiologic evaluation should be scheduled when there is concern related to change in hearing or hearing aid function.

- Bilateral sensorineural hearing loss and permanent conductive hearing loss:
  - Age 0-3 years: At least every 3 months, after hearing loss is confirmed;
  - Age 4-6 years: At least every 6 months, if intervention progress is satisfactory;
- Transient conductive hearing loss (i.e., otitis media with effusion), unilateral or bilateral:

    - Should be monitored after medical treatment (completion of antibiotic treatment, PE tubes, etc.), and/or at least every 3-4 months until resolved and normal hearing is confirmed;
- Unilateral hearing loss (sensorineural or permanent conductive):
    - Infants with unilateral hearing loss should be monitored at least every 3 months during the first year and at least every 6 months after the first year, to rule out changes in the normal hearing ear or progression of hearing loss in the poorer ear.

Amplification:
Refer to the amplification section of these guidelines.

Counseling:
Parents/primary caregivers, including grandparents and immediate family members, should be counseled regarding the child's diagnosed hearing loss (type, degree/severity, and developmental or educational impact). Recommendations should include communication methods, amplification, referrals to early intervention services or to the local educational agency, and the discussion regarding future services for the child. A family centered and culturally-sensitive approach needs to be maintained during all aspects of counseling.

Documentation/Reporting:
- Documentation must be contemporaneous with each visit or interaction to provide a complete and cogent archive of the child's audiological history. Documentation of assessment must address interpretation of test results, the type and severity of the hearing loss, and associated conditions (e.g., medical diagnosis, disability, home program). In addition, documentation must contain pertinent background information, assessment procedures employed, assessment results, interpretation, and specific recommendations. Recommendations may address the need of further assessment, follow-up or referral. When treatment is recommended, information must be provided concerning the frequency, estimated duration and type of service (e.g., individual, group, home program) required (ASHA, 1997). Patient records should follow a documentation standard of HIPPA. Requests for a child's records must respect a parent's rights to confidentiality and protected health information mandates, and require necessary and appropriate informed consent (Pediatric Work Group,1996).
- A complete report should be sent to the child's parent/legal guardian, primary care physician/pediatrician and any referral sources upon parental consent.
- Providers are encouraged to report follow-up and confirmatory hearing testing to the Tennessee Department of Health (TDH) Newborn Hearing Program on infants, toddlers, and children birth to five years old.
- The Confirmation of Evaluation for Hearing Loss form can be acquired by contacting the Tennessee Department of Health Newborn Hearing Program by phone, 615-741-0310 or 615-262-6160. The form is available in PDF format on the Newborn Screening web site. (www2.state.tn.us/health/MCH/NBS; Appendix 5-Audiology Reporting Form).

Hearing Loss Support Programs/Organizations/Resources:
For State and National Resources (Appendix 3-Tennessee and National Hearing Resources)

Tennessee Newborn Hearing Program's "Informational Packet for My Parents":
Parent resources are available through the Tennessee Newborn Hearing Program. An excellent resource for parents and professionals is the "Information Packet for My Parents". The packet was developed for families of children identified with hearing loss. The packet contains brochures and information regarding parent support, communication methods, hearing team members, helpful hints, web sites, and other local, state and national resources. Tennessee hearing brochures and posters are available on the state web site. Documents can be obtained at no cost by contacting, the TDH Newborn Hearing Program, Cordell Hull Building, 5th Floor, 425 Fifth Avenue North, Nashville, TN 37247-4750. Phone 615-741-8530 or 615-262-6160. (Appendix 3-Tennessee and National Resources).