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An Interprofessional Approach to Evaluating Children with Developmental Delays: The important role of the audiologist

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Learning Objectives

1. Understand the role and value of audiologists in an interprofessional team that evaluates children for autism, developmental delay, and ADD/ADHD.
2. Review current practices for hearing screening and audiological evaluation in young children.
3. Discuss considerations for evaluating pediatric patients with developmental delays.

Autism

Prevalence

1980: 1 in 1000 children

2000: 6.7 in 1000 children

2016: 18.5 in 1000 children

2018: 23 in 1000 children (1 in 44)

4.2 times more prevalent in boys

(Maenner et al., 2021)

Autism Characteristics

Impairments in:

- Communication, imitation, and play
- Social attention and affective engagement
- Sensory hyperresponsiveness
- Sensory hyporesponsiveness
- Self-regulation in daily routines
- Sensory interests, repetitions, and seeking behaviors
- Motor coordination and milestones
- Associated with cognitive dysfunction (highly variable)

(Baranek et al., 2022)

Autism Characteristics

Common Observations:

- Speech delay
- Echolalia
- Difficulty maintaining eye contact
- Absence of novel phrases
- Difficulty initiating and sustaining conversations
- Pronoun reversal
- Speech and language regression
- Impaired social interactions
- Repetitive behaviors, limited interests

(McLaughlin, M.R. 2011)

Developmental Delay

Defined by

Failure to meet developmental milestones in several areas of intellectual function in children younger than five years.

(Zablotsky et al., 2019; American Psychiatric Association, 2013)

Speech Delay

Defined by

Abnormal speech and language development in the areas of:

- Speech/articulation
- Language
- Pragmatic
- Voice
- Fluency

(Zablotsky et al., 2019; American Psychiatric Association, 2013)

ADHD

Defined By:

Attention-deficit/hyperactivity disorder (ADHD) is a developmental disorder marked by persistent symptoms of inattention and/or hyperactivity and impulsivity that interfere with functioning or development. (NIH, 2024)

Characteristics

- Hyperactivity
- Impulsivity/effortless control
- Inattention
- Disruptive behavior
- Negative effect/emotionality/high anger
- Difficulty focusing on task and maintain attention
- Associated with cognitive dysfunction (highly variable)

Zablotsky et al., 2019;
Visser et al., 2016

Childhood Hearing Loss and other Comorbidities

Comorbidity Percentages

2014: 40% of children with hearing loss have comorbidities

2022: 67.2% of children with hearing loss had medical comorbidities and attend multiple services (Concern for under-reporting on comorbidities)

(Wiley, 2014; Olivier et al., 2022)

Childhood Hearing Loss

Characteristics

Which characteristics overlap with ASD, ADHD, and other delays?

Prelingual:

- Delayed speech and language development
- Children may not look at or point to objects named by their parents

Postlingual:

- Speech and language gradually decline/regresses
- Lack of progress in vocabulary acquisition
- Parent report that the child is not listening, doesn't respond when their name is called
- Volume differences (patient may speak louder or listen to devices at a louder level)

(McLaughlin, 2011)

Childhood Hearing Loss and ASD

Recent Studies

- **Hearing loss and ASD can co-exist.**
- Diagnosis of one condition frequently results in the delay of diagnosing the other condition. (Beers et al., 2014)
- A study in Southeast Asia evaluated 333 preschool children with ASD, GDD, and SLD; they found 10.8% of the children had confirmed hearing loss. (Ting et. Al, 2023)
- 13% of children with ASD had hearing loss (Trudeau et. Al. 2021)

Barriers to evaluation that lead to delayed diagnosis and intervention

- Long waitlist for diagnostic services
- Lack of centralized coordination of services
- Insurance coverage gaps
- Need for 2-testers
- Overlap in characteristics present in children with these conditions
- Limited provider knowledge/experience about ASD, DD, ADHD, and HL
- Difficulty obtaining ear-specific, frequency-specific thresholds (often requires multiple visits and/or sedated ABR)

(Habayeb et al., 2023)

1 Understand the role and value of audiologists in an interprofessional team that evaluates children for autism, developmental delay, and ADD/ADHD.

Audiologists and Interprofessional Teams

Since the 1990s and early 2000s, audiologists have worked on teams to identify and provide services to children with hearing loss.

→ Newborn Hearing Screening Programs

→ EHDI Programs

→ Craniofacial Teams

→ Pediatric and Adult Cochlear Implant Teams

Interprofessional Teams

Characteristics

- Professionals with complimentary skills work together to address patient and family needs
- Assessments of the patient are generally conducted independently
- Team meets to integrate their respective evaluations of the patient before providing a diagnosis to the patient's family
- Each team member brings a unique piece of the diagnostic puzzle to the table and a bigger picture may appear that was not present in individual assessments
- Team structure can vary between teams

(Lin et al., 2018)

Interprofessional Teams

"For children with communication disorders, an interprofessional team should include, at a minimum, a speech-language pathologist, a pediatric psychologist, and a developmental pediatrician. If available and appropriate, other professionals may participate, including an **audiologist**, social worker, special education teacher, occupational therapist, physical therapist, and so forth."

"Because all observations and findings represent a facet of the child's development and behavior, **the final conclusions may reveal more than the results of any individual assessment**."

(Lin et al., 2018)

Rush Young Child Clinic (YCC)

Fast track evaluation

Created to provide a multidisciplinary evaluation of young children with characteristics of autism.

Rush Young Child Clinic

Our Team

Developmental Pediatricians*

Speech Language Pathologist*

Psychologists*

Genetic Counselor*

Audiologists*

Physician Assistant

Nurse

* Students/residents participate

Our Environment

Multiple Offices in a Medical Office Building

Our Patients

Referred by their pediatrician due to concern for ASD

Birth to 5 years old

Rush Young Child Clinic

Initial Evaluations

Children receive an evaluation with:

- Developmental Pediatrician
- Speech-Language Pathologist
- Audiologists

Children see 2-3 providers in their initial YCC visit.

YCC Schedule

8:00-9:00- Patient 1 sees SLP
9:00-9:30- Patient 1 sees Audiology
9:30-10:30- Patient 1 sees DBP

9:00-10:00- Patient 2 sees SLP
10:00-10:30- Patient 2 sees Audiology
10:30--11:30- Patient 2 sees DBP

12:30-1:30- Team Meeting

Rush Young Child Clinic

Additional Evaluations

- Psychologists
- Genetic Counselors

Families return in 1-2 weeks for additional testing, if needed, and then in another 1-2 weeks to meet with the DBP to receive their child's diagnosis (this is called the feedback appointment).

The Role and Benefit of Audiology on the Team

The Audiological Evaluation

The patient is brought to the Rush University SCOPE Clinic by the SLP. She provides a brief case history that includes the outcome of the NBHS, presence of ear infections, history of head trauma, the patient's communication modes and behavior, and the patient's likes/dislikes.

Hand-off between SLP is key driver to behavioral testing success!

The Audiologic Case History

Each provider has a different set of case history questions. Here are a few that we found unique to audiology:

- Family history of hearing loss
- Thorough otologic history obtained for patients with a history of otitis media
- Review of previous audiological evaluation test results
- Pointed questions to screen for JCIH risk factors for hearing loss

The Role and Benefit of Audiology on the Team

During the Team Meeting

Our team welcomes participation from all team members, including students

- Observe and report on the child's behavior, appearance, and communication/play abilities
- Discuss patient behavior observations with other providers
- Provide insight to family structure/barriers to care
- Suggest recommendations for referrals
- Identify risk factors for hearing loss
- Review of test results and impressions regarding auditory function and hearing
- Recommendation for audiologic re-evaluation and monitoring

Rush YCC Team

Team Meeting Topics of Discussion

- Communication Modes (SLP)
- Communication Barriers (Audiology)
- Play and Interaction Observations
  - Provider and parent strategies
- Patient Behavior
- Test Results from
  - SLP, Audiology, Psychology
- Medical Conditions/Comorbidities
- Genetic Concerns
- Family Structure
- Educational Environment
- Current/Previous Therapies
- Family Barriers
- Referrals
  - Genetic Counselor, EI, SW, ENT
- Diagnosis

Rush YCC Team

Benefits of Operating in this Team

- Increases rapport among providers
- Reduces “wait time” for families and time to diagnosis and services
- More comprehensive, holistic evaluation of the patient
  - Long day for families, but is more efficient and reduces loss to follow-up
  - Allows providers an opportunity to discuss findings they noted that are not part of their professional report
- Opportunity for providers to share knowledge and learn about each other’s professions

2 Review current practices for hearing screening and audiological evaluation in young children.

What are the goals?

- Determine if hearing is interfering with development and/or evaluation/treatment
- Identify children at risk for hearing impairment and monitor hearing status.
- Assess, evaluate, and monitor the status and function of the peripheral auditory system, which includes the external, middle, and inner ears as well as the auditory nerve.
- Obtain ear-specific and frequency-specific auditory threshold information.
- Avoid referral for sedated ABR when possible.
- Prevent further consequences from unidentified auditory impairment.
- Provide recommendations for rescreening, audiological evaluation, or referral for other assessment or treatment.

Evaluating Milestones and Development

Pediatrician's Role

The medical home often serves as the first point of identification of speech, language, and developmental delays. Parent report and questionnaires are utilized to identify delays. Physicians, parents, and caretakers can self-refer to EI for evaluation if delays are suspected in patients under three years old.

Concern for speech and language delay

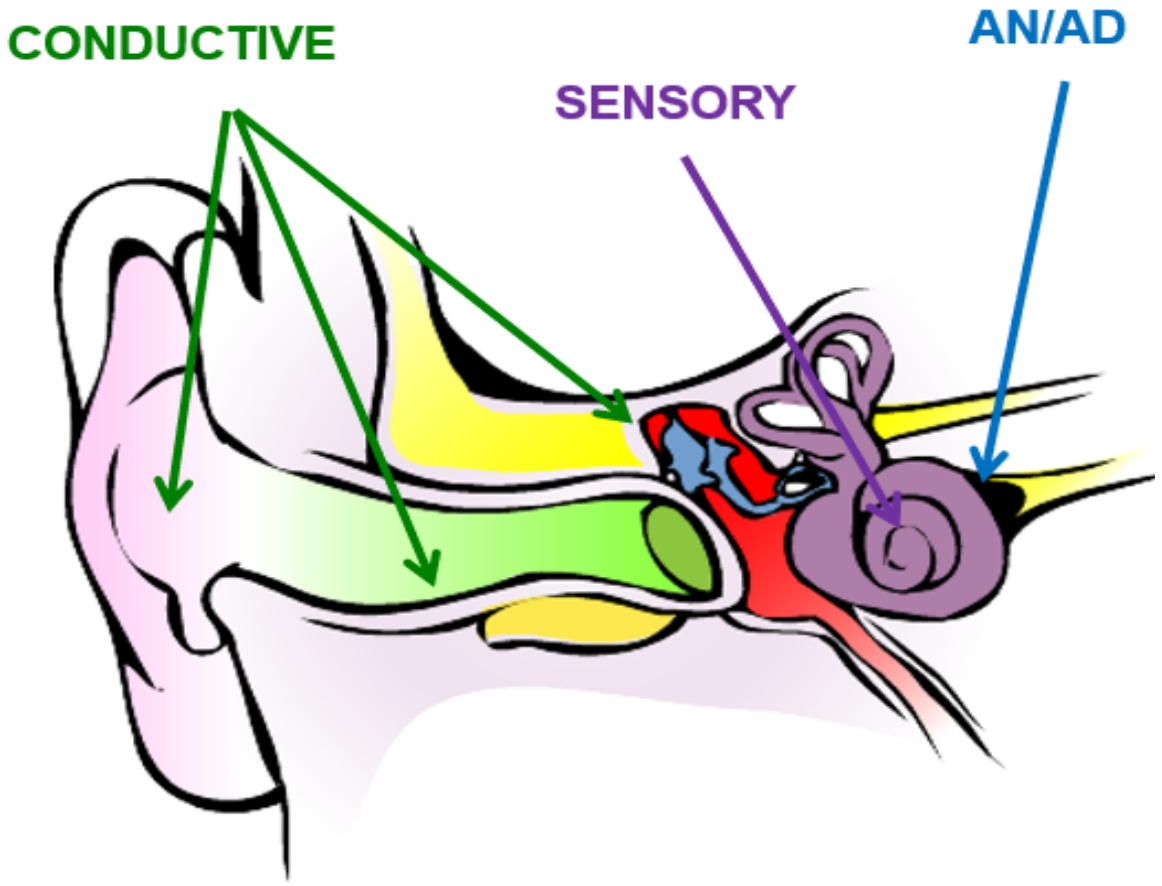
In a 24-month-old or older patient:

- Less than 50 expressive words
- Speech is unintelligible
- Speech and language deficits are observed during the office visit

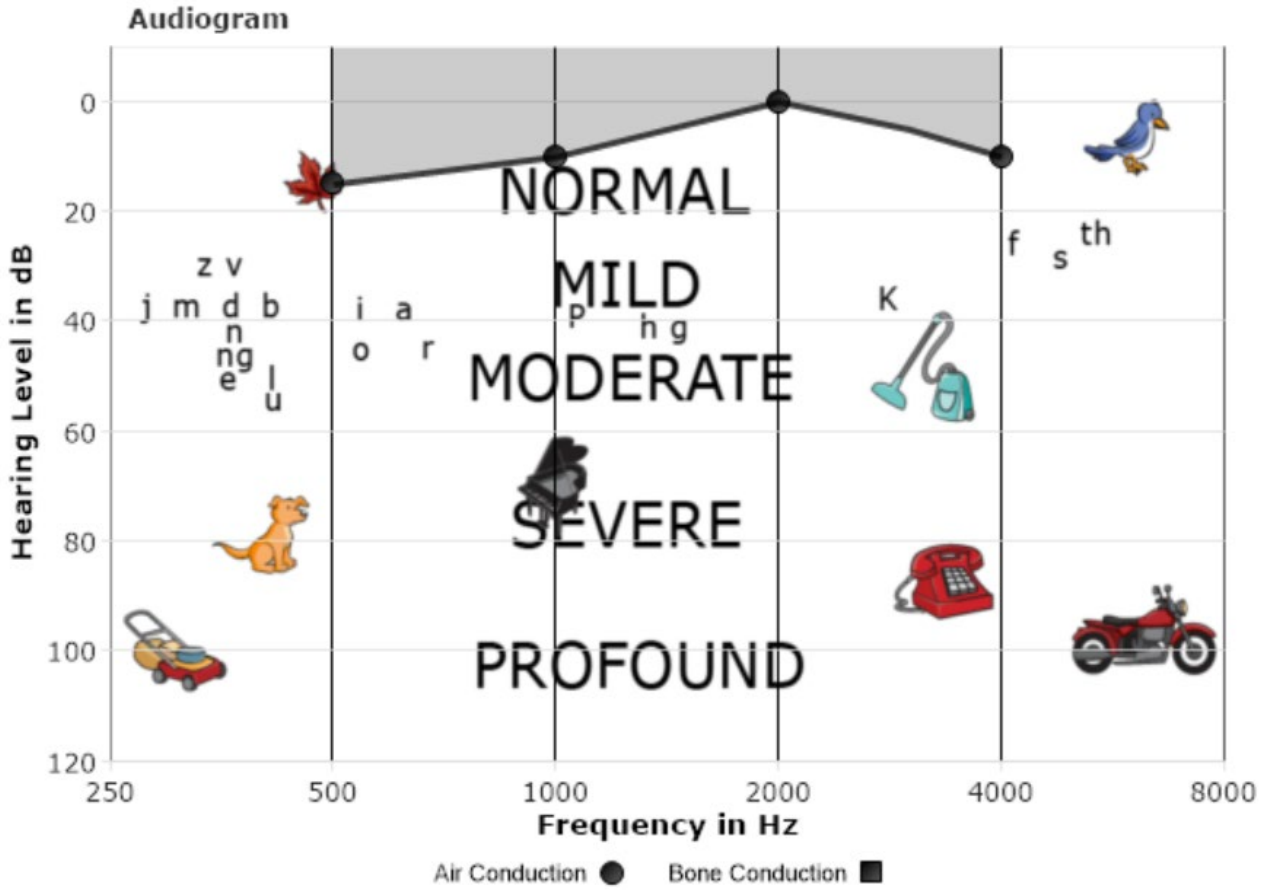
All children who are suspected to have speech and language delays should be referred to SLP and Audiology for evaluation and management.

(Rupert et a.l, 2023)

Assess, evaluate, and monitor the status and function of the peripheral auditory system



Obtain ear-specific and frequency-specific auditory thresholds- The Gold Standard!



Behavioral Audiometry

The perception and understanding of acoustic stimuli can only be measured using behavioral tools (Widen & Keener, 2003).

BOA

- Not a conditioned response and does not provide threshold information
- Can be utilized as a cross-check measure

VRA

- Conditioned response that utilizes auditory localization
- Clinicians observe and reinforce head-turn behavior in response to acoustic stimuli
- VRA audiometric threshold estimates are referred to as Minimum Response Levels (the lowest intensity level at which a response is observed)

CPA

- CPA can be utilized when testing children with a developmental age above 24 months and can provide reliable and valid thresholds to tonal and speech stimuli.

(JCIH, 2019)

Objective Testing

- Immittance measures including tympanometry, acoustic reflex screening, OAE's
- Tympanometry is Important given age of patients being evaluated and risk for ME dysfunction and difficulty reporting

- Infants with absent DPOAEs (in the presence of normal tympanometry) are predicted to have hearing thresholds poorer than 30 dB HL.

(JCIH, 2019)

Tips and Tricks for Testing Patients with ASD, ADHD, and Developmental Delay

Testing Considerations

- Find out what the child likes and allow them to bring favorite toys and security items
- Incorporate their interests in testing (including favorite songs)
- Two-tester paradigm works best
- Be mindful for the need for or removal of sensory stimulation during testing
- Be flexible-be ready to pivot testing order based on patient behavior
- Observe parent behavior and recognize when they need to pause
- Start with soundfield testing since many of these patients have sensory sensitivities
- Be fun and playful with otoscopy but be quick! Save to end if needed!
- Have a lot of different toys ready to use with patients
- Choose test assessments based on developmental age not chronological age

Tips and Tricks for Testing Patients with ASD, ADHD, and Developmental Delay

Additional Considerations

- Recognize parental and provider concern for hearing and utilize that information to help form recommendations for follow-up
- Encourage parents to “test” their child’s hearing at home and practice listening games
- Ask parents what time of the day works best for them when rescheduling testing
- Case history and input from other providers can guide your starting point
- Ask parents and caregivers: Are there any behaviors that you are concerned about or don’t understand?

A few of our favorite things

YouTube Kids

Sedated ABR

Criteria for Referral

- ✓ Child has risk factors for hearing loss.
- ✓ Inability to obtain frequency-specific and ear-specific auditory information through objective and subjective test measures after two audiological evaluations with two testers.

Sedated ABR

A warning about sedated ABR

- General anesthesia may pose potential risk to cognitive function in the young child
- Some children may not be medically cleared for sedation
- Sedated ABR is expensive and time consuming
- Limited providers perform sedated ABR and there can be long waitlists
- Sedated ABR process can be challenging for families
- Parents are overwhelmed with diagnosis process, trying to obtain services, and appts

(JCIH, 2019)

What about the monitoring schedule?

Considerations

- Risk factors
- Parent concern/report
- Behavioral results obtained
- Objective data results
- Middle ear status

Recommendations

Return in 1-2 months

- No behavioral information obtained
- No ear-specific information obtained
- Tympanometry or case history suggests middle ear dysfunction
- Results obtained suggest hearing loss

Return in 3 months

- Some behavioral and objective information obtained within the normal range
- Ear-specific and frequency-specific auditory information not obtained 500-4000 Hz

Return in 6 months

- Hearing is within normal limits but risk factors for HL are present
- Return for monitoring of middle ear function and hearing

****Any child with normal hearing in both ears should be seen annually for audiologic evaluation*

Key Points

- Children with autism and developmental delays may have higher incidence of hearing loss.
- Many children with developmental delays are not being tested after NBHS despite having risk factors.
- Interprofessional Teams are critical for evaluating children with developmental delays.
- Audiologists are critical team members in the evaluation process of children with developmental delays and suspected autism.
- Flexibility and creativity are needed in evaluating children with autism for hearing loss.
- Child-centered care focusing on each patient's likes/dislikes and sensory needs can lead to successful behavioral test results.

3 Questions?

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