Processes Promoting Quality Services & Programs

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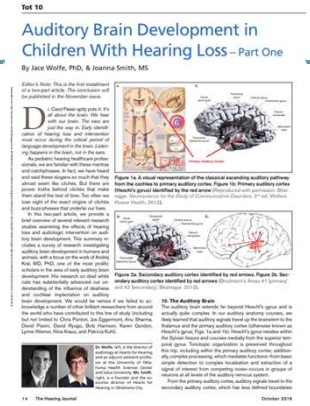
Introduction

- While we can't do it all, we can put processes in place to ensure children are making progress.
  - Have high expectations
  - Think creatively when something isn't working
  - Use tools and metrics backed in evidence to monitor progress, don't assume
    - Collect data at each visit
    - Follow longitudinally
  - Refer out when efforts to improve outcomes don't result in changes or successes.

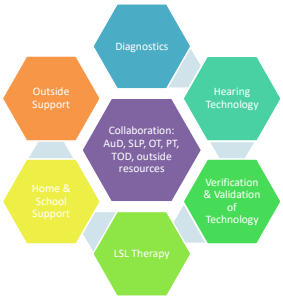

Auditory Brain Development in Children with Hearing Loss – Part Two

By Jace Wolfe, PhD, & Joanna Smith, MS


Auditory Brain Development in Children With Hearing Loss – Part One

By Jace Wolfe, PhD, & Joanna Smith, MS

TEAM APPROACH



Diagnostics

- Ongoing
- Collaborative
  - Auditory verbal therapy is diagnostic in nature
- Objective Measures
- Behavioral Measures (VRA, CPA, speech perception)
- Subjective Measures (Parental Questionnaires, observations)

Objective Assessments/Measurements

- Acoustic immittance testing
  - Tympanometry (226 Hz vs 1000 Hz)
  - Acoustic reflex threshold testing
- OAEs
- ABR
- Cortical Auditory Evoked Potentials (CAEPs)
  - HEARLab® (Martin et al., 2008)

Behavioral Assessments

- Behavioral testing every 3 months until age 7
  - Routine evaluations, HA checks, aided testing
  - Cross-check with objective measures
  - Don't use one visit or one measure in isolation
- Use therapy to develop conditioned response
  - Coordinate practice/generalization into audiology appts
- Experiencing success with behavioral assessments
  - Two-tester paradigm
  - Regular therapist in the booth with child
  - Familiar with child's behaviors and speech errors

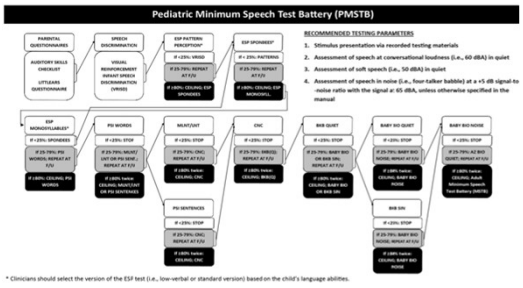
Behavioral Testing

- Aided Speech Perception Testing
  - It is **NOT** optional
  - Various conditions:
  - 60 dB A, 60 dB A, binaural condition, unilateral conditions
  - Recorded speech stimuli
    - (13% decrease in performance compared with MLV)
    - (Roeser & Clark, 2008; Uhler et al., 2016)
  - Ling 6 (HL) Test (recorded)
  - UWO Plurals Test
- Speech in Noise Testing
  - Multi-talker babble NOT speech noise via audiometer
  - Functional Listening Evaluations

Speech Perception Testing

- Some examples of speech perception tests
  - NU-CHIPS or WIPI
  - MLNT/LNT 3-5 yrs
  - PBK-50 5-7 yrs
  - CNC words 8 and older
  - Baby Bio (Spahr et al., 2014) –Ceiling effects?
  - AZ Bio Sentences (8 years and older, typically)
    - Watch out for inappropriate sentences based on child's age.

Pediatric Minimum Speech Test Battery



(Uhler et ial., 2017)

Subjective Assessments

Auditory Skills Development to assess caregiver *perceptions* of auditory behavior

- LittlEARS® Auditory Questionnaire (Coninx et al., 2009)
- PEACH: Parents' Evaluation of Aural/Oral Performance in Children (Ching & Hill, 2007)

LittlEARS®

- 0-24 months (based on chronological age)
- Assesses:
  - Receptive & semantic auditory behavior
  - Expressive (vocal) behavior
- Yes/No format; in age-dependent order
  - 4th grade reading level; can be administered a variety of ways
- Normative data for children w/ or w/o HAs/CIs
- 26 different languages

Coninx, et al., 2009; Tsaikpini et al., 2004, Copyright MED0EL 2004)

PEACH

- 24 months and older
  - Not age based
  - Used in children younger than 24 months old and results were predictors of later outcomes
- Quiet & Noise subscales
- Used with children using HAs/CIs
  - Use with non-users (ANSD; inconsistent users)
- Sensitive to changes in frequency response slopes in hearing aids.

(Ching & Hill, 2007)

Subjective Assessments for the Preschool & School Age Child

- CHILD: Children's Home Inventory of Listening Difficulties (Anderson & Smaldino,2011)
- Preschool SIFTER: Preschool Screening Instrument for Targeting Educational Risk in Preschool Children (age 3-K) (Anderson & Matkin, 2004)
- SIFTER: Screening Inventory for Targeting Educational Risk (Anderson, 1989).
- LIFE-R: Listening Inventory for Education-Revised (Anderson, Smaldino, & Spangler, 2011)
- TEACH: Teacher's Evaluation of Aural/Oral Performance of Children
- (Ching & Hill, 2005)
- Fatigue questionnaires

Summary of Assessment Based Metrics

- Age appropriate unaided and aided testing
  - Use cross-check principle
  - Aided speech perception testing
    - Quiet
    - Noise
    - Individual ears, bilateral or bimodal
  - CAEPs
- Auditory Skills Questionnaires

Hearing Technology

- Goal should be to maximize audibility regardless of technology used
- Hearing severity should not dictate audibility
- Better audibility leads to better language acquisition
- Results of objective, behavioral and subjective measures help dictate best technology options.
- When unsure as to whether to fit, use additional tools for decision making.

Factors affecting audibility

- Transducer measurements
  - How did you test?
- Ear canal acoustics
  - Size/Shape
  - Changes with age/growth
- Hearing loss: Stable or size/age related differences?
  - Ear canal growth ~ change in dB HL not dB SPL needed in a larger ear canal.
- Middle ear status: Otitis media, PE Tubes

Speech Intelligiblity Index

- Unaided SII:
  - Entered HL, RECD and unaided SII
  - Guides fitting decisions for minimal/mild HL
    - <80 = consider amplification
- Unaided SII is best for determining need for HAs in mild HL
  - Don't rely on speech perception testing alone
  - Don't rely on articulation scores
  - Consider the impact to brain development

Fitting to minimal/mild HL

- Use these tools & CAEPs if available to you.
- Consider NAL-NL2 if child seems adverse
- Counseling families about the implications
- Possible resistance:
  - Concern for overamplification or causing damage
    - In a 2-4 yr study period, a small shift in hearing thresholds were noted, but corresponded to change in RECD with growth in ear canal size with age. If fit to targets, no amplification induced hearing loss is expected. (McCreery et al., JAAA, 2016).
  - No evidence of benefit.
    - Share OCHL study posters/handouts

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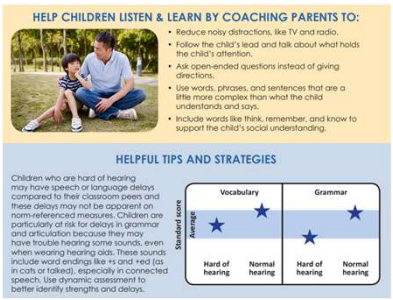

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Hearing Journal Tot 10 Article December 2017

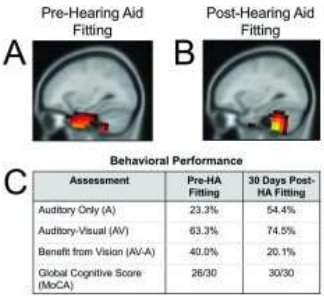

Tot 10

Lessons from OCHL

By Joanna Smith, MS, and Jace Wolfe, PhD

Sharma & Glick, 2018

- A lesson from early-stage mild-moderate hearing loss in adults using high-density EEG.
- Untreated hearing loss resulted in increase in effortful listening likely due to reduced acoustic stimulation.
- Reversed after 3 months of use of appropriately fit hearing technology.



Assessment	Pre-HA Fitting	30 Days Post-HA Fitting
Auditory Only (A)	23.3%	54.4%
Auditory-Visual (AV)	63.3%	74.5%
Benefit from Vision (AV-A)	40.0%	20.1%
Global Cognitive Score (MoCA)	26/30	30/30

Sharma & Glick (2018) *Hearing Review*

Tools for managing hearing technology

- Hearing aids:
  - RECD and probe mic measurements
  - Unaided and aided SIIs
  - Aided speech perception testing in various conditions
  - Auditory Skills Questionnaires
  - Aided Cortical Auditory Evoked Potential testing
  - Speech and language evaluations

Tools for managing hearing technology

- Cochlear Implants
  - Aided speech perception testing in various conditions
  - Auditory Skills Questionnaires
  - Aided Cortical Auditory Evoked Potential testing
  - Speech and language evaluations
- Bimodal devices
  - Aided speech perception with individual ears and combined condition
  - Other tools same as above
  - ** Ensure bimodal benefit, not detriment!

Verification of Hearing Technology

- RECD
- Real ear probe mic measures
  - Simulated vs. On-ear
  - LTASS for 3 Speech input levels: 55 dB, 65 dB, 75 dB
  - MPO
  - Verification of high frequency access
    - /s/ & /sh/
    - https://www.phonakpro.com/content/dam/phonakpro/gc_us/en/products_solutions/pediatrics/documents/best_practice_protocols/028-1528-03-Best-Practice-Protocol-SoundRecover2.pdf

Verify, verify, verify?

- May need to change gain settings based on RECD changes or changes in hearing
- Regularly record and monitor speech intelligibility index (SII).
- Neglecting to do so results in poorer speech perception abilities in quiet and in noise, especially in high frequencies. (McCreery et al, 2017).

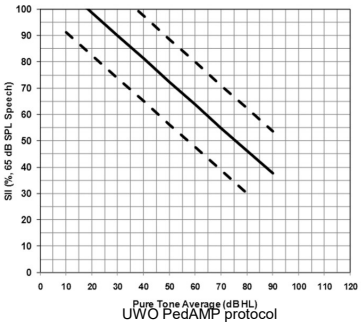
Speech Intelligibility Index

- What is it?
  - Proportion of speech that is audible with a level distortion factor and hearing loss desensitization factor in quiet environments at soft (55 dB) and average (65 dB) levels. For hearing losses ≥ 62 dB SPL➔level distortion factor is applied
  - used to quantify speech audibility
- SII ≠ Speech Perception scores
- SII will decrease as degree of hearing loss increases

Optimal audibility

- Higher aided SII scores
  - Better word recognition in quiet and in noise
  - Higher auditory skill development scores on parental questionnaires
- Stiles, Bentler, & McGregor (2012) studied relationship between SII and Lexical Abilities
  - Aided SII & PTA ≈ word recognition
  - Aided SII ≈ Lexical abilities

More on the SII…



UWO PedAMP protocol

Language as it relates to severity of loss and residualized SIIs

Severity of loss & Language

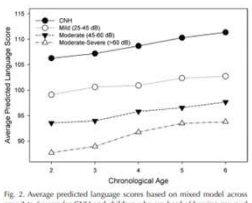


Fig. 2. Average predicted language scores based on mixed model across ages 2 to 6 years for CNH and children who are hard of hearing grouped by severity of unaided hearing loss. CNH, children with normal hearing.

Residualized SII & Language

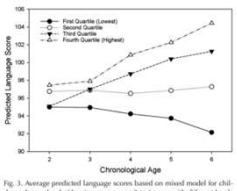


Fig. 3. Average predicted language scores based on mixed model for children who are hard of hearing across ages 2 to 6 years with different levels of rSII. rSII, residualized speech intelligibility index.

Tomblin et al., 2013 Ear & Hearing

Tomblin et al., 2013 Ear & Hearing

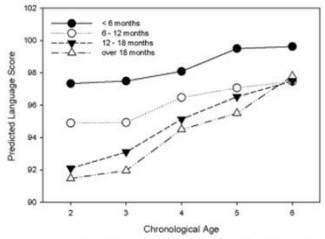


Fig. 5. Average predicted language scores based on mixed model across the ages of 2 to 6 years for children receiving hearing aids at 0–6, 6–12, 12–18, and over 18 months.

Early and Consistent Amplification in Severe to Profound Losses?

- Hearing aids may provide gross discrimination of durational patterns (i.e. short vs. long)
- Stimulates the nerve/builds auditory brain
- Serves as visual reminder to parents to use and support listening and spoken language
- Helps baby to engage in behaviors that will aid in listening and spoken language development:
  - Joint attention
  - Auditory attention
  - Cognitive and play skills

Validation

- Return to diagnostics and assessments and incorporate LSL interventions
- Behavioral measures
  - Unaided & aided testing
- Subjective measures
- Supplement with objective measures
- Re-verify HAs and CI function at regular intervals

When to become concerned

- Limited auditory progress
  - LittlEARS®/PEACH
  - SLE
- Poor SII scores despite appropriately fit hearing aids

Auditory Skills Questionnaires (ASQ) and Outcomes

- Results on LittlEARS or PEACH varied greatly among children who are hard of hearing.
- Greater aided audibility, increased HA wear time and better language abilities ~ higher LittleEARS and PEACH scores & better speech perception abilities in quiet.
- Phonological working memory was a positive predictor for word recognition abilities in noise

Use of datalogging, ASQs and speech perception abilities can guide parent counseling and provide resources to improve these aspects, including device retention and outside supports or therapies where needed.

Addressing the concern

- Recheck hearing
  - Repeat ABR testing if behavioral results are inconclusive/inconsistent
- Data logging and Daily Listening Questionnaire
  - Guides the conversation if the child is not wearing technology all waking hours
  - Provide strategies/equipment to improve wear time
- Initiate HA trial for children not currently in technology (i.e. mild or unilateral losses, ANSD)
- Change hearing technology/consider CI

Cochlear Implant Candidacy:

It's not what it used to be.

What if we could…

- Implant young enough that a child didn't experience delays?
- Intervene with progressive hearing losses sooner rather than later?
- Use these insights to go back to your clinic and find those patients who need a change?
  - Evidenced based support
  - Tools

The Evidence is here....

- Older evidence supports early implantation
  - Better word learning
    (Houston & Miyamoto, 2010; Houston et al., 2012)
  - Better expressive and/or total language
    (Cuda et al., 2014; Holman et al., 2013; Nicholas & Geers, 2013; Tobey, et al. 2013; Tomblin et al., 2005)
  - Speech perception (Tajudeen et al., 2010)

When compared with those receiving CIs later…

Data from Melbourne (at school entry ~ 5-6 years old)

- Vocabulary Development (mean standard score on PPVT):
  - Children implanted ≤ 12 months = **100**
  - Children implanted between 13-19 months = **83**
- All measures of language development:
  - Children implanted ≤ 12 months = All were WNL
  - Children implanted between 13-19 months = 50% outside normal limits
- Focusing on development of listening and spoken language yields better speech perception abilities and vocabulary development.

Dettman et al., 2016, Otology & Neurotology; Dettman et al., 2013, Otology & Neurotology

What if we implant earlier?

- Early is BEST and 12 months is not early enough!
  - Dettman et al., (2016) Otology and Neurotology
- For each 6 month delay in implantation, the decrease in language outcomes increases (in terms of standard deviation SD in language skills compared to children with typical hearing).
  - Delaying CI from 6 to 12 months = 0.7 SD
  - Delaying CI from 12 to 18 months = additional 0.4 SD (1.1 SD below mean)
  - Delaying CI from 18 to 24 months = additional 0.3 SD (1.4 SD below mean)

(Ching & Dillon, 2013).

Compelling Evidence Supports Early Implantation

By Joanna Smith, MS; Jace Wolfe, PhD; and Shani Dettman, PhD

What are these infants missing?

- Auditory System is functional by 25 weeks gestation
- Neonates attend to rhythmic patterns of speech and have developed a type of "statistical learning" in ways that they start to predict how syllables work.
- Typically hearing children start developing the foundation to interpret their native language at early ages.

What about our youngest kiddos?

- Infants typically use a whole year of listening before producing their first word
  - A child with severe to profound HL who cannot be implanted before 12 months of age will then need 2 years before they produce their first word (in theory)
- Crucial milestones for receptive language development are being met for typically hearing children before 12 months of age.

Without clear auditory access…

A child will not be able to

- discriminate between native phonemes (occurs naturally around age 7 months) (Kuhl et al., 2005).
- develop a sensitivity to prosody cues (developed around 6-9 months of age) (Newman et al., 2006)
- recognize familiar words in fluent speech (typically occurring around 12 months of age). (Newman et al., 2006)

*** The acquisition of these linguistic skills is strongly linked with language comprehension abilities at 2 years of age.

Typical ages for developing certain skills

At 6 months

- Link meaningful sound patterns (mommy, daddy, uh-oh, bye bye) (Tincoff & Jusczyk, 1999)
- Isolate novel words that follow familiar words (i.e. name). (Bortfield et al., 2005).

At 7.5-12 months

- Develop word segmentation abilities (Jusczyk et al., 1999; Bortfeld et al., 2005; Seidl & Johnson, 2008)

- At 8 months of age:
  - Establish longer-term word storage (up to 2 weeks) (Jusczyk & Hohne, 1997)

How do we get to an implant by 6 months?

- Early identification
- Early intervention (HA fitting, therapy, establish care with highly skilled otologist)
- Outcome measures (Evidence based)
  - Aided SII
  - Objective aided testing (CAEP)
  - Auditory
- Ongoing support to families
  - Early discussions in therapy and audiology appts.

CI Criteria for Pediatric vs Adult

- More stringent guidelines for children than adults?
  - Adults have already acquired language.
  - Adults can use context clues much better than children.
- Why are we expecting children to work harder than adults to hear?
- Think about what impact their hearing difficulties have in their school performance and ability to interact with peers.

Consider cochlear implantation

- Limited progress
- Candidacy guidelines vs. criteria
  - Consider the whole child not just whether they fit the current candidacy guidelines.
  - FDA Guidelines vs. Off-label
  - What is best for the child?

Pediatric CI Candidacy

FDA Guidelines

- 12 months of age or older
- Profound bilateral SNHL (≥ 90 dB HL)
- Little to no benefit with appropriately fit hearing aids
- Limited auditory progress
- Family motivation
- Appropriate expectations
- No medical contraindications

Candidacy by Manufacturer

Manufacturer	Cochlear	Advanced Bionics	Med El
Degree & Type of Hearing Loss	**≤ 2 yrs:** Bilateral profound SNHL (>90 dB HL) **≥ 2 yrs:** severe to profound SNHL	Bilateral, profound SNHL (> 90 dB HL)	Bilateral, profound SNHL (90 + dB at 1000 Hz)
Speech Perception (older children)	≤ 30% correct word recognition on MLNT or LNT	**< 4 yrs:** < 20% on simple open-set words (MLNT/LNT) **≥ 4 yrs:** < 12% on difficult open-set words (PB-K) or <30% on open-set sentences (HINT-C)	< 20% correct word recognition for MLNT or LNT

Audiologic information for decision making

- It's not what they have to lose, it's what they stand to gain.
- Audiogram:
  - Unaided thresholds: what is useful?
  - Sloping losses
- Speech perception
  - Consider results like you would a grade in school.
  - 80% or better- is that too lenient?

Can you predict benefit?

- Children with pure-tone average (PTA) of
  - ≥ 82 dBHL = 95% chance of improved benefit.
  - ≥75 dB HL = 90% chance of improved benefit
  - > 60 dB HL have a 75% chance of performing better with a CI over HAs
- Children ≤ 2.5 y.o. without significant cognitive deficits:
  - Typically experienced 1 year progress in 12 months, time.
  - Remained delayed equal to age at implantation.

(Leigh, Dettman & Dowell, 2016, IJA)

Tools to evaluate older child

- Recorded speech testing and testing in noise are important facets of a speech test battery for candidacy (to establish baseline for post-CI)
  - Keep the bar high on expectations

– Functional Listening Evaluations (FLE)

Use of questionnaires from parents and teachers

- CHILD
- LIFE-R
- SIFTER

When to become concerned (older children)

- Limited auditory progress
  - PEACH/CHILD/SIFTER/LIFE-R
  - SLE
  - Feedback from SLP
  - Feedback from teachers and parents
- Poor SII scores despite appropriately fit HAs
  - Refer to studies re: PTA and chance of improved success.
  - Consider duration of limited HF access (when applicable) & counsel appropriately.

What about older children?

- These children may have progressive losses
- They may have speech and language within normal limits
- As speech perception testing gets harder, they may struggle more
- They may exhibit increased listening effort. Listening requirements increase as children age (moving to more lecture-based learning).

Tools to evaluate older child

- Recorded speech testing and testing in noise are important facets of a speech test battery for candidacy (to establish baseline for post-CI)
  - Keep the bar high on expectations
- Use of questionnaires from parents and teachers
  - CHILD
  - LIFE-R

Asymmetric Hearing Loss

- But they have great hearing in the other ear?!?
- Two ears are necessary for true binaural/spatial hearing, therefore both ears should be optimized if possible.
  - Atresia
  - SSD
  - Unilateral mild to moderate hearing loss

Aural Preference Syndrome

- SSD & asymmetric HL in childhood results in:
  - Reorganization of auditory pathways towards hearing ear
  - Weak central representation of the deaf ear.
- Delayed intervention results in:
  - Long-term deficits
  - Slow-rates of improvement with intervention
- Early intervention in asymmetric hearing loss yields best outcomes for restoring binaural/spatial hearing.

(Gordon, Henkin, & Kral, 2015)

Technologies for AHL/SSD

- Bone conduction hearing devices (BCHD)?
- Hearing aid?
- Remote microphone technology?
- Cochlear implant?
- What is best for restoring binaural hearing?
  - Consider treatments that directly stimulate the auditory system on that side.
  - If CI is contraindicated, other options are available, but appropriate monitoring and counseling is necessary.

What about bimodal pediatric users?

- Is their contralateral ear benefitting from a HA?
- Has their hearing deteriorated in the HA ear?
- Do they have the best available technology for that ear? (AB & Phonak; Cochlear & Resound)
- How do speech scores between conditions compare?
  - CI only, HA only, CI + HA
- Subjectively, can the child report about the HA?
  - Do they reject wearing it or are they inconsistent?

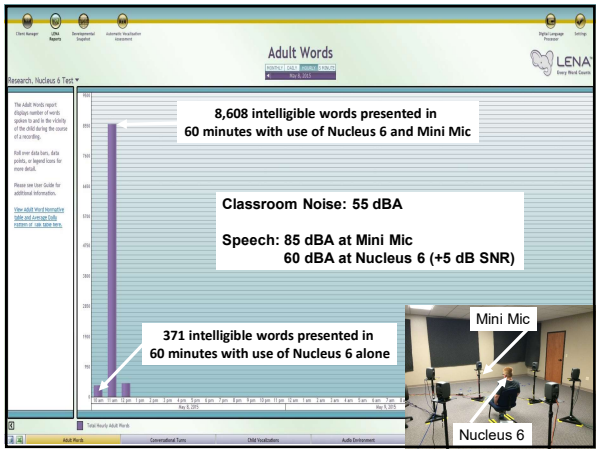
Beyond ear level technology

- Hearing aids and CIs are well managed
  - Hearing in quiet is excellent
- What about the child's performance in noise?
- Remote microphone technology
  - Who?
  - What?
  - When?
  - Why?
  - How?

Imran Mulla, 2013

- LENA Data Logging in Infants/Toddlers
  - Car seat (70 mph): -10 dB SNR
  - Bus: -10 dB SNR
  - Stroller: -8 dB SNR
  - Shopping cart: -6 dB SNR
  - Car seat (30 mph): -5 dB SNR
  - Wind Noise: -3 to -10 dB SNR

Conservative Take: Use in situations in the child has no chance to hear without remote mic use



Remote Mic (RM) Technology

- Consider for all children
  - Use tools to assess benefit (pre and post fitting, and ongoing)
    - PEACH/TEACH/LIFE-R
  - Personal systems vs. soundfield systems
    - Configurations for home vs. school
    - Easiest to manage
    - Cost-accessible
    - Digital systems are best

Evaluation of Speech Recognition with Personal FM and Classroom Audio Distribution Systems

Evaluation of Speech Recognition with Personal FM and Classroom Audio Distribution Systems

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Speech recognition in quiet and in noise was evaluated for children with normal hearing, children with hearing loss, and adults with normal hearing. Performance was evaluated in a classroom environment without use of wireless radio frequency (RF) hearing assistance technology (HAT) and with two different types of classroom audio distribution (CAD) systems (a sxd-gain multiple loudspeaker system and an adaptive single-tower CAD system). Children's speech recognition was also assessed with an adaptive personal frequency modulation (FM) system coupled to their personal hearing aids as well as with simultaneous use of the personal FM system with the aforementioned CAD systems.

The results of this study indicated that performance in quiet was similar between the condition without RF use and each of the conditions with use of RF HAT. However, speech recognition in noise was signi cantly better with use of each of the RF HAT. Use of the adaptive single tower CAD system provided better speech recognition in noise than use of the sxd-gain multiple loudspeaker CAD system. The best performance was achieved with the adaptive personal FM system and simultaneous use of the personal FM and adaptive single tower CAD system with no differences between those conditions. Performance with simultaneous use of the personal and adaptive CAD system was considerably better than performance obtained with simultaneous use of the personal and sxd-gain, multiple loudspeaker system. Adults with normal hearing achieved better performance across all conditions when compared to children with normal hearing, while children with normal hearing outperformed children with hearing loss.

Results

- Personal FM better than no FM at all noise levels.
- Personal FM better than CADS at 60, 65, 70, and 75 dB A
- Phonak CADS + personal FM and personal FM alone are both better than Audio Enhancement CADS + personal FM at 60, 65, 70, and 75 dB A.
- Possible causes?
  - Loss of adaptive (Dynamic) FM
  - Loss of noise pre-processing at Inspiro.
  - Insufficient input from audio output of AE Elite II to inspiro

Conclusions/Clinical Implications

- Adults understand speech in noise better than children.
- Children with NH understand speech in noise better than children with HL.
- CADS improve speech recognition in noise for all subjects.
- Dynamic CADS provide better speech recognition in noise than fixed-gain CADS.
- Personal FM provides the largest improvement in speech recognition in noise.
- Phonak Dynamic DM5000 + Personal FM provides better performance in noise than AE Elite II + Personal FM.
- Little to no speech recognition in noise improvement with Phonak CADS + Personal FM vs. Personal FM alone.
  - But CADS may improve classroom acoustics in real world.

The WHOLE child

The child is not progressing. Why?

- Do they have access?
  - Appropriately fit? Full time use?
- Developmental?
  - Does the child need time to catch up?
  - Late identification
- What else might be going on?

Beyond Technology

Technology is provided and well managed (or so we think).

- What's next?
  - Listening and Spoken Language Therapy
  - Home and School Supports
  - Working with other collaborative partners

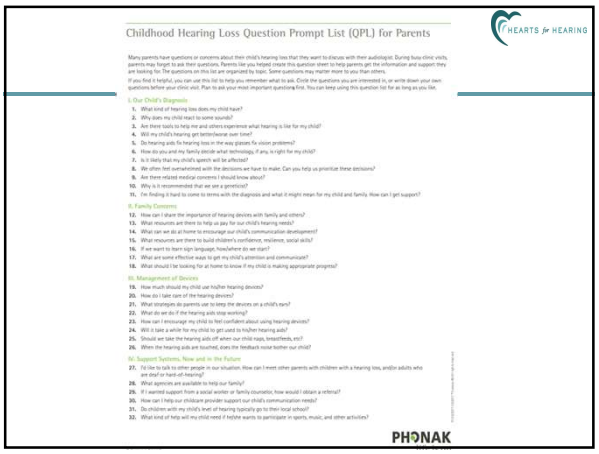
Food for thought…

- Linguistically and conversationally rich language environments are necessary for any child to develop speech and language.
- The reality is that many of our children who are late identified and late implanted are the same children that face a poor language environment,
- Early language deprivation & language-poor environments only exacerbate the situation.
- Use tools to help these families beat the odds.

Additional Considerations & Resources

- The next set of handouts are not within the scope of the presentation, but are designed to provide additional insight beyond the hearing and technology aspect of caring for children with hearing loss and their families.
- As we use tools to ensure audibility, we also understand that there are other components that affect outcomes. The following slides contain information to consider for treating the whole child.

Resources



Childhood Hearing Loss Question Prompt List (QPL) for Parents

Many parents have questions or concerns about their child's hearing loss that they want to discuss with their audiologist. During busy clinic visits, parents may forget to ask their questions. Parents like you helped create this question sheet to help parents get the information and support they are looking for. The questions on this list are organized by topic. Some questions may matter more to you than others.

If you find it helpful, you can use this list to help you remember what to ask. Circle the questions you are interested in, or write down your own questions before your clinic visit. Plan to ask your most important questions first. You can keep using this question list for as long as you like.

I. Our Child's Diagnosis

1. What kind of hearing loss does my child have?
2. Why does my child react to some sounds?
3. Are there tools to help me and others experience what hearing is like for my child?
4. Will my child's hearing get better/worse over time?
5. Do hearing aids fix hearing loss in the way glasses fix vision problems?
6. How do you and my family decide what technology, if any, is right for my child?
7. Is it likely that my child's speech will be affected?
8. We often feel overwhelmed with the decisions we have to make. Can you help us prioritize these decisions?
9. Are there related medical concerns I should know about?
10. Why is it recommended that we see a geneticist?
11. I'm finding it hard to come to terms with the diagnosis and what it might mean for my child and family. How can I get support?

II. Family Concerns

12. How can I share the importance of hearing devices with family and others?
13. What resources are there to help us pay for our child's hearing needs?
14. What can we do at home to encourage our child's communication development?
15. What resources are there to build children's confidence, resilience, social skills?
16. If we want to learn sign language, how/where do we start?
17. What are some effective ways to get my child's attention and communicate?
18. What should I be looking for at home to know if my child is making appropriate progress?

III. Management of Devices

19. How much should my child use his/her hearing devices?
20. How do I take care of the hearing devices?
21. What strategies do parents use to keep the devices on a child's ears?
22. What do we do if the hearing aids stop working?
23. How can I encourage my child to feel confident about using hearing devices?
24. Will it take a while for my child to get used to his/her hearing aids?
25. Should we take the hearing aids off when our child naps, breastfeeds, etc?
26. When the hearing aids are touched, does the feedback noise bother our child?

IV. Support Systems, Now and in the Future

27. I'd like to talk to other people in our situation. How can I meet other parents with children with a hearing loss, and/or adults who are deaf or hard-of-hearing?
28. What agencies are available to help our family?
29. If I wanted support from a social worker or family counselor, how would I obtain a referral?
30. How can I help our childcare provider support our child's communication needs?
31. Do children with my child's level of hearing typically go to their local school?
32. What kind of help will my child need if he/she wants to participate in sports, music, and other activities?

PHONAK

LSL (Auditory Verbal) Therapy

- Diagnostic in nature
  - Informs clinician & parent about where child currently performs and expected trajectory
  - Helps audiologist monitor hearing & technology
- Coaching model using strategies that caregivers can apply in everyday settings & support language-rich environment.
- Targets natural speech and language development
- Developmental vs. remedial model

LSL Therapy

- The goal is for a child to develop listening and spoken language skills commensurate with his/her same age, typically hearing peers.
- Informs decisions about child's hearing status and technology needs
- Dose of therapy is guided by progress and a variety of other factors
  - Age at intervention
  - Family involvement/resources
  - Other factors including additional disabilities

LSL Therapy

- Most effective when family, therapists and audiologists are all in communication.
- LSLS are well suited to help guide families when outside support is indicated.
- Effective LSL providers understand the need for and have built relationships with
  - Infant Mental Health Specialists
  - Social Workers
  - Occupational & Physical Therapy
  - Developmental Pediatrician
  - Neurologists

Speech and Language

- Speech and language evaluations
  - 6 months progress in 6 months time
- Documenting speech and language behaviors
  - Babbling
    - Tapers around 7 months of age in children with greater degrees of hearing loss
    - Separates the babies with hearing loss from the babies with typical hearing

Home & School Support

- Help families navigate life outside of the clinic
  - What are the psychosocial aspects of the diagnosis and management that are affecting the family life?
  - What outside factors may be interfering with the child's progress?

Home Support

- What behaviors are the parents seeing at home?
- What behaviors does the clinician see in sessions?
- What resources might help the child?
- What resources might help the parents?

Psychosocial

- Understanding the process
  - Long-term commitment
  - Routine follow up (audiology, hearing technology maintenance, mapping and therapy)
- Resources (financial and familial)
- Realistic expectations
  - Every child is different
  - Special circumstances

Outside Resources & Support

- Infant Mental Health
  - https://www.zerotothree.org/espanol/infant-and-early-childhood-mental-health
  - Adverse Childhood Experiences (ACE) Study
    - https://acestoohigh.com/
- Parent-Child Interaction Therapy (PCIT)
  - http://www.pcit.org/
- Social Services Providers
  - Family resources (financial, social-emotional)
  - Psychosocial factors

Other specialists?

- Occupational Therapy
  - Sensory Processing & Executive Function
  - Fine motor needs
- Physical Therapy
  - Gross motor needs
- Medical professionals
  - Neurologist
  - Neuropsychologist
  - Developmental Pediatrician
  - Opthalmology
  - Genetics

School Support

- IFSP and IEP development
- Preparing for transitions
  - Part C to Part B
- Finding appropriate services
  - Educational Audiologist
  - Speech Language services in the school

EHDI & Literacy

- Children who receive early intervention for their hearing losses, regardless of degree of loss are more likely to be ready for school entry.

Tools to determine readiness:

- Placement and Readiness Checklists: https://www.handsandvoices.org/pdf/PARC_2011_ReadinessChecklists.pdf

Literacy

- Reading Readiness & Literacy Skills
  - Phonological Awareness
  - Pre-literacy skills
  - Listening and Reading Comprehension
  - Moby Max: www.mobymax.com (Helps fill in the gaps & promotes retention)
- Executive functioning and reading
  - Understood.org
    - Great resource for learning & attention issues (including executive function).

You can't do it all…

- Tools and opportunities when a child or parent has concerns in school and the child does not have services from TOD, EdAuD, SLP
  - LIFE-R
  - TEACH: Teacher's Evaluation of Aural/Oral Performance of Children (Ching & Hill, 2005)
  - Fatigue questionnaires
  - Literacy specialists (private) and school

Moving forward

- Aggressive audiological management is ongoing
- Follow the child longitudinally, check in regularly
- Consider the whole child
  - Objective and subjective measurements guide decision making & help with counseling
  - Ensure audibility via HAs, CIs & RM technology
  - Refer out when concerns arise.

Collaborative conclusions

- Integrative approach
- Supports
- Provision of technology and therapies to help that child reach his/her full potential
- Understand that behaviors tell us something about how that child is hearing, listening, understanding, speaking, feeling, acting and succeeding.

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