Expert Clinician Panel

Sarah McKay
Hillary Snapp
Patricia Roush
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Sarah McKay  Hilary Snapp  Pat Roush
Case

- 2-year-old girl
- Mild to moderately-severe, SNHL right; normal left
- Vocabulary: 30 words, uses several 2-word combinations
- Thorough medical work up; no etiology determined
- Parents told ‘not to worry’ about their child’s loss because ‘she has one good ear that is sufficient for her language and educational progress’
Clinical Panel
Hearing Aid Candidacy & Fitting Considerations

Sarah McKay, Au.D.
Is this child a candidate for a hearing aid?

- Completion of diagnostic ABR, OAE, and ear-specific behavioral pure tone threshold testing
- Mild to moderately-severe chronic/permanent hearing loss in the impaired ear (note configuration)
- Otologic work-up indicating no transient or permanent medical contraindications
- Enrollment in a program designed to monitor speech, language and auditory development
- Usable word recognition abilities in the impaired ear (if age-appropriate)

Counseling Parents to Make Informed Decisions

• Talking points
  • Impact of UHL on a child
  • Risks associated with UHL
  • Device considerations
• Recommended evaluations
• Provision of written materials about UHL
• Provision of speech-language milestones
Considerations for Early Fitting of Amplification-UHL

What we do know:
- Plasticity factors
- Risk of progression of loss
- Improved localization
- Reported subjective benefit of older children fit with aid
- Better peer acceptance

What we do not know:
- Early amplification’s impact on:
  - Speech recognition abilities
  - Speech & language development
  - Academic achievement
  - Cognitive abilities
  - Social-emotional well-being
- Potential detrimental effects?
- Future CI candidacy/success
Hearing Instrument Selection for this Child

• **Out of office trial with conventional hearing aid** (four week increments)

• Unaided speech perception assessment (if possible)
  – Speech Reception Threshold (SRT)
  – Closed-set word recognition
  – Closed-set test presented as open-set

• Verification of fitting
  – Real-ear measurements
  – Aided Speech Intelligibility Index (SII)

• Provision of Unilateral Amplification Journal
Hearing Instrument Validation for this Child

- Review of completed journal and documentation of anecdotal information regarding acceptance of hearing aid and perceived benefit
- Administration of age-appropriate functional auditory measures (e.g. CHILD, Pre-School SIFTER, PEACH)
- Administration of Unilateral Hearing Loss Questionnaire
- Assessment of aided speech perception abilities (if possible or to be attempted at each subsequent visit)
Unilateral Amplification Journal

- Hours worn at home
- Hours worn at preschool/school
- Situations where listening seemed easier
- Situations where listening seemed more difficult
- Additional comments

Unilateral Hearing Loss Questionnaire

- Compares current amplification to no amplification
  - Listening conditions
  - Behavior
  - Perceived benefit
- Information used to guide counseling

<table>
<thead>
<tr>
<th>WEEK 4</th>
<th>HOURS OF USE AT SCHOOL</th>
<th>HOURS OF USE AT HOME</th>
<th>SITUATIONS WHERE LISTENING WAS EASIER</th>
<th>SITUATIONS WHERE LISTENING WAS DIFFICULT</th>
<th>ADDITIONAL COMMENTS</th>
</tr>
</thead>
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<td>MONDAY DATE:</td>
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<td>SUNDAY DATE:</td>
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</tbody>
</table>

Please answer the following questions using this scale:

<table>
<thead>
<tr>
<th>1. How has your child’s attention span since receiving his/her hearing aid?</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greatly Worsened</td>
<td>1</td>
</tr>
<tr>
<td>Worsened</td>
<td>2</td>
</tr>
<tr>
<td>Same</td>
<td>3</td>
</tr>
<tr>
<td>Improved</td>
<td>4</td>
</tr>
<tr>
<td>Greatly Improved</td>
<td>5</td>
</tr>
</tbody>
</table>

| 2. How is your child’s ability to follow directions since receiving his/her hearing aid? | 5 |
| 3. How is your child’s general frustration level since receiving his/her hearing aid? | 5 |
| 4. How is your child’s ability to understand TV speech and conversations since receiving his/her hearing aid? | 5 |
| 5. How is your child’s response when called from another room since receiving his/her hearing aid? | 5 |
| 6. How is your child’s ability to understand what is being said when playing or interacting in a group situation since receiving his/her hearing aid? | 4 |
| 7. How is your child’s ability to listen from the backseat of the car since receiving his/her hearing aid? | 4 |
| 8. How is your child’s ability to understand conversations/instructions in a noisy listening environment (restaurant, mall, etc.) since receiving his/her hearing aid? | 4 |
| 9. How is your child’s ability to determine which direction sound is coming from since receiving his/her hearing aid? | 5 |
| 10. How is your child’s confidence level since receiving his/her hearing aid? | 5 |
| 11. How does your child like his/her hearing aid? (use the following scale): Hates it | 1 |
| Does not like | 2 |
| Ambivalent | 3 |
| Likes it | 4 |
| Loves it | 5 |
| 12. Based on your experience, how do you feel about your decision to get a hearing aid for your child? (use the following scale): Wish you had done it | 2 |
| Glad you did it now | 3 |
| Done it | 4 |
| Wish you had done it sooner | 5 |

Additional Comments:
Selective Use of Amplification for this Child

- Case-by-case considerations
- Use in communication rich environments?
- Use when distance is a factor?
- Use contingent on background noise?

Potential Pros
- May be more acceptable to parents who are “on the fence”
- Allows slow approach with select environments only
- When unsure, do no harm

Potential Cons
- May minimize the importance of amplification to parents
- May meet more resistance by young child
- May impact future device success
Re-routing Solutions

Hillary A. Snapp, Au.D., Ph.D.
Department of Otolaryngology
University Of Miami

Pediatric Unilateral Hearing Loss Loss Conference
October 22 - 24, 2017
Learning Objectives

• Re-routing solutions
• When to consider re-routing as a solution in pediatrics
• Limitations
• Frequency Modulation/Digital Modulation
“Children with unilateral hearing loss are at greater risk than children with normal hearing for speech and language delays and academic difficulties.”

“Should be considered candidates for hearing instrument amplification in the impaired ear due to evidence for potential developmental and academic delays.”

“In children with severe or profound unilateral hearing losses and normal hearing in the other ear, Contralateral Routing of Signal (CROS) or bone conduction devices may be considered depending on the child’s age and ability to control their environment.”

“Currently there is a limited amount of data available to inform these decisions.”
Things to Consider:

• Age of the patient
• Language Development
• Environment – Day Care vs Home
• Nature and degree of hearing loss
• Costs
• Family engagement
Contralateral Routing of Signal (CROS)

• Age/Development of the child must be considered
  – Head control
  – Ability to retain in ear
  – Self report
  – Perform validation test measures with reliability
  – Occlusion of the normal ear

• Routing noise to better ear?
  – Ability to manipulate environment successfully
Managing Occlusion
Bone Conduction Hearing Devices

- Softband until age 5
- Removes issues of occlusion of better hearing ear
- Can manipulate placement to allow for access to speech input across environments/listening situations
- Ipsilateral stimulation by bone conduction
  - May provide binaural input
  - Stimulation of poorer ear may result in a masking effect of better ear
FM/DM

• Preferable in classroom situations over CROS arrangement due to high noise levels and ability to overcome negative SNRs (AAA, 2013).

• Speech at a distance

• Direct input: Benefit or limitation?
  – Attention
  – Behavior
  – Fatigue
  – Academic performance

• Evidence for FM outside of classroom is lacking
FM/DM

- Goal is to provide consistent access to speech and overcome adverse listening environments
- Involves significant investment in education of all care takers
  - Parent buy in
  - The complications of managing toddlers
  - Is the FM/DM connected? Is it coming out of the ear?
  - Associated cost
  - Good ear – plugged versus adding to the hearing aid
Jones, C. (2017) Teens and technology, Phonak WP

- FM limited to traditional classroom situations
- > 50% reported never having used RM systems for applications outside of the classroom
- 24% discontinued RM use

Students who continue to use RM recognize benefit.

Other Considerations

• Limited subjective tools for asymmetric and UHL in pediatrics
  – Age/development
  – Parent/care taker reports

• Evidence of long-term outcomes and benefit

• Rerouting versus “binaural” input for development
THANK YOU

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7th International Conference on Bone Conduction and Related Technologies

www.OSSEO2019.COM

2019 ACI 16th Symposium on Cochlear Implants in Children
Clinician’s Panel
Unilateral Hearing Loss
Philadelphia
October 23, 2017

Patricia Roush, AuD
Professor
University of North Carolina-Chapel Hill
What other information might be helpful?

• Has the child had a recent speech and language evaluation or is she receiving any additional services?
• How many children are in her classroom and what are room acoustics like?
• Is the child currently using FM/HAT in classroom?
• Does the school have an educational audiologist who could visit classroom to observe child and assess needs?
What other information might be helpful?

• What input can we obtain from the child’s teachers?
  – Teacher questionnaire may be useful

• Does the child’s family have specific concerns?
  – If so, in what specific situations have they noticed difficulty?
  – Parent questionnaire may be helpful here.
Will available evidence based guidelines help with our decision making?

- AAA Clinical Practice Guidelines Pediatric Amplification (June 2013)
- Cincinnati Children’s Hospital Best Evidence (BESI) Statement (2009)
- National Workshop on Mild and UHL (2005)
  - CDC and Marion Downs Hearing Center
Date published/posted: August 20, 2009

Hearing Loss

Severe to Profound

FM trial first line intervention

Educate about hearing aid use as second line

Monitor impact of intervention with functional listening tools

Mild to Moderately Severe

HA trial first line intervention

And/or FM system (classroom vs coupled with HA)

3b (Updike 1994 [4b])
(Kenworthy 1990 [3b])

4a (Kiese-Himmel 2002 [4b])

5 (Local Consensus [5])

4b (McKay 2005 [5b])
Recommendations

In *all* children with unilateral SNHL:

- Managing providers should discuss potential impact of UHL with child and family to help them understand potential gains, realistic goals, costs, and physical requirements of amplification so they can make an educated decision regarding interventions.

- Be cognizant of cost...Most insurance companies do not cover HAs....nor do they pay for FM systems as covered benefits and many schools do not uniformly provide FM systems for children with UHL.
• Children with unilateral hearing loss are at greater risk than children with normal hearing for speech and language delays and academic difficulties.

• Children with **aidable** unilateral hearing loss should be considered candidates for amplification in the impaired ear due to evidence for potential developmental and academic delays.
How do we define “aidable” UHL?

A. <70dB PTA or <80dB PTA?
B. < 70dB PTA and >50% word recognition score?
C. < 70dB PTA and >25% word recognition score?
D. Other?

Perhaps each one of us might arrive at a different decision in regard to what constitutes ‘aidable’ residual hearing.
...Therefore, a child with "aidable" hearing on the affected side is one who benefits from using his or her hearing aid.

Intervention with a hearing aid should not be pursued if there is a lack of benefit. As such, a trial with amplification may be necessary in some cases.
Considerations to discuss with family

- Discuss potential benefits and limitations of hearing aid use with family
  - Important to discuss realistic goals
  - Classroom assessment to evaluate room acoustics and make any needed modifications
  - FM/HAT in classroom
    - Personal FM to normal hearing ear with non-occluding earmold or open dome (5 years may be young for this option)
    - Sound field system may be more beneficial given age of child
Considerations for UHL management

• What are attainable goals for a given child?
  – Improved localization ability
  – Reducing head shadow
  – Better listening in noise

• What measures could be used in clinic to assess benefits (following acclimatization) of personal amplification?
  – Tests of speech perception in quiet and noise with better ear occluded and non-occluded
  – Speech in noise measures
    • e.g. BKB SIN, Pediatric AZ Bio or similar measures
CROS Hearing Aids
CROS

Retrieved from:

https://www.hear.com/fileadmin/media/usa/CROS_US.jpg
• Special consideration should be given to the fitting of amplification on children with unilateral, minimal or mild hearing loss….

  – Use of Contralateral Routing of Signal (CROS) amplification requires particular care
    • Designed to overcome head shadow effect
    • Could be helpful in quiet environment when signal of interest originates from the direction of the nonfunctioning ear
    • However, study by Kenworthy, Klee & Tharpe, 1990 indicated that CROS amplification may not be beneficial for children in classroom setting because of the introduction of additional noise to the normal-hearing ear.
For those with UNL, CROS aids might not be recommended until the child is able to control his environment...
AAA Clinical Practice Guidelines
Pediatric Amplification (June 2013)

Recommendations for Determining Candidacy:

• **Contralateral routing of the signal (CROS) and Bilateral routing of the signal (BICROS) fittings** are specially designed for patients having either unilateral hearing loss or bilateral asymmetrical hearing loss where one ear is **unaidable**, respectively…

• **For the child with unilateral deafness**, an FM system with the wireless remote microphone receiver portion coupled to the open, good ear may be preferable in classroom situations to the CROS arrangement to give the benefit of increased signal to noise ratio, a benefit in a noisy classroom.
• …both the American Academy of Audiology and the American Speech-Language-Hearing Association (ASHA) site the lack of evidence for the provision of CROS hearing aids for children and should be recommended only if the child can control his/her environment. This is because noise entering on the impaired side could interfere with the non-impaired side and have detrimental effects (Updike, 1994).
Key considerations for CROS

• Take care not to occlude the ‘better ear’; easier with availability of newer slim tube and dome style coupling methods.
• Ensure that CROS in not detrimental to child when in noise
• Consider age/ability of child to identify when off side mic is interfering with signal of interest and ability to selectively de-activate offside mic.
• Developmental age of 7-8 years may be needed before being able to selectively change programs
• Ability of caregivers to understand and assist with training child on how to effectively use CROS
Key Points

While CROS and Bi-CROS options not a good choice for very young children (or for every child); once child is old enough to control environment, it may be beneficial depending on the listening environment.

Frequent monitoring of hearing and regular follow up visits needed to periodically reassess child’s listening needs and make programming changes in HA and/or add new technologies/features.
Thank You!

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