

**Indiana's Early Hearing Detection and Intervention Program
Diagnostic Guidelines for Audiologic Assessment, Pediatric Amplification and
Intervention of the Infant**

Revised October 2010



Early Hearing Detection and Intervention (EHDI)

Indiana's Best Practice Guidelines for Audiologic Assessment, Pediatric Amplification and Intervention of the Infant

Indiana's Early Hearing Detection and Intervention (EHDI) program is in accordance with the National EHDI 1-3-6 plan which states:

1. All infants should be screened for hearing loss before 1 month of age
2. All infants not passing the hearing screening (in one or both ears) should receive complete diagnostic audiometric and medical evaluation before 3 months of age
3. All infants identified with hearing loss should be enrolled in appropriate early intervention services before 6 months of age
4. All infants identified with hearing loss will be linked to a medical home
5. All infants identified with hearing loss will be provided with information regarding parent support organizations

The Joint Committee on Infant Hearing, the American Academy of Pediatrics, and the Centers for Disease Control and Health and Human Services' Healthy People 2010 and other related professional organizations has recommended these goals to prevent or minimize developmental delays due to hearing loss.

The recommendations in this document do not indicate an exclusive course of treatment or serve as a standard of care. Variations taking into account individual circumstances and unique program needs may be appropriate.

INDIANA'S EHDI PROGRAM

Indiana Statutes IC 16-41-17-2 mandates the screening of all newborns in Indiana for hearing disorders. When an infant has not passed two newborn hearing screens, hospitals are responsible for providing referral information for a diagnostic audiologist and/or a referral to the primary care physician. It is important that the diagnostic evaluation be completed prior to three months of age in order to identify a hearing loss within the recommended time frame, reduce parental anxiety, and to decrease the need for conscious sedation. Procedures and protocols for hospital screenings can be found in the EHDI Policy Manual.

It is not recommended to re-screen the infant who did not pass the initial two screenings. If an out-patient screening is completed within 2 weeks of discharge the same type of technology used for the initial screening must be used for the subsequent screening. Any charges submitted for out-patient screenings should use the following screening CPT codes: **92586** for automated auditory brainstem response screen (AABR) and **92587** for otoacoustic emissions screen (OAE).

Infants who pass the hearing screening but are considered at-risk for delayed onset of hearing loss should be seen for a diagnostic audiologic evaluation at 9-12 months of age.. Indiana requires follow-up diagnostic testing for the following **risk factors**:

- 1) Family history of permanent childhood hearing loss
- 2) In utero infection (e.g. cytomegalovirus, rubella, herpes, toxoplasmosis, syphilis)
- 3) Hyperbilirubinemia at a serum level requiring exchange transfusion

- 4) Ears that are formed in a different way than usual (no ear, partial ear or no ear canal opening). These babies should not be screened but referred immediately to audiology for diagnostic testing. Babies with other craniofacial anomalies who are screened and pass should be referred to the Primary Care Provider (PCP) for follow-up diagnostic testing at 9-12 months of age.

Other risk factors do exist and all parents should be informed to monitor the development of their child's hearing and language development. If they have concerns over time, the family should request follow-up testing. For a more complete listing of risk factors please refer to the Joint Committee on Infant Hearing 2000 Position Statement.

Health Surveillance Responsibility: Genomics & Newborn Screening Program, at the Indiana State Department of Health (ISDH), administers the Newborn Screening Program, which includes hearing and heel-stick screenings. Health Information Protection and Privacy Act (HIPPA) define newborn screening as a public health authority. Pursuant to 45 CFR 164.512(b) of the Privacy Rule, covered entities such as birthing facilities and audiologists may disclose, without individual authorization, protected health information (PHI) to public health authorities. Public health entities are authorized by law to collect or receive such information for the purpose of conducting public health surveillance, public health investigations, and public health intervention.

Data Management and Tracking: In early 2006, the Indiana University laboratory will enter newborn hearing screening data into a data management and tracking system. This will allow ISDH to follow up on all newborns referred from birthing facilities for not passing two screens, discharged without a screen or those who are at risk for delayed onset of hearing loss. In 2008, the EHDI Alert Response System (EARS) was introduced for hospitals to report screening results using a web-based format and for audiologists to report diagnostic findings.

Purpose of Assessment: The primary purpose of an audiologic assessment is the confirmation of hearing status. If hearing is normal the report allows EARS to close the case. If a hearing loss is confirmed, a description of the severity, type, and configuration assists in the subsequent medical diagnosis, determination of etiology, and early intervention services.

REQUIREMENTS FOR PROVIDERS OF INFANT AUDIOLOGIC ASSESSMENT

Equipment

Audiologists who provide pediatric services must have access to specialized equipment. Completion of audiologic assessment at one site and in one visit is preferable. Facilities should have access to the equipment identified below:

1. **Auditory Brainstem Response (ABR)** test equipment that is capable of various stimulus levels and types including (a) clicks, (b) frequency specific stimuli such as tone bursts at audiometric frequencies and (c) transducers including air conduction insert earphones and bone conduction oscillator
2. **Evoked Otoacoustic Emissions (OAE)** test equipment, either transient-evoked OAE (TEOAE) and/or distortion-product OAE (DPOAE)

3. **Middle ear acoustic immittance analyzer for tympanometry with high frequency probe tones** and middle ear muscle reflex (MEMR) threshold measurement

Additional equipment needed for on-going assessment via behavioral audiometry:

- Sound-treated audiometric test booth
- Audiometer with insert earphones
- Sound-field testing capabilities
- Visual reinforcement audiometry (VRA)

Optional Equipment:

Auditory steady-state response (ASSR) may be used in conjunction with the above test battery to help estimate frequency-specific hearing sensitivity. Although ASSR may help confirm test results, it should not replace traditional ABR.

Practitioner Qualification

Audiologists who provide pediatric assessment:

- Must hold a current Indiana license in Audiology
- Should have pediatric experience and expertise
- Should have and routinely use recommended equipment listed above

INFANT DIAGNOSTIC AUDIOLOGIC ASSESSMENT

Audiologic assessment should evaluate both ears whether referral was in one or both ears. Typically, infants less than 3 months of age can be evaluated during natural sleep without sedation.

ASSESSMENT OF CHILDREN BIRTH TO 4 MONTHS DEVELOPMENTAL AGE¹

Minimal Test Battery

1. **Case History/Parental Concern**
2. **Otoscopy**
3. **High/Multi-Frequency Tympanometry**
4. **Diagnostic OAE**
 - i. TEOAEs need to be present above the noise floor by at least 6 dB and/or have a reproducibility of $\geq 70\%$ for the range of 1-4k Hz using stimulus level of 70-80 dB SPL
 - ii. DPOAEs need to be present above the noise floor by at least 6 dB from 2-5k Hz with a F1-F2 stimulus level of 65-55 dB SPL
5. **ABR:** Wave V click response at $\leq 25\text{dBnHL}$ for each ear
Note: In order for the assessment to be accurate, it is essential that the infant is in a sleep state so that there is no bodily or eye movement causing electrical activity that could obscure the auditory evoked potentials.

If any of the test results are not within the normal range, continue with additional confirmatory testing to determine degree, type, and configuration of the hearing loss. Completion of the full diagnostic protocol is essential for accurate assessment and for planning of the child's educational future.

Confirmatory test procedures may include:

- Click ABR thresholds in 10dB steps; responses should be assessed to 90-95 dBnHL if responses are not observed at softer levels to assess the integrity of the auditory pathway. Evaluate absolute latencies, interpeak latencies and waveform morphology.
- Frequency specific ABR thresholds at one low frequency (500 Hz) and one high frequency (4000 Hz) in each ear. If time permits, obtain thresholds for 1000 and 2000 Hz.
- Bone conduction ABR thresholds should be obtained for each ear to determine the type of hearing loss. Masking should be used when appropriate.
- Assessment of neural response if Wave V is not identified. Compare responses obtained to rarefaction and condensation clicks presented at 80-90 dBnHL using a fast click rate (>30 per second) and obtain a recording with pinched earphone tubing to rule out electrical artifact. If a response (cochlear microphonic) that reverses with polarity change and disappears when tubing is pinched is observed, auditory neuropathy (auditory dysynchrony) should be suspected.
- Acoustic immittance measures using a high frequency probe tone stimulus for 0-6 months of age and MEMR (acoustic reflexes) – if not completed previously.
- Behavioral observation audiometry (BOA) to a speech stimulus and/or a 500 and 2000 Hz tone or narrow band noise by air conduction and bone conduction and identify any minimal responses. Attempt to obtain startle response.

ASSESSMENT OF CHILDREN 6 TO 36 MONTHS DEVELOPMENTAL AGE

Children with hearing concerns or communication delays require audiologic assessment to rule out the presence of hearing loss. The goal of audiometric assessment is to obtain ear specific, frequency specific, and hearing threshold information. Assessment(s) should be similar to those recommended previously. If behavioral testing cannot be obtained, further assessment using electro-acoustic measures may be indicated.

SEDATION FOR AUDITORY BRAINSTEM RESPONSE TESTING

Sedation may be necessary for some infants. A comprehensive sedation policy is available from JCAHO (www.JCAHO.org). **Sedation should only be administered on-site at the testing facility by qualified medical personnel.** Each facility needs to have a comprehensive conscious sedation policy, which outlines the steps required to ensure patient safety.

COUNSELING, RECOMMENDATIONS, REFERRAL AND REPORTS

If hearing is within the normal limits

1. Review results of the audiologic assessment, implications of the audiologic findings, and recommendations with the parents including information about typical speech, language and listening milestones.
2. Follow-up is recommended if a parent notices a decrease in hearing or at the physician's request.
3. If risk factors for delayed-onset hearing loss are present further follow-up is left to the discretion of the audiologist. The audiologist should counsel the parent on the importance of monitoring the child's hearing and language development. Parents should be provided with the Language and Hearing Milestones Handout.

Enter the baby into the EARS system and complete the Diagnostic Audiologic Evaluation (DAE) form as completely and accurately as possible and submit it to the Indiana State Department of Health, Genomics and Newborn Screening Program within 5 business days.

If hearing loss is confirmed

All infants with confirmed hearing loss (permanent conductive, sensorineural, or auditory dysynchrony/neuropathy) should be followed at a minimum every three months until hearing thresholds are established and then every six months until age three. Ongoing audiologic follow-up should be determined by the family and child's individual needs.

1. Recommend referral to an otolaryngologist (pediatric if available) for a complete otologic work-up and medical clearance for amplification.
2. Discuss with the parents and the infant's primary care physician the possibility of additional specialty referrals including genetics, neurology, ophthalmology, etc.
3. Discuss audiologic evaluation of siblings
4. Review all results and recommendations for intervention with the family including:
 - a. Amplification options which may include hearing aids, FM systems, and cochlear implants
 - b. Early intervention and communication opportunities
 - c. Family Resource Guide for Children with Hearing Loss
 - d. Local, state, and national parent support organizations
 - e. Funding assistance, if necessary
5. Refer the family to Indiana's First Steps Early Intervention Program for entry into the local Part C of Individuals with Disabilities Education Act (IDEA) system for specific information regarding intervention options and resources. This referral is for all infants with confirmed hearing loss including unilateral loss, bilateral loss, and/or auditory dysynchrony (auditory neuropathy). Federal Part C law (IDEA 2004) indicates that a referral to Part C should occur within 2 days of diagnosis. Note that while the State's Part C (First Steps) program is available to eligible children regardless of income, First Steps is an opt-in program. If a family wishes to decline a referral to First Steps (i.e. prefers to use private funding), have them sign a statement that they have been informed about First Steps and have declined your offer of a referral.
6. Disseminate written reports and recommendations to the parents, the infant's primary care provider, and other care providers and agencies as requested by parents.
7. Submit the Diagnostic Audiologic Evaluation (DAE) form as completely and accurately as possible through EARS. This should be resubmitted and updated if hearing status or demographic information changes.

GUIDELINES FOR PEDIATRIC AMPLIFICATION

For most infants with hearing loss, an important component of intervention will include amplification and other assistive devices. It is a matter of family choice regarding whether or not their infant should use amplification. The sooner deaf and hard-of-hearing infants are appropriately fit with amplification the better the outcome for the development of listening and spoken language. Ideally, fitting of amplification will occur by six months of age.

Audiologists are the professionals qualified to select and fit all forms of amplification for infants and children. Audiologists must hold a master's and/or doctoral degree from an accredited university and be licensed by the state of Indiana.

Please refer to the American Academy of Audiology Pediatric Amplification Protocol October 2003 for detailed recommendations related to fitting and verification practices (see Appendix) which includes

- Personnel Qualifications
- Candidacy
- Pre-selection Issues and Procedures
- Circuitry-Signal Processing
- Hearing Instrument Selection/Fitting Considerations
- Verification
- Hearing Instrument Orientation and Training
- Validation
- Follow-up and Referral

IMPORTANT AMPLIFICATION CONSIDERATIONS

Amplification Options

- Binaural hearing aids should be fit unless contraindicated by medical condition or audiologic results
- Behind-the-ear (BTE) aids are the most appropriate for infants and children
- Hearing aids should provide the greatest amount of flexibility in terms of gain, output and frequency response characteristics in order to provide the most appropriate fit. Flexibility is essential so that changes can be made as additional audiologic information becomes available or as hearing changes over time.
- All hearing aids should have safety features including tamper resistant battery doors and volume control covers
- All hearing aids should be compatible with FM and assistive listening devices such as: direct audio-input (DAI) capabilities, telecoil, microphone-telecoil switching option (M/MT/T)
- A bone conduction aid may be appropriate if the loss is conductive and BTEs cannot be used. A bone anchored hearing aid (BAHA) is a device surgically implanted into the skull and is not approved for children less than 5 years of age by the U.S. Food and Drug Administration (FDA). The soft band BAHA is an option for children under 5 years of age.
- For some infants with profound hearing loss and some infants with physical limitations/considerations, the addition or use of an FM system or body style aid may be appropriate
- Frequency Modulation (FM) systems coupled to personal hearing aids can be considered when a child becomes mobile.
- Cochlear implants are approved by the FDA for children twelve months of age or older. The child must have a severe to profound bilateral sensorineural hearing loss, used optimally fitted hearing aids for 3-6 months with little benefit, been

enrolled in appropriate early intervention and meet the medical candidacy requirements.

- **Components/Accessories**
 - **Earmolds/Tubing:** Consider appropriate materials and acoustic modifications. Frequent replacement of earmolds is necessary as the infant grows.
 - **Bone Oscillators/Cords:** Frequent replacement may be needed
 - **Retention devices:** pediatric earhooks, straps or “Huggies”, toupee or wig tape, cords or “Crittter Clips”, headbands or hats
 - **Maintenance Kits:** All families should receive a kit which includes dry aid kit, battery tester, stethoscope, air blower, wax loop, and brush
 - **Moisture Guards:** such as SuperSeals and Hearing Aid SweatBands

- **Loaner Hearing Aids:** Loaner aids may be accessed when the infant’s hearing aids need to be repaired. In certain circumstances loaner hearing aids may be accessed while hearing thresholds are being determined. Loaner aids should match the performance characteristics of the child’s own aids as closely as possible. Loaner hearing aids are also available from the Lion’s Hearing Aid Bank located at Riley Hospital for Children to families whose children are undergoing trial amplification use as part of the cochlear implant evaluation process.

MONITORING OF CHILDREN WITH AMPLIFICATION

At minimum, the infant should be scheduled for appointments with the audiologist at least every three months during the first two years of using amplification and every four to six months after that time. Follow-up appointments should include:

- Behavioral audiometric evaluations – unaided and aided results
- Adjustment of the amplification system based on updated audiometric information
- Periodic electro-acoustic evaluations of amplification system
- Listening checks of amplification system
- Checks of earmold fit and tubing replacement
- Periodic probe microphone measurements with measured real-ear to coupler differences (RECD) (especially when earmolds are replaced or modified)
- Periodic functional measures to document development of auditory skills
- Functional auditory skill assessment obtained by the audiologist and early interventionist (e.g., IT-MAIS, ELF, etc.)
- Speech, communication, and language skill assessment obtained by the early interventionist
- Parent and health care provider input

PARENT COUNSELING

Information about all amplification options should be provided to parents. Parents and other family members or individuals that will assist in caring for the amplification system

should receive orientation and ongoing support and assistance as needed. Orientation and training should include:

- Warranty and extended warranty information
- Trial period explanation
- Insurance following warranty expiration for repairs or loss
- Care of the hearing aids, including cleaning and moisture concerns
- Suggested wearing schedule
- Hearing aid insertion and removal with practice
- Overnight storage
- Insertion and removal of batteries, battery life, storage, disposal, toxicity
- Instruction on listening checks
- Basic troubleshooting
- Assistive device coupling and use, if needed
- Moisture solutions (dehumidifiers and covers)
- Tools for maintenance and care (battery tester, stethoscope and air blower)
- Possible solutions for retention, compliance and loss
- Schedule of recommended follow-up

FAMILY SUPPORT

Indiana's EHDI Program has established a support network for families with newly identified children. Guide By Your Side (GBYS) is a program from Hands & Voices that provides emotional support, technical assistance, networking, and unbiased information from trained Parent Guides to other families and to the systems that serve them.

At the foundation of Guide By Your Side is the Hands & Voices value of peer support and a parent – driven agenda. Key Elements of the Program include early support to parents after confirmation of hearing loss, unbiased resource dissemination about hearing loss, emotional support from another parent who “understands”, creation of a Family Support Notebook, help to ensure smooth entrance into Early Intervention and services and opportunity for continued support through Hands & Voices Chapter. Please contact the GBYS Program Director at lkovacs@isdh.in.gov .

FIRST STEPS - INDIANA'S EARLY INTERVENTION PROGRAM

Indiana First Steps is the statewide, family-centered, coordinated system to serve all children from birth to three years of age who have disabilities or who are at risk for developmental delays. This program is available to all families living in Indiana regardless of income. Infants with diagnosed hearing loss are eligible for referral to First Steps and should be referred upon diagnosis (unless the parent declines a referral). Upon referral, a First Steps Intake/Service Coordinator should contact the family to set up an intake evaluation. Once completed, the family will be scheduled for an eligibility evaluation, which is then followed by an Individualized Family Service Plan meeting. At the IFSP meeting, evaluation results, objectives, and services are written as an IFSP. All audiological services, including amplification, earmolds, additional diagnostic assessment, as well as ongoing early intervention by a Developmental Therapist or Speech-Language Pathologist should be listed. Note that only those services indicated on the IFSP will be covered by First Steps.

First Steps services, ongoing early intervention services, and habilitation are available to families of children with hearing loss, including those who are candidates for cochlear implants or children who have been implanted. Cochlear implants and related mapping services are not reimbursed under Part C. For more information regarding reimbursement for amplification, hearing aid follow-up visits, etc. contact <https://www.infirststeps.com>

FUNDING

Sources may include:

- **Private insurance:** Check with carrier to determine what services may be covered.
- **Children's Special Health Care Services (C.S.H.C.S)** - 1-800-475-1355
- **Hoosier Healthwise:** 1-800-889-9949
- **Indiana Comprehensive Health Insurance Association:** 317-387-5553
- **Managed Risk Medical Insurance Board:** 1-800-289-6574
- **Supplemental Security Income (SSI):** 1-800-772-1213

CONSIDERATIONS

Outpatient Screening

Screening is not recommended for any infant over 30 days of age. A complete diagnostic evaluation should be completed.

CONCLUSION

The outcomes of a successful early hearing detection and intervention (EDHI) program are that:

1. All infants born in Indiana receive a hearing screening before one month of age
2. All infants with hearing loss are identified as soon as possible before three months of age
3. Infants with confirmed hearing loss begin receiving early intervention services, as appropriate for the child and family, before six months of age
4. That all children with hearing loss have a medical home
5. That all families who have children with hearing loss are linked to family-to-family support

SELECTED REFERENCES:

American Academy of Audiology, (2003), Pediatric Amplification Protocol. Reston, VA.,AAA.

American Speech-Language-Hearing Association. (1997) Guidelines for audiologic screening. Rockville, MD:ASHA

American Speech-Language-Hearing Association. (2004). Guidelines for the Audiologic Assessment of Children from Birth to 5 Years of Age (Guidelines).

Joint Committee on Infant Hearing (2000). Year 2000 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs. *American Journal of Audiology*, 9, 9-29. *Audiology Today*, Special Issue, 2000)

Pediatric Working Group of the Conference on Amplification for Children with Auditory Deficits (1996) Amplification for Infants and Children with Hearing Loss. *American Journal of Audiology*, 5(1), 53-68.

SELECTED WEBSITES:

www.asha.org

American Speech-Language-Hearing Association

www.audiology.org

American Academy of Audiology

www.infanthearing.org

National Center for Hearing Assessment and Management

www.nih.gov/nidcd

National Institute on Deafness and Other Communication Disorders

www.cdc.gov/ncbddd/ehdi/

Centers for Disease Control and Prevention

www.hearing.in.gov

Indiana State Department of Health, Genomics and Newborn Screening, Early Hearing Detection and Intervention

www.infirststeps.com

Indiana First Steps Early Intervention Program

www.deaf-kids.org

Outreach Services for Deaf & Hard of Hearing Children

www.handsandvoices.org

Hands & Voices/Chapters/Indiana

www.hearindiana.org

Indiana Chapter of the Alexander Graham Bell Association for the Deaf and Hard of Hearing