

BEST PRACTICES IN PEDIATRIC AUDIOLOGY: THE CLEVELAND CLINIC MODEL

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Abstract

The purpose of this poster presentation is to share the Cleveland Clinic's "Pediatric Audiology Best Practices" algorithm for the evaluation and management of infants and children who are deaf or hard of hearing. Our model reflects best current practices of comprehensive audiologic testing (including ABR, ASSR, OAE, immittance, and behavioral audiologic assessment); early amplification strategies (including fitting, verification, and validation); and decision steps for cochlear implant (CI) candidacy and follow-up programming. Following identification, infants may be enrolled into auditory-based intervention. The algorithm decisions are team-based with input from audiology, speech-language pathology, and otology.

**Its ALL About
Learning to Listen!**

Diagnostic Plan

ABR click thresholds

IF NORMAL (as defined as 20 dBnHL thresholds) do following tests:

- * Screening ASSR air conduction or 250 Hz tone burst ABR
- * Tympanometry using age-appropriate frequency

RESULTS:

If normal – See **Treatment Plan A1**

If abnormal – See **Treatment Plan A2**

IF ABNORMAL (defined as prolongation of all waves I-V that are parallel to the normal Latency-Intensity Function) do the following tests:

- * ASSR air conduction
- * ASSR bone conduction
- * Tympanometry using age-appropriate frequency

RESULTS:

If results suggest *conductive hearing loss* – See **Treatment Plan B**

If results suggest *mixed hearing loss* – See **Treatment Plan C**

IF ABNORMAL (defined as prolongation or absence of wave V) do the following tests:

- * ASSR air conduction
- * Screening ASSR bone conduction
- * DP-OAEs
- * Tympanometry using age-appropriate frequency

RESULTS:

If results suggest *mild to moderately-severe SNHL* – See **Treatment Plan D**

If results suggest *severe to profound SNHL* – See **Treatment Plan E**

If results suggest *profound SNHL/deaf* – See **Treatment Plan F**

IF ABNORMAL (defined by the presence of a cochlear microphonic and abnormal/absence of wave III-V) do the following tests:

- * DP-OAEs
- * Tympanometry using age-appropriate frequency
- * Ipsilateral acoustic reflexes

RESULTS:

If results suggest *auditory neuropathy (AN)* – See **Treatment Plan G**

Treatment Plans

Treatment Plan A1: Confirmed normal hearing sensitivity

- * Retest hearing using age-appropriate behavioral audiometry by 12 months of age
- * Retest hearing using age-appropriate behavioral audiometry every 6 months if infant is at risk for progressive hearing loss until 3 years of age
- * Retest hearing using age-appropriate behavioral audiometry if parental concerns arise

Treatment Plan A2: Probability for hearing loss is low

- * Repeat testing within 4 to 6 weeks

Treatment Plan B: Confirmed conductive hearing loss

- * Otologic management and repeat audiometric/electrophysiologic testing following resolution of conductive pathology
- * Audiologic management if conductive pathology cannot be resolved medically/surgically:
 - Sensory device (e.g., Baha™, hearing aids, FM devices) assessment, fitting, and follow-up
- * Closely monitor speech and language development
- * Enrollment in Early Intervention Program¹, if needed

Treatment Plan C: Confirmed mixed hearing loss

- * Otologic management and repeat audiometric/electrophysiologic testing following resolution of conductive pathology
- * Audiologic management for SNHL:
 - Sensory device (e.g., hearing aids, FM devices) assessment, fitting, and follow-up
- * Communication Evaluation² to assess developmental status
- * Enrollment in Early Intervention Program¹, if needed

Treatment Plan D: Confirmed mild to moderately-severe SNHL

- * Otologic work-up and management
- * Audiologic management for SNHL:
 - Selection of sensory devices (e.g., hearing aids, FM devices) assessment, fitting, and verification
 - Follow-up every 3-6 months as needed
- * Communication Evaluation² to assess developmental status
- * Enrollment in Early Intervention Program¹
- * Closely monitor speech and language development

Treatment Plan E: Confirmed severe to profound SNHL

- * Otologic work-up and management
- * Audiologic management for SNHL:
 - Hearing aids/FM devices provided on a loaner basis for pre-implant trial (trial period will be dependent upon age of identification and development of auditory/speech/language)
 - Selection of sensory devices (e.g., hearing aids, FM devices) assessment, fitting, and verification
 - Follow-up every 3-6 months as needed
- * Communication Evaluation² to assess developmental status
- * Enrollment in Early Intervention Program¹
- * Cochlear Implant Evaluation³/initial appointment
- * Closely monitor auditory, speech, language development with hearing aids/FM devices (proceed with implantation evaluation if child is not making acceptable auditory/speech/language development)
- * Cochlear implant intervention⁴, if child receives cochlear implants⁵

Treatment Plan F: Confirmed profound SNHL to deaf

- * Otologic work-up and management
- * Audiologic management for SNHL (fast-tracked for cochlear implant consideration):
 - Hearing aids/FM devices provided on a loaner basis for pre-implant trial (trial period will be dependent upon age of identification and development of auditory/speech/language)
 - Selection of sensory devices (e.g., hearing aids, FM devices) assessment, fitting, and verification
 - Follow-up every 3-6 months as needed
- * Communication Evaluation² to assess developmental status
- * Enrollment in Early Intervention Program¹
- * Cochlear Implant Evaluation³/initial appointment
- * Closely monitor auditory, speech, language development with hearing aids/FM devices (proceed with implantation evaluation if child is not making acceptable auditory/speech/language development)
- * Cochlear implant intervention⁴, if child receives cochlear implants⁵

Treatment Plan G: Confirmed auditory neuropathy/dysynchrony

- * Otologic work-up and management
- * Audiologic management for AN:
 - Hearing aids/FM devices provided on a loaner basis to determine if amplification is beneficial.
 - Selection of sensory devices (e.g., hearing aids, FM devices) assessment, fitting, and verification
 - Follow-up every 3-6 months as needed
- * Communication Evaluation² to assess developmental status
- * Enrollment in Early Intervention Program¹
- * Cochlear Implant Evaluation³/initial appointment
- * Closely monitor auditory, speech, language development with hearing aids/FM devices (proceed with implantation evaluation if child is not making acceptable auditory/speech/language development)
- * Cochlear implant intervention⁴, if child receives cochlear implant⁵

If child is over 12 months of age:
If development of auditory/speech/language is not age-appropriate:
* Cochlear Implant Evaluation³
* Cochlear implant intervention⁴
* Enrollment in Early Intervention Program

Other Cleveland Clinic Audiology-SLP Services

- Auditory-Verbal Therapy
- Auditory-Based Therapy
- Communication Evaluations
- Assistive Listening/Alerting Devices (ALD) Demonstration Room
- TrakAid - Hearing Aid Data Management System
- TrakCI - Cochlear Implant Data Management System
- Tinnitus Management Support Group Sessions
- Adult Audiologic Rehabilitation – Hearing Aid Support Group
- Adult Audiologic Rehabilitation – Cochlear Implant Support Group

Acronym Key

- ABR = Auditory Brainstem Response
- ASSR = Auditory Steady State Response
- DP-OAE = Distortion Product-Otoacoustic Emissions
- SNHL = Sensorineural Hearing Loss

Early Intervention Program at Cleveland Clinic Hearing Implant Program

- Monitor speech/phonetic repertoire
- Monitor receptive/expressive language development (e.g., SKI-HI LDS, REEL-3, MacArthur Inventories, Minnesota CDI)
- Monitor auditory development

Communication Evaluation

- Case history
- Auditory functioning
- Speech/oral-motor
- Receptive/expressive language skills
- Referrals to developmental pediatrics, OT, PT, psychology, social work, as needed

Cochlear Implant Evaluation

- Candidacy – both medical/surgical and audiological
- Aided testing with appropriately fit hearing aids/FM system
- Device selection: manufacturer/processor, unilateral versus bilateral (simultaneous versus sequential)

Cochlear Implant Intervention

- Initial activation performed 2-weeks post-surgery
- Follow-up monitoring of CI Mapping
- Serial CI audiogram at 3-6 month intervals
- Serial speech perception measures at 3-6 month intervals
- Serial outcome measures at 3-6 month intervals (e.g., IT-MAIS, MAIS; LittEars)

Main Campus Audiologists

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