

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Services Division
Denver, Colorado 80246-1530 8100 Lowry Blvd.
Phone (303) 692-2000 Denver, Colorado 80230-6928
TDD Line (303) 691-7700 (303) 692-3090
Located in Glendale, Colorado
<http://www.cdph.state.co.us>



Colorado Department
of Public Health
and Environment

V. Recommended Guidelines For Pediatric Amplification

Qualifications for Pediatric Hearing Aid Services

- Audiologists are the professionals singularly qualified to select and fit all forms of amplification for children, including personal hearing aids, FM systems, cochlear implants, and other assistive listening devices. Audiologists have a master's and/or doctoral degree in Audiology from a regionally accredited university and are currently registered by the Department of Regulatory Agencies of the State of Colorado.
- Audiologists fitting hearing aids on infants and young children must have experience with amplification and management of infants and children with hearing loss and have the test equipment necessary to complete all described testing for hearing aid selection and evaluation procedures.
- An audiologist must complete the procedures described in Guideline IV: Recommended Protocol for Infant Audiologic Assessment.
- Medical clearance must be obtained from an otologist, a pediatric otolaryngologist, or a general otolaryngologist prior to hearing aid fitting.

Criteria for Candidacy

- Permanent, bilateral hearing loss exceeding 20 dB HL in a portion of the frequency range critical for speech understanding (approximately 1000-4000 Hz). Degree of hearing loss may be determined by either:
 - Behavioral thresholds obtained by conditioned audiometric techniques appropriate to the child's developmental level (i.e., visual reinforcement audiometry, conditioned play audiometry, or standard behavioral audiometry), or
 - Estimates from electrophysiologic correlates of hearing sensitivity (i.e., click and frequency-specific auditory evoked potentials/OAEs).

- Children with permanent unilateral hearing loss (exceeding 20 dB HL in a portion of the frequency range) with measurable hearing in the affected ear as measured by ABR and behavioral testing may benefit from amplification. Infants should be fit to the “best estimate” audiogram based on the completion of assessment techniques from Guideline IV: Recommended Protocol for Infant Audiologic Assessment.
- Final amplification decisions should be based on audiologic information, performance in home/educational environment (based on parental and interventionist report), existence of other special needs, speech and language development, and the family’s preferences.

Pre-selection/Physical Characteristics

- Amplification options:
 - Behind-the-ear (BTE) aids are the hearing aid style appropriate for most children. In-the-ear hearing aids are **not** recommended for use with infants and young children due to the rapid growth of the outer ear. Body aids may be appropriate if the child has physical limitations preventing the use of BTEs.
 - A bone conduction aid may be appropriate if the loss is conductive and BTEs cannot be used due to medical or physical contraindications. A bone-anchored hearing aid is a device that is surgically implanted into the skull behind the ear and may be useful for an individual who must use a bone conduction aid on a permanent basis. The BAHA does not have the approval of the U.S. Food and Drug Administration (FDA) for use in children less than five years old.
 - Currently, the following criteria must be met for a child to receive a cochlear implant: the child is at least 12 months of age, has a bilateral profound sensorineural hearing loss, has used optimally fit appropriate hearing aids consistently for at least six months, has been enrolled in an early intervention program, exhibits minimal benefit from the hearing aids, and meets medical candidacy requirements.
 - Frequency modulation (FM) systems, coupled with personal hearing aids, should be considered when the child becomes mobile and needs to hear a caretaker at a greater distance. FM technology is the system of choice to improve signal-to-noise ratio.
 - Hearing aids with wide dynamic range compression as a signal-processing strategy should be considered for their improved ability to make soft speech audible. Compression should also be considered as an output limiter, providing comfort and good sound quality for the output of intense signals.
 - Hearing aids with processing schemes to reduce background noise or enhance speech perception may be considered, however their benefit to young children has not been established.

- Hearing aids with multiple channels should be considered when the audiometric configuration requires the shaping of gain or output in specific frequency regions.
 - Hearing aids with multiple memories and remote controls should be considered for ease of adjustment for the caretaker and for flexibility.
 - Directional microphones, or dual microphones, should be considered only for older children to improve signal-noise-ratio when FM technology, the system of choice to improve signal-to-noise ratio, is not being used. Young children need to hear environmental noise and distance speech from all directions to maximize language and speech development and therefore directional microphones are not usually recommended for this population.
- FM compatibility: All hearing aids should be compatible with FM and assistive listening devices such as:
 - Direct audio-input (DAI) capabilities.
 - A telecoil.
 - A microphone-telecoil switching option (M/MT/T switch).
- Safety features:
 - Tamper-resistant battery doors.
 - Volume control covers.
- Binaural: All hearing aid fittings for binaural hearing loss should be binaural unless there is evidence over time of no benefit in one ear.
- Earmolds:
 - Should be made of a soft material for comfort, safety, and retention.
 - Should be replaced whenever feedback is excessive on optimal settings.
 - May be used with cream (“Otofirm” or “Otoease”) to help reduce feedback.
- Retention devices:
 - Straps or “Huggies.”
 - Toupee or wig tape.
 - Cords or “Critter Clips.”

- Headbands.
- Maintenance kit: All families should be offered a maintenance kit, which includes:
 - Dry aid kit.
 - Battery tester.
 - Stethoscope.
 - Instruction books.
 - Warranty information.
 - Explanation of trial period.

Selection and Verification

- Individual or age-appropriate ear acoustics should be accounted for in the hearing aid selection and fitting process. Aids can be pre-set prior to direct evaluation of the hearing aid on the child using average age-related real-ear to coupler difference (RECD) values. The Desired Sensation Level (DSL) method, calculated either manually or in a computer-assisted format, is the approach of choice for the RECD procedure.
- The preferred verification method is to use probe microphone measurements and the child's ear, ear mold, and personal amplification system. The procedure should be combined with a prescriptive technique that estimates target responses appropriate for the characteristics of the amplification system (linear vs. non-linear, analog vs. digital). The verification should always include direct measurement of the real-ear saturation response (RESR) and target maximum output values.
- Aided soundfield threshold measurements may be useful for the evaluation of audibility of soft sounds, but they are not recommended to verify appropriate electroacoustic requirements.

Validation and Monitoring

- Aided auditory skills should be monitored to ensure optimal electroacoustic settings of the hearing aids. Monitoring should include:
 - Audiologic assessment directly measuring the child's performance, including aided soundfield responses to speech and frequency-specific stimuli.
 - Functional auditory skill assessment obtained by the audiologist and early interventionist.

- Speech, communication, and language skill assessment obtained by the early interventionist.
- Parent and health care provider input.

Informational Counseling and Follow-up

- Information about all amplification options should be provided to parents. Orientation and training should include family members, caregivers, and the child. Orientation and training information should be discussed, demonstrated, and sent home in a written or video format. Orientation and training will include:
 - Care of the hearing aids, including cleaning and moisture concerns.
 - Suggested wearing schedule.
 - Insertion.
 - Removal.
 - Overnight storage (including the mechanism for turning off the hearing aids).
 - Insertion and removal of the batteries.
 - Battery life, storage, disposal, toxicity.
 - Basic troubleshooting (batteries, feedback, plugged earmold and/or receiver).
 - Telephone coupling and use.
 - Assistive device coupling and use.
 - Moisture solutions (e.g., dehumidifying systems and covers).
 - Tools for maintenance and care (e.g., battery tester, listening stethoscope, earmold air blower).
 - Issues of retention/compliance/loss (including spare hearing aids and any available loaner programs).
 - Recommended follow-up appointments to monitor use and effectiveness.
- Minimally, an audiologist should see the child at least every three months during the first two years of amplification and every four to six months after that time. Follow-up appointments should include:

- Behavioral audiometric evaluations.
 - Adjustment of the amplification system based on updated audiometric information.
 - Assessment of communication abilities, needs, and demands.
 - Periodic electroacoustic evaluations.
 - Listening checks.
 - Check fit of earmold.
 - Periodic probe microphone measurements.
 - Periodic functional measures to document development of auditory skills.
 - Insurance recommendations following warranty period for repairs or loss.
- An early interventionist should provide ongoing rehabilitation including auditory training.