

## INFANT AUDIOLOGY ASSESSMENT GUIDELINES

### I. Background

The [California Newborn Hearing Screening Program](#) adheres to the Healthy People 2010 [Early Hearing Detection and Intervention \(EHDI\)](#) objectives of 1-3-6; screening infants by 1 month of age, identification of hearing loss by 3 months of age, and intervention by 6 months of age. The Infant Audiology Assessment Guidelines reflect the [2007 Joint Committee on Infant Hearing Position Statement](#), as well as a collaboration of California audiologists who participated in the 2009 Infant Audiology Symposium.

The goals of the guidelines are to assist the pediatric audiologist in obtaining complete infant diagnostic evaluations by applying the current standard of care. The diagnostic assessment of infants should: establish frequency specific thresholds in each ear and determine the type, degree and configuration of the hearing loss; assist in the appropriate selection, fitting, and verification of amplification; and provide referrals to other disciplines, such as otolaryngology, genetics, early interventionists, and ophthalmologists.

It is imperative that in the pursuit of early identification of hearing loss and entrance into early intervention services that the rights of infants and families are guaranteed through informed choice, decision-making and consent. Infant and family information should be afforded the same level of confidentiality and security as all other medical information in practice and law. Therefore, it is highly recommended that consent to share information between audiology and other health care and educational providers be obtained.

### II. Role of the Audiologist within the Medical Home

The pediatric audiologist is responsible for the diagnosis, treatment and management of infants and toddlers 0 – 3 years identified with hearing loss. Competency in age-appropriate evaluations, as well as integration of the test battery to determine ear specific, frequency specific, type, degree, and configuration of the hearing loss is required. As the first identifier of the hearing loss, the audiologist should initially act as the “case manager” of the child with hearing loss, coordinating services between the primary care physician (PCP) and the specialty medical and educational professionals necessary for complete, family centered care. Information should be appropriately communicated to the family, as well as to the PCP and other professionals. To assist with communication between the Medical Home and the audiologist, the American Academy of Pediatrics has developed a flowchart “Guidelines for Pediatric Medical Home Providers ([Appendix G](#))” which can be found in the appendices of these guidelines.

### III. Infant Diagnostic Hearing Evaluation

The diagnostic audiologic evaluation of an infant should include both developmentally appropriate behavioral measures, objective physiologic threshold measures using frequency specific (tonal/toneburst) stimuli and a measure of middle ear function.

A. The following is recommended to be performed on ALL infants referred for a diagnostic hearing evaluation:

- 1.) History, to include family history (see [appendix A](#)) and infant's communication development to-date
- 2.) Otoscopic examination

B. Evaluation: Birth to Six Months of Age

- 1.) Auditory Brainstem Response (ABR)\* Thresholds:
  - a. Ensure that frequency specific threshold information is obtained at a minimum using 500 and 2000 Hz tonal stimuli /tonebursts in each ear.
    - i. If either threshold is greater than 20 dBnHL, complete bone conduction ABR threshold testing in each ear using 500 Hz and 2000 Hz tonal stimuli/tonebursts to determine the type of hearing loss.
- 1.) High frequency tympanometry (1000 Hz).
- 2.) Diagnostic otoacoustic emissions (OAE) (either Transient Evoked Otoacoustic Emissions (TEOAE) or Distortion Product Otoacoustic Emissions DPOAE)
- 3.) Behavioral evaluation: Observation of the infant's auditory responses to sound; will likely not yield threshold information but is an important aspect of cross-checking.
- 4.) Auditory neuropathy evaluation to be completed when there is an absent or abnormal ABR:
  - ABR click (air conduction) >80 dBnHL, with rarefaction and condensation averaged separately to look for cochlear microphonic.

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\*While Auditory Steady State Response (ASSR) testing can provide valuable frequency specific information for hearing aid fitting and/or cochlear implant candidacy there is insufficient evidence for the use of ASSR alone to evaluate auditory status. ASSR may be incorporated as a part of the diagnostic test battery, but is not required. Interpretation of ASSR results is not recommended without the completion of ABR testing.

- C. Evaluation: 6-36 months of age
- 1.) Behavioral evaluation in each ear:
    - a.) Speech awareness or recognition threshold
    - b.) Frequency specific threshold results for 500-4000 Hz by air conduction and bone conduction as required.
    - c.) If behavioral responses are inconclusive, complete or refer for ABR testing. Follow ABR guidelines above in the section on birth to six months of age.
  - 2.) Tympanometry
  - 3.) Diagnostic OAE (either TEOAE or DPOAE)
  - 4.) Acoustic reflex threshold testing
  - 5.) The [Joint Committee on Infant Hearing \(JCIH\)](#) recommends that at least one ABR test should be completed as part of the audiology diagnostic evaluation for children younger than 3 years for confirmation of permanent hearing loss.

**IV. Parent Information**

- A. Children without a hearing loss
- 2.) Remind parents to watch for development of communication skills and that hearing can be tested at any age
  - 3.) If risk indicators for late onset or progressive hearing loss are present (see [appendix B](#)), the audiologist counsels regarding the need for and calendars the follow-up process and informs the primary care physician.
- B. Children with hearing loss

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1. Immediately following Identification of Hearing Loss
  - 1.) Discussion of results.
  - 2.) Provide parents with information on hearing loss.
  - 3.) Notification of early intervention referral
  - 4.) Make referral to the Early Start Program within 2 working days (see [appendix C](#) for guidance on referrals) and to community support services.
  - 5.) Discuss medical referral(s) (e.g. otolaryngology, ophthalmology, genetics). Obtain consent for exchange/release of information.
  - 6.) Make [California Children's Services \(CCS\)](#) referral, if not already completed (see appendix F [English](#) | [Spanish](#) DHCS 4480).
  - 7.) Inform medical home of hearing loss, recommendations and next steps (see [appendix G](#)).
2. Follow-up visit
  - 1.) Discuss communication options
    - a.) Provide non-biased information, discuss audiologic intervention recommendations
  - 2.) Discuss early intervention services
  - 3.) Discuss funding and community support services.

**V. Early Intervention**

- A. Upon confirmation of a permanent or long-term hearing loss, a referral to the California Early Start Program is required, by law, to be made by the audiologist within two working days of diagnosis (parental consent is not required) (See [appendix D](#)).
  - 1.) For children 0-3 years of age refer to the single point of entry within the California Department of Education (1-866-505-9388)
  - 2.) Children ages 3 years and older should be referred to back to their school of attendance for services. For pre-school aged children who are not connected to a school district, follow the steps for 0-3 years of age.

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**VI. Amplification**

A. Reminders:

- 1.) Hearing aid evaluation and fitting should be completed as soon as possible, and before six months of age.
- 2.) Infants with diagnosed hearing loss require an otologic evaluation and a medical clearance by a licensed Ear, Nose and Throat (ENT) physician.
- 3.) Obtain appropriate consent to release and/or receive confidential medical information if not done previously.

B. Selection Process

- 1.) Choose features and controls for the degree and type of hearing loss that are appropriate for infants and young children; including compatibility with assistive technology and safety (i.e. choking hazards posed by small detachable pieces).
- 2.) Select ear molds in an appropriate material and style to ensure a good physical fit for comfort and retention.

C. Fitting, Programming and Verification

- 1.) Use the child's own ear mold.
- 2.) The fitting method employed to determine hearing instrument electro-acoustic characteristics should be audibility-based to ensure appropriately amplified long term average speech spectrum.
- 3.) Ensure audibility of soft and average conversational speech and comfort for loud sounds.
- 4.) When possible obtain real ear measurements or real ear to coupler difference (RECD) in a 2 cc coupler. If real ear measurement of sound pressure level (SPL) in the ear canal is not possible use averaged/normative data\*.

\*Caution should be used when employing normative data on a child with atypical anatomy or growth.

- 5.) Prescriptive targets may be modified to accommodate type of hearing loss and/or synergistic effects of amplification relative to the etiology of hearing loss.

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- 6.) Further electroacoustic measurement after the desired output (gain) has been set should include verification of low distortion at varying inputs at user prescribed settings.
- 7.) Displays in the manufacturers fitting software do not accurately represent amplification characteristics or actual acoustic response in a child's ear canal. Relying on First Fit software is not recommended.
- 8.) Beyond the verification accomplished by utilizing real ear measurements or RECD, individual ear and binaural functional gain measurement for tones and speech provides valuable information in determining the child's responsiveness to sounds.
- 9.) Behavioral observation of comfort for loud sounds can be verified in the sound field.
- 10.) Functional gain is NOT a substitute for verifying the electroacoustic response.

## **VII. Cochlear Implant Referrals**

When an infant is diagnosed with a bilateral severe-profound sensorineural hearing loss and it is evident that the communication choice of the family is oral, referral for cochlear implantation counseling is appropriate as soon as the treatment approach has been decided. While most insurance plans require a hearing aid trial period and/or the infant to be at least one year of age, early referral to the cochlear implants centers offers the necessary time for the multiple evaluations prior to the surgery, and prepares the infant and the family for the optimal, earliest implantation available. Hearing aid trials can be concurrent to the cochlear implant evaluation process, and referral to the cochlear implant center should not be delayed for the hearing aid trial. Delaying referral to the cochlear implant center results in further oral language delays that are best remediated with early treatment.

Referrals for children case managed by [CCS](#) should include the audiogram or audiology report and the Cochlear Implant Evaluation Request Form (see [appendix E](#)), filled out by the referring audiologist to the best of their abilities. Infants must have a bilateral, severe-profound sensorineural hearing loss to be considered for cochlear implantation through [\(CCS\)](#).

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**Appendices**

- A [Family Health History](#)
- B [JCIH Risk Factors](#)
- C [Early Start Referrals - Guidelines for Audiologists](#)
- D [Early Start Referral](#)
- E [Cochlear Implant Evaluation Request Form](#)
- F [Referral to CCS / Application to determine CCS Eligibility](#)  
[English](#) | [Spanish](#) DHCS 4480 (PDF)
- G [Guidelines for Pediatric Medical Home Providers](#)

**Helpful Links**

- CCS [California Children's Services](http://www.dhcs.ca.gov/services/ccs)  
[www.dhcs.ca.gov/services/ccs](http://www.dhcs.ca.gov/services/ccs)
- CMS [Children's Medical Services Branch](http://www.dhcs.ca.gov/services/cms)  
[www.dhcs.ca.gov/services/cms](http://www.dhcs.ca.gov/services/cms)
- NHSP [California Newborn Hearing Screening Program](http://www.dhcs.ca.gov/services/nhsp)  
[www.dhcs.ca.gov/services/nhsp](http://www.dhcs.ca.gov/services/nhsp)
- EHDI [Early Hearing Detection and Intervention](http://www.cdc.gov/ncbddd/ehdi)  
[www.cdc.gov/ncbddd/ehdi](http://www.cdc.gov/ncbddd/ehdi)
- JCIH [Joint Committee on Infant Hearing](http://www.asha.org)  
[www.asha.org](http://www.asha.org)  
  
[2007 Joint Committee on Infant Hearing Position Statement](#)