

North Carolina Pediatric Amplification Fitting Protocol

This amplification fitting protocol was developed using guidelines published by the American Speech-Language-Hearing Association, the American Academy of Audiology, and the Pediatric Working Group of the Conference on Amplification for Children with Auditory Deficits. References provided at the end of this document. Components of the protocol include: (1) assessment, (2) hearing aid selection, (3) hearing aid verification, (4) hearing aid orientation, (5) validation, and (6) follow-up. Family counseling is a vital component throughout the entire hearing aid fitting process.

When should an infant be fitted with amplification?

It is recommended that infants with confirmed hearing loss be fitted with amplification and enrolled in appropriate early intervention services as soon as possible, but no later than the age of 6 months according to EHDI 1-3-6 goals. In cases where the hearing loss does not present until after 6 months (i.e. late onset hearing loss), amplification should be fitted and enrollment in early intervention services should take place as soon as possible.

Who should complete the fitting of amplification for infants?

An audiologist is the professional singularly qualified to select and fit all forms of amplification for children (personal hearing aids, FM systems, cochlear implants, and other assistive listening devices). Audiologists working with young children must have experience with amplification and management of infants and children with hearing loss and have the test equipment (See Section I and II) necessary to complete all described testing for hearing aid selection and evaluation procedures. *If the practitioner does not have the expertise and equipment to follow these guidelines, the infant and family should be referred to a professional equipped for and qualified in infant hearing aid (amplification) fitting.*

When does a child need amplification?

Amplification should be considered for children who have:

- (1) confirmed permanent bilateral hearing loss of any degree (sensorineural, conductive, or mixed); or
- (2) confirmed permanent unilateral hearing loss in a portion of the frequency range critical for speech understanding with measurable hearing in the affected ear as measured by ABR and behavioral testing, taking into account the “special considerations” listed below; and
- (3) received written medical clearance for amplification use from an otologist, pediatric otolaryngologist, or a general otolaryngologist.

What are special considerations in determining candidacy for amplification?

1) *Middle ear conditions*

2) *Other health concerns*

3) *Unilateral hearing loss* (American Academy of Audiology, 2013)

“Use of hearing aid amplification is indicated for some children with unilateral hearing losses. The decision to fit a child with a unilateral hearing loss should be made on an individual basis, taking into consideration the child’s or family’s preference as well as audiologic, developmental,

communication, and educational factors. Children with unilateral hearing loss are at a greater risk than children with normal hearing for speech and language delays and academic difficulties. Amplification options such as personal FM systems also should be considered. Use of communication strategies (noise reduction, positioning, etc.) may prove to be beneficial and easily accomplished for the infant or toddler with unilateral hearing impairment. The use of Contralateral Routing of Signal (CROS) amplification requires particular care. Its design is to overcome the problem caused by the head shadow effect. This could be especially helpful in a quiet environment and when the signal of interest originates from the direction of the non-functioning ear. However, one recent study indicated that CROS amplification may not be beneficial for children in a classroom setting, because of the introduction of additional noise to the normal-hearing ear.”

4) ***Minimal-mild hearing loss*** (American Academy of Audiology, 2013)

“Current evidence suggests that children with minimal and mild hearing losses are at high risk for experiencing academic difficulty. As such, children with minimal and mild hearing loss should be considered candidates for amplification and/or personal FM system or soundfield systems (FM) for use in school.”

5) ***Profound hearing loss*** (American Academy of Audiology, 2013)

“A finding of no response by ABR should not exclude a child from hearing aid candidacy, as residual hearing may exist at intensity levels greater than those capable of eliciting a standard ABR response. Children with confirmed profound hearing loss still may experience benefit from hearing aid amplification. An infant or child with severe to profound hearing loss is a cochlear implant candidate.”

6) ***Auditory Neuropathy Spectrum Disorder (ANSD)*** (American Academy of Audiology, 2013)

“Children with ANSD should have a trial with amplification if hearing sensitivity is sufficiently poor that speech at conversational levels will not be easily audible. Amplification should only be provided based on behavioral observations until reliable behavior thresholds can be established.”

7) ***Permanent conductive hearing loss*** (American Academy of Audiology, 2013)

“Children with permanent conductive hearing loss should be fit with air conduction hearing aids when anatomically possible or bone conduction hearing aids if anatomy is insufficient for coupling (atresia, chronically draining ears or other significant anatomical malformations.”

8) ***Normal peripheral hearing sensitivity*** (American Academy of Audiology, 2013)

“In some cases, children with normal peripheral hearing sensitivity may benefit from amplification. These cases may include children with auditory processing disorders (APD) and children with unilateral hearing impairment when an FM system is coupled to the normal-hearing ear. In such cases, close audiologic monitoring of hearing sensitivity, and careful control of the output of the amplification is required.”

What should be included in the amplification fitting process?

- I. Assessment (to determine type, degree, and configuration of hearing loss as well as candidacy for audiologic rehabilitation)
 - A. Case history
 - B. Otoscopic inspection
 1. Outer ear
 2. Ear canal
 3. Tympanic membrane
 - C. Comprehensive diagnostic audiology evaluation (following the recommended Diagnostic

Audiology Protocol)

D. Actual or estimated thresholds of discomfort (using frequency specific stimuli)

E. Counseling

1. Informational (i.e. test results, amplification options, communication options, next steps, funding options, etc.)

2. Expectational (i.e. realistic expectations, motivation, etc.)

F. Written medical clearance must be obtained in accordance with federal regulations (FDA 801.401 and FDA 801.421).

II. Hearing instrument selection

A. Physical characteristics

1. Earmold material (soft material recommended for children)

2. Hearing aid type (behind-the-ear, bone conduction, etc.)

3. Binaural fitting is optimal unless contraindicated (i.e. unilateral hearing loss)

4. Compatibility with assistive listening devices (i.e. FM system)

5. Safety features (i.e. tamper resistant battery compartment, deactivate or lock volume control, etc.)

B. Electroacoustic characteristics

1. Use probe microphone measures

2. Use pediatric specific prescriptive approach (i.e. Desired Sensation Level {DSL})

a. RECD (real-ear-to-coupler difference) – measured RECD is preferred over the use of estimates

b. RESR (real-ear saturation response) – output limiting

3. Follow signal routing and signal processing recommendations as outlined in AAA Clinical Practice Guidelines on Pediatric Amplification.

****NOTE: It is important to use DSL or other pediatric specific prescriptive/verification software that will produce results which can be replicated on non-manufacturer specific equipment. Some manufacturers have built in their own fitting algorithms into the version of DSL included as part of their manufacturer-specific fitting software, and this can change the results of the hearing aid fitting.****

III. Hearing aid verification

A. (Preferred) Use pediatric specific prescriptive approach (i.e. DSL); or

B. Real ear probe microphone measures

****NOTE: Real-ear measures (including DSL) must occur in the absence of factors that would prohibit their use (i.e. bone conduction hearing aid, cochlear implant, etc.)*

C. Aided sound field thresholds – appropriate for **some** devices (i.e. bone conduction hearing aids, cochlear implants, frequency transposition hearing aids). It is NOT advisable to use functional gain as the only verification of hearing aid fitting.

IV. Hearing aid orientation

A. Use and care of hearing instrument

1. Battery management/safety

2. Hearing aid features and landmarks

3. Use and routine maintenance

4. Working knowledge of hearing aid components

5. Assistive device coupling

6. Storage

7. Usage patterns/adjustment/wearing schedule

8. Insertion/removal

9. Device retention

10. Troubleshooting/identification of nonfunctioning hearing aids

B. Realistic expectations

V. Hearing aid validation

- A. Aural rehabilitation
- B. Direct measurement of auditory performance
- C. Self-assessment questionnaires

VI. Follow-up

- A. Schedule
 - 1. Birth to 3 years: follow-up every 3 months (more frequently if necessary, and some of these follow-up visits may be only for hearing aid/earmold check)
 - 2. 3-6 years: follow-up every 6 months (more frequently if necessary)
 - 3. 6 years and older: follow-up annually (more frequently if necessary)
- B. Counseling of family members in the process of accepting the hearing loss; important for carry-over into the social-familial and educational environments

What are the state-mandated reporting requirements?

All persons performing assessments for selection of amplification shall identify the child and report the outcome of the amplification selection process to the North Carolina State Laboratory for Public Health within 5 days following each evaluation date and the date of any missed scheduled appointments for such evaluations.

*History Note: Authority G.S. 130A-125;
10A NCAC 43F.1204*

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