Maine Center for Disease Control and Prevention

An Office of the Department of Health and Human Services

John E. Baldacci, Governor Brenda M. Harvey, Commissioner

2010
MAINE NEWBORN HEARING PROGRAM
PEDIATRIC AUDIOLOGY GUIDELINES
BIRTH TO 36 MONTHS

STATE OF MAINE
DEPARTMENT OF HEALTH & HUMAN SERVICES
MAINE CDC
DIVISION OF FAMILY HEALTH

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Preface

The Maine Newborn Hearing Program was established through legislation in 2000. The purpose of the program is to enable Maine families and their children to obtain information regarding hearing screening, to secure appropriate follow-up assessment when confirmation of hearing loss is needed and to learn about treatment and intervention services at the earliest opportunity. Early intervention provides the best opportunity to prevent or mitigate developmental delays associated with the late attainment of fluent language and communication skills.

Newborn hearing screening is only the first step in the process of identifying infants and children with hearing loss. Audiologic evaluation and the fitting of amplification are critical elements in the appropriate management of infants and children with hearing loss. In 2003, the Maine Newborn Hearing Program and the Maine Academy of Audiology collaborated in the development and publication of Pediatric Audiology Guidelines to help establish consistent and appropriate audiologic care for infants and children identified with hearing loss in Maine. This year, the Maine Newborn Hearing Program and the Maine Academy of Audiology have collaborated to update and expand the 2003 guidelines. The 2010 Pediatric Audiology Guidelines are intended to be flexible and used as a resource to facilitate the identification of children with slight to profound hearing loss in time to allow for the introduction of appropriate and effective interventions. Infants and children may have a variety of coexisting conditions with hearing loss and these guidelines must be considered in the context of each infant, child and family circumstance.

Preferred practice pattern protocols for pediatric audiologic evaluations and pediatric amplification should be applied by practitioners. Resources for best practice protocols are available electronically through:

American Academy of Audiology (AAA) http://www.audiology.org
American Speech-Language-Hearing Association (ASHA) http://www.asha.org
Joint Committee on Infant Hearing (JCIH) http://www.jcih.org

The Maine Newborn Hearing Program wishes to express special acknowledgement and gratitude to the Maine Academy of Audiology Pediatric Guidelines Committee for sharing their time, expertise and energy in the development of this document. The Academy is committed to promoting highest quality audiologic services for infants and their families.

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Infant Audiologic Evaluation

The Joint Committee on Infant Hearing's *Year 2007 Position Statement* and the Department of Health and Human Services' Healthy People 2010 include the following goal for infants: *to confirm hearing loss by three months of age with appropriate intervention no later than six months of age.* With existing technology and expertise, this goal can be met routinely.

These guidelines are not a description of or instruction regarding how to carry out an audiologic evaluation. They are for information only and audiologists are encouraged to exercise their clinical judgment and apply preferred practice patterns when determining appropriate care of the individual.

Audiologists must respect the growing cultural diversity in Maine and be aware that differences between their culture and another person's could affect the audiologist's relationship with patients and concerned family members. Audiologists should strive to be culturally sensitive by learning about the culture and way of life of the family and individual with whom they are working and apply these new understandings to be more effective service providers and communicators.

I. Introduction

The primary purpose of an audiologic evaluation is the confirmation of hearing loss. When a hearing loss is confirmed, a description of the severity, type, and configuration may assist in the subsequent diagnosis, determination of etiology, and initiation of early intervention.

A. Infants are candidates for an audiologic evaluation when they:

- Have not passed an initial hearing screening and re-screen prior to discharge in the birthing facility using physiologic measures, or:
- Have not passed an initial hearing screening prior to discharge and an outpatient rescreening using physiologic measures within 4 weeks of discharge from the birthing facility, or:
- Have not been screened prior to discharge from a birthing facility or were not born in a birthing facility. In these cases, the birthing facility and/or primary care provider should arrange for a hearing screening using physiologic measures at an outpatient facility within 4 weeks (See Appendix A: Guidelines for Pediatric Medical Home Providers).

B. Premises underlying audiologic evaluation of infants:

1. Hearing loss can be confirmed within the first months of life
2. A battery of tests is needed to confirm and describe the degree and type of hearing loss
3. Results of an audiologic evaluation are necessary to plan appropriate intervention strategies

4. The audiologic evaluation of an infant is an ongoing process. Behavioral threshold information may be obtained as early as six (6) months of age using Visual Reinforcement Audiometry (VRA) procedures (preferably with insert earphones).

II. Minimum Requirements for Providers of Infant Audiologic Evaluation

The judgment regarding the ability to provide a comprehensive infant audiologic evaluation is instrumentation-driven. Audiologists with skills and expertise in evaluating infants and children with hearing loss should provide audiology diagnostic and auditory habilitation services. Currently there is no certification for "pediatric audiology" in Maine. Families may prefer or need to go to one audiologic test site for comprehensive diagnostic audiologic services rather than multiple audiologic test sites for their infant's audiologic evaluation.

A. Practitioner Qualifications

An accurate infant audiologic evaluation necessitates appropriate audiologist training and experience using instrumentation and protocols designed to obtain the information necessary to provide timely identification and management of infants and children with hearing loss. In the absence of a specialized certification, audiologists are expected to follow their professional code of ethics regarding their capability of providing such services. If the audiologist does not have the expertise and instrumentation to follow these guidelines, the infant and family should be referred to a professional equipped for and experienced in infant audiologic evaluation.

Audiologists who provide the audiologic evaluation must hold a current State of Maine License to practice Audiology. Temporary licensed audiologists, Clinical Fellows, and 4th year Au.D. students who provide assessments must be under the direct supervision of a licensed audiologist. It is understood that any practitioner providing assessments has met all state guidelines and mandates for practicing Audiology.

B. Instrumentation

Comprehensive infant audiologic evaluation facilities (i.e. category A) should have access to the instrumentation identified below:

1. **Auditory Evoked Potential** test instrumentation capable of providing information regarding the type and degree of hearing loss via use of various stimulus types, levels, polarities, and transducers (i.e. air conduction by insert receiver phones or headphones and bone conduction oscillator)
2. **Evoked Otoacoustic Emissions (EOAE)** test instrumentation, either transient-evoked OAE (TEOAE) or distortion product OAE (DPOAE) capable of a variety of test parameters, especially adjustment of stimulus levels
3. **Middle ear acoustic immittance analyzer** with high frequency probe tone capability, such as 1000 Hz, for tympanometry. Middle ear muscle reflex (MEMR) threshold measurement capability is needed for infants older than 4 months of age.

C. Additional instrumentation required for on-going evaluation via behavioral audiometry

1. Sound-treated audiometric test booth meeting the most up-to-date American National Standards Institute (ANSI) standards
2. Annually calibrated audiometer with insert earphones, headphones, and bone oscillator with pediatric headband meeting the most up-to-date ANSI standards
3. Sound-field testing capability meeting the most up-to-date ANSI standards
4. Visual reinforcement instrumentation

III. Recommended Protocol for a Comprehensive Audiologic Evaluation

When permanent hearing loss is suspected, the test battery for an audiologic evaluation includes the following procedures recommended by the Joint Committee on Infant Hearing 2007 procedures:

A. Evaluation: birth to developmental age of 6 months

1. **Child and Family History:** The Joint Committee on Infant Hearing's *Year 2007 Position Statement* and the American Academy of Pediatrics *2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Program* outline specific risk indicators for hearing loss in infants. Child-family history should include, but not be limited to, documentation concerning the risk indicators found in Appendix B, parental and/or caregiver report of auditory and visual behaviors and communication milestones.
2. **Visual Examination of Physical Features:** Visual examination of the child's physical appearance for purposes of identifying features indicative of syndromes that include hearing loss
3. **Otoscopic Inspection:** An otoscopic examination of the child's outer ear should be performed to ensure that the ear canals are clear enough to proceed with further testing
4. **Evoked Otoacoustic Emissions (EOAE):** Transient-evoked OAE (TEOAE) or distortion product OAE (DPOAE) may be used to assist in the interpretation of cochlear function and determination of site of lesion when hearing loss is identified
5. **Auditory Evoked Potentials:** Assessment of the ABR using air-conduction and bone conduction tone bursts to obtain information regarding the degree, configuration and type of hearing loss. If there is a risk of neural hearing loss (Auditory Neuropathy Spectrum Disorder), a click-evoked ABR should be done using both condensation and rarefaction stimuli to determine if the cochlear microphonic is present. Auditory Steady-State Responses (ASSR) should not be used as the sole measure of auditory status in newborn and infant populations (Stapells, Gravel, & Martin, 1995).

6. **Middle Ear Measures:** Tympanometry using a 1000 Hz probe tone* to obtain information regarding middle ear status at time of testing and need for possible medical intervention (* Lower frequency probe tones may be used for infants older than 4 months of age). There is insufficient data for routine use of middle ear muscle reflexes (MEMR) in the initial diagnostic assessment of infants younger than 4 months of age.
(Keefe, Gorga, Neely, Zhoa, & Vohr, 2003)
7. **Clinician Observation:** An infant's behavioral response to sound, or the lack of it, and parental/caregiver report should be used as a crosscheck for physiologic test results. Direct observation of auditory behavior alone is not adequate for determining whether hearing loss is present in this age group.

B. Evaluation: developmental age of 6-36 months

1. **Child and Family History:** The Joint Committee on Infant Hearing's *Year 2007 Position Statement* outlines specific risk indicators for hearing loss in infants and children. Child-family history should include, but not be limited to, documentation concerning the risk indicators found in Appendix B, parental and/or caregiver report of auditory and visual behaviors, and communication milestones
2. **Visual Examination of Physical Features:** Visual examination of the child's physical appearance for purposes of identifying features indicative of syndromes that include hearing loss
3. **Otoscopic Inspection:** An otoscopic examination of the child's outer ear should be performed to ensure that the ear canals are clear enough to proceed with further testing
4. **Behavioral Response:** Behavioral audiometry with test procedures (VRA, TROCA or CPA) appropriate for child's developmental age. Testing should include pure tone threshold assessment across the speech frequencies, by air and bone conduction, speech detection thresholds, and speech recognition measures for each ear
5. **Evoked Otoacoustic Emissions (EOAE) Evaluation:** Transient-evoked OAE (TEOAE) or distortion product OAE (DPOAE) may be used to assist in the interpretation of cochlear function and determination of site of lesion when hearing loss is identified
6. **Middle Ear Measures:** Acoustic immittance measures including tympanometry and middle ear muscle reflex thresholds
7. **Electrophysiologic Measures:** If the reliability of behavioral audiometric results is questioned and an ABR has not been performed in the past, then an ABR should be completed

IV. Conveying Test Results and Recommendations

Test results should be conveyed immediately after the audiologic evaluation so that parents/caregivers understand the outcome of the evaluation and the importance of follow-up. The following should be completed face-to-face and in a culturally sensitive manner:

A. Review of the results and their implications

B. Discussion of the importance of prompt follow-up, early intervention and surveillance of infant-child development in the habilitation process

C. Review and explanation of recommendations for intervention including:

1. The need for medical evaluation and diagnosis
2. The role and benefits of amplification
3. The importance of family education on communication options
4. The availability of early intervention and family support services through Maine's Part C service provider (CDS), the Early Childhood and Family Services (ECFS) program, and other state/local resources. Written information should be provided.
5. The availability of funding assistance for services, if necessary, and the importance of parent-to-parent support. Written information on programs and referral contacts should be provided.
6. Provision of the appropriate Maine Newborn Hearing Program (MNHP) *"Resource Guide for Families of Children with Hearing Loss"*

D. Referral for additional assessment and treatment

The pediatric medical home provider (PMHP), as defined by the American Academy of Pediatrics, is primarily responsible for monitoring the health, development, and general well-being of the child. Over thirty percent (30%) of children with confirmed hearing loss will demonstrate developmental delays or other disabilities (Karchmer and Allen, 1999). The role of the audiologist in follow-up will likely require participation in an interdisciplinary team that includes a number of specialties.

1. In consultation with the medical home provider, the audiologist should refer the child for additional medical evaluations and treatment including, but not limited to, an Otolaryngologist to identify the etiology of hearing loss, provide recommendations on medical treatment options, and provide medical clearance for hearing aid use.
2. As appropriate, the audiologist should discuss additional specialty evaluations with the child's caregiver and the child's PMHP. Every infant with hearing loss should receive ophthalmologic evaluations at regular intervals to rule out late-onset vision impairment (JCIH 2007).
3. The audiologist should initiate the amplification process, if appropriate, and ensure that medical clearance for amplification has been obtained through an Otolaryngologist in accordance with Maine State Law.
4. The audiologist should discuss and specify/determine an audiologic follow-up assessment schedule for expanding on test results and evaluating the stability of hearing loss. Scheduling for hearing aid selection and fitting should be done if the family wishes to pursue amplification options. Follow-up recommendations should be detailed in a report for the family and copied to the medical home provider.

E. The following should be addressed immediately after evaluation for infants *with normal hearing:*

1. Review results of the audiologic evaluation, implication of the audiologic findings, and any follow-up recommendations with the parents/guardians
2. Provide information about risk indicators for progressive and delayed-onset hearing loss (See Appendix A and B). If there are risk factors for progressive or delayed-onset of hearing loss, the nature of the risk should be discussed and a follow-up assessment schedule should be discussed and specified/determined. Follow-up audiologic recommendations should be detailed in a report for the family and copied to the PMHP.
3. Provide information and educational material about typical auditory, speech, and language skills development in children
4. Complete the Maine Audiologic Assessment Report electronically or fax hardcopies of the assessment or test results to the MNHP (Appendix C and D)

V. Data Management and Reporting

Test results from all hearing screenings and audiologic evaluations on infants and children up through the age of three (3) **must** be reported to the MNHP, and is mandated by law. Data reporting must be done on individuals who are found to have hearing within normal limits as well as those with suspected or confirmed hearing loss.

A. Definitions:

1. Hearing loss: Congenital permanent bilateral or unilateral sensory or permanent conductive hearing loss equal to or greater than 16 dB HL based on reliable behavioral test results
2. Degree of hearing loss (in dB HL) (average of 500, 1000 and 2000 Hz):

(Adapted from Anderson & Matkin, 1991)

Normal	-10 to 15 dB
Slight	16 to 25 dB
Mild	26 to 40 dB
Moderate	41 to 55 dB
Moderate to Severe	56 to 70 dB
Severe	71 to 90 dB
Profound	91 dB or greater

3. Test results revealing hearing loss of 20 dB HL or greater at 4000 Hz or greater should also be reported

B. Reporting confirmed hearing loss

Once any degree of hearing loss is confirmed by a battery of tests for hearing loss:

1. Report the confirmation of hearing loss to the State Child Development Services (CDS) office within 48 hours. ***Parental consent is not required for this federally mandated reporting (CFA 303.321d).***
2. The following data **must** be reported to the MNHP (within one month of testing) either by secure internet at https://linkmc.ums.maine.edu/meaareport/meaareport.aspx, via fax, or by mail using the appropriate Audiologic Assessment Form (Appendix C and D):
   Parental/guardian permission is not required for reporting to MNHP (PL, CH 236).
   a. Child's name
   b. Child's DOB
   c. Mother's name
      (if unknown, may enter 'unknown' as the field must be completed)
   d. Testing date
   e. Testing results (if test results are HL greater than 20 dB, must complete type of hearing loss)
   f. Facility name
   g. Audiologist name

C. Reporting hearing within normal limits

The following data **must** be reported to the MNHP (within one month of testing) either by secure internet at https://linkmc.ums.maine.edu/meaareport/meaareport.aspx, via fax, or by mail using the appropriate Audiologic Assessment Form (Appendix C and D): ***Parental/guardian permission is not required for reporting to MNHP (PL, CH 236).***

1. Child's name
2. Child's DOB
3. Mother's name
   (if unknown, may enter 'unknown' as the field must be completed)
4. Testing date
5. Testing results
6. Facility name
7. Audiologist name

D. Additional audiologic evaluations may be required to complete the reporting data for any child. Data for each visit **must** be reported to the MNHP when acquired. The timing and number of follow-up evaluations for infants and young children should be individualized with consideration given to:

1. Test reliability and validity
2. Presence of or risk for multiple developmental disabilities
3. History of middle ear dysfunction or disease

VI. Transition to Early Intervention

A. Interdisciplinary family-centered intervention

Any child with confirmed hearing loss and their family have the right to prompt access to quality intervention services. Intervention should begin as soon as hearing loss is confirmed by an audiologist and no later than six months of age. The planning and provision of intervention services for hearing loss should include service providers from multiple disciplines and agencies. The parents/caregivers are the central figures in the interdisciplinary team and they should always be involved as such.

B. Outcomes

The outcomes of a successful early hearing detection and intervention (EHDI) program are the following:

- All infants with hearing loss are identified as soon as possible, preferably within 3 months of age and no later than 6 months of age
- Infants with confirmed hearing loss begin receiving early intervention services, as appropriate for the child and family, as soon as possible and preferably by 6 months of age and no later than 12 months of age

C. Quality indicators for successful intervention programs

1. Services are family-centered
2. Families are provided with unbiased information about all options and opportunities regarding approaches to communication
3. Infant-child development is monitored at 6-month intervals using norm-referenced instruments
4. Individuals who are deaf or hard of hearing are included in the intervention program
5. Services are provided in a natural environment in the home and in any early intervention programs providing services outside of the home
6. High quality services are offered regardless of where the family lives
7. Informed consent is obtained at all appropriate junctures
8. Service programs and providers are sensitive to and accommodating of cultural and language differences and needs
9. Annual surveys of parent/guardian satisfaction are conducted (JCIH, 2007)

D. Interdisciplinary cooperation and communication

It is critical to successful early hearing detection and intervention that the disciplines communicate and share information. Although desired, it is often not practical for the multiple disciplines to actually meet as a team. Active communication by involved disciplines promotes timely coordination of habilitative service delivery and a positive outcome. Disciplines involved may include, but are not limited to, the following:

1. Pediatric Medical Home Provider (PMHP)
2. Audiologist
3. Speech Pathologist
4. Parent Outreach Services
5. Neurologist

6. Otolaryngologist/Otologist
7. Geneticist
8. Physical Therapist
9. Occupational Therapist

E. The audiologist's role in promoting positive outcome in early intervention

The audiologist's role in habilitative services is to provide follow-up audiologic care for an infant or young child with a confirmed or suspected hearing loss. The audiologist is a vital source of information needed by the family or guardian(s) to make informed decisions. Audiologists are also an important source of information to community health and service programs, and they are encouraged to be active team members in the development and ongoing review of the child's Individualized Family Services Plan (IFSP) and in the process of transitioning from part C to the part B Individual Education Plan (IEP)

Amplification

"Amplification with hearing instruments should be considered for a child who demonstrates a significant hearing loss, including sensorineural, conductive, or mixed hearing losses of any degree. The duration and configuration of hearing loss will assist the audiologist in the decision to fit a child with amplification. Additional factors such as the child's health, cognitive status, and functional needs also will influence the time-line of fittings." (Adapted from *AAA Pediatric Amplification Protocol*, October 2003)

I. Introduction

The following guidelines are adapted from the American Academy of Audiology's *Pediatric Amplification Protocol*, October 2003. Their purpose is to identify the essential components of a pediatric amplification protocol, to provide a framework for selecting and fitting amplification, to evaluate outcome of treatment, and to provide ongoing management for infants, young children and their families.

A. Qualifications for practitioners selecting and fitting all forms of amplification for children:

1. Hold a current license to practice Audiology in Maine and adhere to all regulatory requirements
2. Be knowledgeable about state and federal laws and regulations that apply to the identification, intervention and education of infants and children who are deaf and hard of hearing
3. Have the training and experience necessary to assure adequate skill in assessing the hearing of infants and young children
4. Have the expertise and equipment required for performing the selection, evaluation, fitting, and verification procedures described below
5. Have access to case history and prior audiological information
6. Know proper referral procedures to assure appropriate support and management

B. Medical Referral

The child's pediatric medical home provider is primarily responsible for monitoring the health, development and general well being of the child. The audiologist is an active participant in developing and implementing the plan of intervention for infants and young children with auditory disabilities and as such they should:

1. Facilitate referral to an Otolaryngologist/Otologist with pediatric experience for investigation into etiology, medical treatment, and/or medical clearance for amplification
2. Facilitate referral for vision screening
3. Be aware of the risk for other related conditions and inform the pediatric medical home provider, parents or guardian(s) of any concerns regarding the likelihood of these conditions. Recommendations for outside referrals should state why the specific referral is being suggested.

Recommended referrals may include, but are not limited to, the following specialty areas:

a. Genetic testing/counseling
b. Vision screening
c. Nephrology
d. Cardiology
e. Neurology
f. Rheumatology

C. Ongoing management and surveillance

1. If a child has unilateral, mild, or chronic conductive hearing loss or is "at risk" for progressive or delayed onset hearing loss, ongoing services should include audiologic follow-up
2. Children referred to a physician for conductive hearing loss should be re-assessed by an audiologist no later than 6-8 weeks following completion of any medical intervention. The audiologist should inform the parents or guardian(s) of the need for re-evaluation and should document the referral to the PMHP.
3. All infants with a risk indicator for hearing loss (Appendix A and B), regardless of surveillance findings, should be referred for an audiological assessment at least once by 24 to 30 months of age. Children with risk indicators which are highly associated with delayed-onset hearing loss, such as having received ECMO or having CMV infection, should have more frequent audiological assessments (JCIH, 2007).
4. Medical evaluation and management of possible middle ear disorders should not preclude follow-up audiological evaluation for permanent hearing loss. Every effort should be made to establish the presence of permanent hearing loss within three months of birth.
5. Amplification and early intervention should not be delayed beyond six months of age unless there are clear contraindications

II. Amplification Process

A. Basic requirements for pre-selection of amplification

The recommended data for hearing aid selection and fitting is developed over the course of evaluating the infant or child and the hearing aid fitting may begin before all data are obtained (AAA, Pediatric Amplification Protocol, October 2003).

1. Ear-specific thresholds or best estimates of hearing thresholds for air-and bone conduction stimuli
2. Appropriate speech audiometry measures should be considered for infants and young children
3. Acoustic immittance measures.
4. Evoked otoacoustic emissions (EOAE)
5. Parental consent to fit amplification
6. Medical clearance from an Otolaryngologist/Otologist

B. Amplification and hearing assistance technology considerations

1. **Routing of Signal**
   a. Binaural amplification should be provided to young children unless there are clear contraindications
   b. Bone conduction hearing aids when appropriate
   c. Implantable devices (written information should be provided)
2. **Style**
   Behind-the-ear (BTE) hearing aids are the style of choice for most children. Providing the best possible amplified speech signal should not be compromised for cosmetic purposes, particularly in the early years of life when auditory skills development and speech-language learning is occurring at a rapid pace.
3. **Coupling for assistive technology**
   FM-compatible hearing aids for accessing the various forms of current assistive device technology. Direct Audio Input (DAI), telecoil (T), ear level FM receiver and microphone-telecoil (M-T) switching options must be considered. FM systems may be a primary or supplemental amplification.
4. **Fine tuning**
   Instrument program features that allow flexibility in fine tuning electro-acoustic programs/parameters are critical. The hearing abilities of infants can be a prolonged process of discovery. Hearing aid fine tuning flexibility is needed to meet this challenge and to address fluctuant or progressive hearing loss.
5. **Safety** Tamper-resistant features and retention devices
6. **Sound Channel & Earmolds**
   - Earmolds constructed of a soft material.
   - Pediatric tone hooks.
7. Volume control deactivation capability or volume control covers.
8. Loss and damage insurance for each hearing aid.
9. Alerting/safety devices for the home.

C. Additional fitting considerations

- Minimally, hearing threshold based prescriptive fitting methods that provide speech audibility for different input levels should be used for each infant or child
- Target levels for gain and output should be used to verify optimal aided speech audibility and reduce the risk of loudness discomfort levels being reached or exceeded

D. Verification

Manufacturer fitting software provides a good starting point to "pre-fit" hearing aids based on a selected fitting formula. To ensure that speech is both audible and comfortable for the infant or child, it is essential that hearing aid performance be verified and compared to a specific fitting formula (Roush, P 2004).

The following instrumentation is needed for pediatric amplification fittings and verification:

1. Hearing Instrument Test (HIT) equipment that meets the most current ANSI standards to verify the electroacoustic characteristics of the selected amplification
2. Instrumentation for making in-situ or simulated real ear measurements using Real Ear to Coupler Difference (RECD) with various intensity input levels for verification
3. Appropriate hardware and software to support the selected instruments and pediatric prescriptive fittings

E. Amplification orientation and training

Parent/guardian orientation and training should be provided 1:1 in direct consultation. Information should also be provided in writing for review by the family, guardian(s), and individuals who are part of the program of intervention. Information provided should include a review of:

1. Proper use, care, and maintenance of selected amplification
2. Insertion and removal of earmolds
3. Insertion, removal, and disposals of batteries, as well as the hazards of battery ingestion
4. Basic trouble-shooting
5. Overnight storage
6. Need for follow-up to confirm and expand on test results, check hearing aid function, and replace amplification and earmolds as needed
7. Counseling and establishing realistic expectations

F. Validation

Validation is an ongoing process that ensures the infant or child is receiving optimal speech input from others and that their own speech is adequately perceived (AAA Pediatric Amplification Protocol, 2003).

1. The parent/guardian should be encouraged to maintain a log/checklist for documenting observed auditory behaviors in order to monitor their child's auditory awareness and auditory skill development in the child's natural environment.
2. An evaluation of the child's functional auditory and communication needs should include assessment tools that:
    a. Demonstrate the child's listening ability in their natural learning/listening environments (i.e. listening in noise, listening for soft/distant speech, etc.)
    b. Assess the home and/or childcare environment

c. Are sensitive to the cultural and family dynamics of the child's care environment
d. Identify factors unique to the child's natural environment

3. Periodic evaluation of infant or child auditory skills development and family needs using functional evaluation tools/questionnaires such as:

   a. Children's Home Inventory of Listening Difficulties (CHILD) (Anderson & Smaldino, 2007)
   b. The Family Expectation Worksheet (Palmer & Mormer, 1999)
   c. The Infant Toddler Meaningful Auditory Integration Scale (IT-MAIS) (Zimmerman, Osberfer, Robbins, 1998)
   d. The Meaningful Use of Speech Scale (MUSS) (Robbins, Svirsky, Osberger & Pisoni, 1998)
   e. Functional Auditory Performance Indicators (FAPI) (Stredler-Brown, Johnson, 2001)
   f. Early Listening Function (ELF) (Anderson, 2002)

G. Follow up and referral

The fitting of personal amplification for infants and young children who are hard of hearing or deaf is an ongoing process. Surveillance of auditory skills development is an integral part of audiologic follow-up. At a minimum, an audiologist should see a child every 3 months during the first two years of using amplification and every 4-6 months thereafter (The Pediatric Working Group, 1996, American Academy of Audiology Pediatric Amplification Protocol, 2003).

Follow-up exams may include, but not limited to:

1. Behavioral audiometric evaluation
2. Current assessment of communication skills
3. Listening checks of the hearing aid
4. Earmold fit check
5. Electroacoustic evaluation and analysis of amplification
6. Adjustment of amplification system based on updated audiologic test results and auditory skill development
7. Information and assessment of communication demands
8. Periodic re-evaluation of the real ear to coupler difference (RECD) and other probe microphone measures as appropriate
9. Validation of expected benefit of amplification including periodic functional measures (See Section F: Validation)

H. Follow-up services to family members and other individuals caring for amplification

1. Advise and educate family and service providers on hearing loss and the limitations of amplification to facilitate the growth of realistic expectations as the child ages and matures
2. Encourage families and service providers to acknowledge the presence of hearing loss even when the adverse effects of hearing loss are not readily apparent, such as mild and/or unilateral hearing loss
3. Teach the family the trouble-shooting and maintenance skills needed to be self-directed in support of the child's consistent use of amplification
4. Educate families on the benefits of assistive technology in meeting a child's speech, language, and learning needs

5. Advise on changes in technology and related insurance issues
6. Support transitions in the school environment and revisit relevant services and sources of support for the child and the family.
7. Increase input/reporting from the child
8. Schedule monitoring/check-ins regarding hearing loss and amplification devices

Agency Contact Information

Child Development Services

The Child Development Services (CDS) system is an Intermediate Educational Unit that provides both Early Intervention (birth - two years) and Free Appropriate Public Education (FAPE for ages three - five years) under the supervision of the Maine Department of Education. The CDS system ensures the provisions of Special Education Rules - Federal and State Regulations statewide through a contractual or grant relationship between the Department of Education and each regional site.

Contact Information:

Child Development Services, State Office
Debra Hannigan, State Director
State Intermediate Educational Unit
146 State House Station
Augusta, ME 04333

Central Reporting Numbers:
(207) 624-6660 Voice
(207) 624-6661 Fax

Early Childhood and Family Services

Statewide Educational Services (SES), a division of the Maine Educational Center for the Deaf and Hard of Hearing offers information, support and education to families through its Early Childhood and Family Services (ECFS) program to children newborn to five years of age who are deaf, hard-of-hearing, or have a suspected hearing loss. ECFS is a state-funded, independent agency providing information, support and training to families and professionals throughout Maine. Their services include home visits, daycare and preschool visits, and are provided without cost to the families.

Contact Information:

Karen Hopkins, ECFS Coordinator
Early Childhood and Family Services
1 Mackworth Island
Falmouth, Maine 04105

(207) 781-6335 Voice
(207) 781-6220 Fax
karen.hopkins@mecdhh.org Email

Maine Newborn Hearing Program

The Maine Newborn Hearing Program (MNHP) is a part of the Maine CDC, Department of Health and Human Services. The MNHP coordinates newborn hearing screening programs and follow-up of infants and young children with hearing loss. A family packet with information about state and national resources, programs, websites, and publications is available without cost to families and providers. The MNHP Coordinator and a Parent Consultant are available for resource and referral information.

Contact Information:

Betsy Glencross
Coordinator, Maine Newborn Hearing Program
11 State House Station
286 Water Street, 7th Floor
Augusta, Maine 04333-0011

(207) 287-6879 Voice Main Line
(207) 287-8427 Voice Direct Line
(800) 606-0215 TTY
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Appendix

Appendix A Guidelines for Pediatric Medical Home Providers

Appendix B Risk Indicators for Hearing Loss

RISK INDICATORS ASSOCIATED WITH PERMANENT CONGENTIAL, DELAYED-ONSET, OR PROGRESSIVE HEARING LOSS IN CHILDHOOD

Risk indicators that are marked with a "§" are of greater concern for delayed-onset hearing loss.

1. Caregiver concern§ regarding hearing, speech, language, or developmental delay

2. Family history§ of permanent childhood hearing loss

3. Neonatal intensive care of more than 5 days or any of the following regardless of length of stay: ECMO,§ assisted ventilation, exposure to ototoxic medications (gentamycin and tobramycin) or loop diuretics (furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion

4. In utero infections, such as CMV,§ herpes, rubella, syphilis, and toxoplasmosis

5. Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies

6. Physical findings, such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing loss

7. Syndromes associated with hearing loss or progressive or late-onset hearing loss,§ such as neurofibromatosis, osteopetrosis, and Usher syndrome; other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson

8. Neurodegenerative disorders,§ such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome

9. Culture-positive postnatal infections associated with sensorineural hearing loss,§ including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis

10. Head trauma, especially basal skull/temporal bone fracture§ that requires hospitalization

11. Chemotherapy§

American Academy of Pediatrics, Year 2007 position statement: Principles and guidelines for early hearing detection. Pediatrics 2007 Oct.; 106 (4): 798- 817.

Appendix C Maine Audiologic Assessment Report Form – Soundfield Testing

MAINE AUDIOLOGIC ASSESSMENT REPORT FORM
Best Ear Only

Child's Last Name: _____ First Name: _____MI:_____

Sex: Male Female Child's Date of Birth: ___/___/___ Birthing Facility_____

Mother/Guardian Name: _____ Mother's Date of Birth: ___/___/___

Mother/Guardian **Street** Address: _____
APT #

_____
City State Zip

Mother/Guardian **Mailing** Address: _____
(if different from Street Address)

Mother/Guardian Phone Number: Home ( )_____ Work ( )_____

Child's Primary Care Provider/Medical Home: _____

Child's Primary Care Provider City: _____

Referred by (circle one): PCP ENT CDS Other_____

Reason referred: (check appropriate response)

☐ refer on newborn screen ☐ High Risk Indicator of:_____ (specify) ☐ Speech/language delay
☐ middle ear pathology suspected ☐post treatment/surgical check-up ☐Hearing Aid fitting ☐ Other _____(specify)

Audiological Evaluation Results: Test date _____ (MM/DD/YYYY)

BEST EAR
a. Result: (dBHL, avg .5, 1.0 & 2.0 kHz):
____Not Tested
____Undetermined
____0 to 20
____21 to 40
____41 to 55
____56 to 70
____71 to 90
____91+

b. If result is >20 dBHL, indicate type of loss:
☐SNHL ☐ Perm. Conductive ☐Mixed ☐Unknown

c. What tests were conducted in addition to soundfield testing?
☐ OAE (DPOAE or TEOAE)
☐ Immittance
☐ High Freq Immittance
☐ MEMR (AR)

e. Does child have auditory dys-synchrony? ☐ Yes ☐ No

Referral Made To:
CDS: ☐ Yes ☐ No ECFS: ☐ Yes ☐ No PCP: ☐ Yes ☐ No

For Contact Information for Local CDS Agency, Please call 207-624-6600
Early Childhood & Family Services (ECFS) Toll Free Phone: 1-866-231-8910, Fax: 207-781-6220

Facility Name:_____ Name of Audiologist: _____

Comments:

Fax the completed form to: 207-287-4743
Or **mail** to: Maine Newborn Hearing Program, 286 Water St, 7th Floor, State House Station 11, Augusta ME 04333-0111. Phone: (207) 287-6879

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Appendix D Maine Audiologic Assessment Report Form - Individual Ear Testing

MAINE AUDIOLOGIC ASSESSMENT REPORT FORM
Individual Ear Results

Child's Last Name: _____ First Name: _____MI:_____

Sex: Male Female Child's Date of Birth: ___/___/___ Birthing Facility_____

Mother/Guardian Name: _____ Mother's Date of Birth: ___/___/___

Mother/Guardian **Street** Address: _____
APT #

_____
City State Zip

Mother/Guardian **Mailing** Address: _____
(if different from Street Address)

Mother/Guardian Phone Number: Home ( )_____ Work ( )_____

Child's Primary Care Provider/Medical Home: _____

Child's Primary Care Provider City: _____

Referred by (circle one): PCP ENT CDS Other_____

Reason referred: (check appropriate response)

☐ refer on newborn screen ☐ High Risk Indicator of:_____ (specify) ☐ Speech/language delay
☐ middle ear pathology suspected ☐post treatment/surgical check-up ☐Hearing Aid fitting ☐ Other _____(specify)

Audiological Evaluation Results: Test date _____ (MM/DD/YYYY)

RIGHT EAR	**LEFT EAR**
a. Result: (dBHL, avg .5, 1.0 & 2.0 kHz): ____Not Tested ____Undetermined ____0 to 20 ____21 to 40 ____41 to 55 ____56 to 70 ____71 to 90 ____91+	a. Result: (dBHL, avg .5, 1.0 & 2.0 kHz): ____Not Tested ____Undetermined ____0 to 20 ____21 to 40 ____41 to 55 ____56 to 70 ____71 to 90 ____91+
b. If result is >20 dBHL, indicate type of loss: ☐SNHL ☐Perm. Conductive ☐Mixed ☐Unknown	b. If result is >20 dBHL, indicate type of loss: ☐ SNHL ☐Perm. Conductive ☐Mixed ☐Unknown
c. What tests are the above results based on? ☐ Click ABR (AC/BC) ☐ Tone Burst ABR List Freqs_____ ☐ Bone Cond ABR List Freqs_____ ☐ ASSR (Ac/BC) List Freqs_____ ☐ Other _____	c. What tests are the above results based on? ☐ Click ABR (AC/BC) ☐ Tone Burst ABR List Freqs_____ ☐ Bone Cond ABR List Freqs_____ ☐ ASSR (Ac/BC) List Freqs_____ ☐ Other _____
d. What other tests were performed? ☐ OAE (DPOAE or TEOAE) ☐ Immittance ☐ High Freq Immittance ☐ MEMR (AR)	d. What other tests were performed? ☐ OAE (DPOAE or TEOAE) ☐ Immittance ☐ High Freq Immittance ☐ MEMR (AR)

e. Does child have auditory dys-synchrony in this ear? ☐ Yes ☐ No	e. Does child have auditory dys-synchrony in this ear? ☐ Yes ☐ No

Candidate for amplification ☐ Yes ☐ No
☐ Hearing Aid Recommended: ○ Right ○ Left ○ Both
☐ Hearing Aid Fit: ○ Right ○ Left ○ Both ○ Other
Referral to statewide hearing aid loaner program? ☐ Yes ☐ No

Qualifies for MaineCare HA funding? ☐ Yes ☐ No
Applied to outside funding source? ☐ Yes ☐ No
Applied to Part C for HA funding? ☐ Yes ☐ No

Referral Made To

CDS: ☐ Yes ☐ No ECFS: ☐ Yes ☐ No PCP: ☐ Yes ☐ No

For Contact Information for Local CDS Agency, Please call 207-624-6600
Early Childhood & Family Services (ECFS) Toll Free Phone: 1-866-231-8910, Fax: 207-781-6220

Facility Name:_____ Name of Audiologist: _____

Comments:

Fax the completed form to: 207-287-4743
Or **mail** to: Maine Newborn Hearing Program, 286 Water St, 7th Floor, State House Station 11, Augusta ME 04333-0111. Phone: (207) 287-6879

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Printed with support of federal grant funds from the
U.S. Department of Health & Human Services,
Maternal Child Health Bureau, Health Services & Resource Administration
Grant-#H61MC00078-10
State appropriation # 013-10A-2125-01-UNHS9

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