

Expert Clinician Panel

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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



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Children's Hospital
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Center for Childhood Communication



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)

*Children's Hospital of Philadelphia Unilateral Hearing Loss Practice Guideline (2017):
Candidacy Criteria for Conventional Amplification Birth-36 months of age*

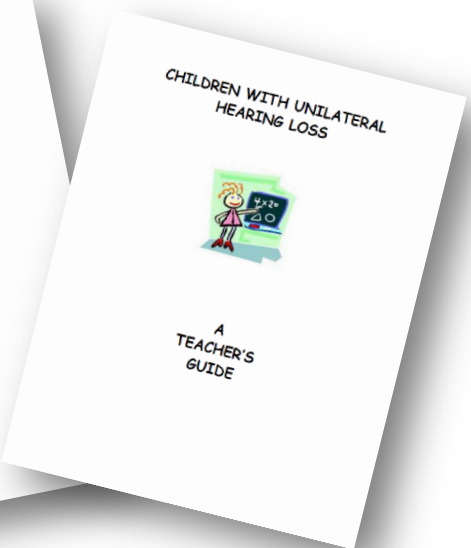
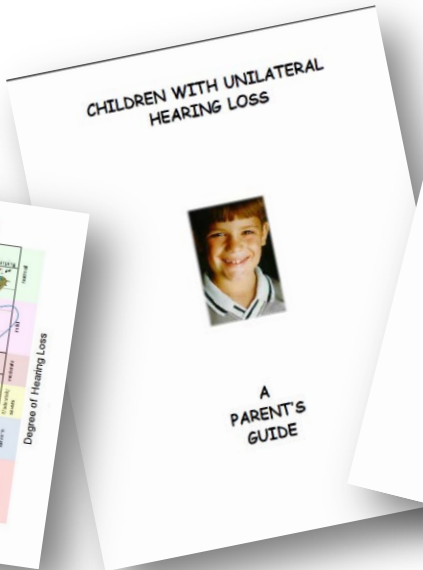
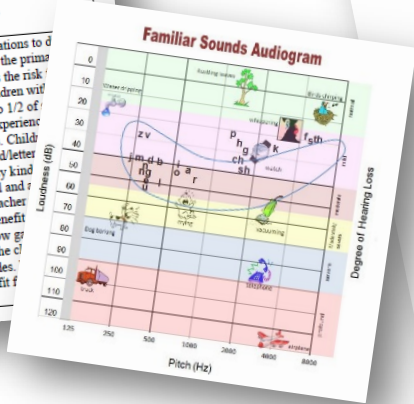
Counseling Parents to Make Informed Decisions

- 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

“one good ear that is sufficient...”

Relationship of Hearing Loss to Listening and Learning Needs

UNILATERAL HEARING LOSS		
Possible Impact on the Understanding of Language and Speech	Possible Social Impact	Potential Educational Accommodations and Services
Child can "hear" but can have difficulty understanding in certain situations, such as hearing faint or distant speech, especially if poor ear is aimed toward the person speaking. Will typically have difficulty localizing sounds and voices using hearing alone. The unilateral listener will have greater difficulty understanding speech when environment is noisy and/or reverberant, especially when normal ear towards the overhead projector or other competing sound source and poor hearing ear towards the teacher. Exhibits difficulty detecting or understanding soft speech from the side of the poor hearing ear, especially in a group discussion.	Child may be accused of selective hearing due to discrepancies in speech understanding in quiet versus noise. Social problems may arise as child experiences difficulty understanding in noisy situations. May misconstrue peer conversations and feel rejected or ridiculed. Child may be more fatigued in classroom due to greater effort needed to listen, if class is noisy or has poor acoustics. May appear inattentive, distractible or frustrated, with behavior or social problems sometimes evident.	Allow child to change seat locations to the normal hearing ear toward the primary speaker. Student is at 10 times the risk of educational difficulties as children with normal hearing ears and 1/3 to 1/2 of children with unilateral hearing loss experience significant learning problems. Child has difficulty learning sound/letter associations in typically noisy kindergarten settings. Educational and monitoring is warranted. Teacher beneficial. Typically will benefit from personal FM system with low gain sound-field FM system in the classroom, especially in the lower grades. The hearing loss, may benefit from the impaired ear.



Considerations for Early Fitting of Amplification-UHL



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


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



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

UNILATERAL AMPLIFICATION JOURNAL

	HOURS OF USE IN SCHOOL	HOURS OF USE AT HOME	SITUATIONS WHERE LISTENING WAS EASIER	SITUATIONS WHERE LISTENING WAS DIFFICULT	ADDITIONAL COMMENTS
WEEK 4					
MONDAY DATE:					
TUESDAY DATE:					
WEDNESDAY DATE:					
THURSDAY DATE:					
FRIDAY DATE:					
SATURDAY DATE:	NA				
SUNDAY DATE:	NA				

NAME: _____	TRIAL END QUESTIONS (circle best answer): I liked the sound quality. strongly agree agree neutral disagree strongly disagree The device was easy to use. strongly agree agree neutral disagree strongly disagree The device was comfortable strongly agree agree neutral disagree strongly disagree I would use this device. strongly agree agree neutral disagree strongly disagree
DOB: _____	
MRN: _____	
DEVICE: _____	

- 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

Please answer the following questions using this scale:

1	2	3	4	5
Greatly Worsened	Worsened	Same	Improved	Greatly Improved

QUESTION	RATING
1. How has your child's attention span since receiving his/her hearing aid?	3
2. How is your child's ability to follow directions since receiving his/her hearing aid?	4
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 conversation/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):	
1 2 3 4 5	
Hates it. Does not like it. Ambivalent Likes it. 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):	
1 2 3 4 5	
Wish you had not done it. Glad you did it now. Wish you had done it sooner.	5

Additional Comments:

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



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

Thank You!

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Re-routing Solutions

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Pediatric Unilateral Hearing 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



2013 AAA Pediatric Amplification Guidelines

- “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

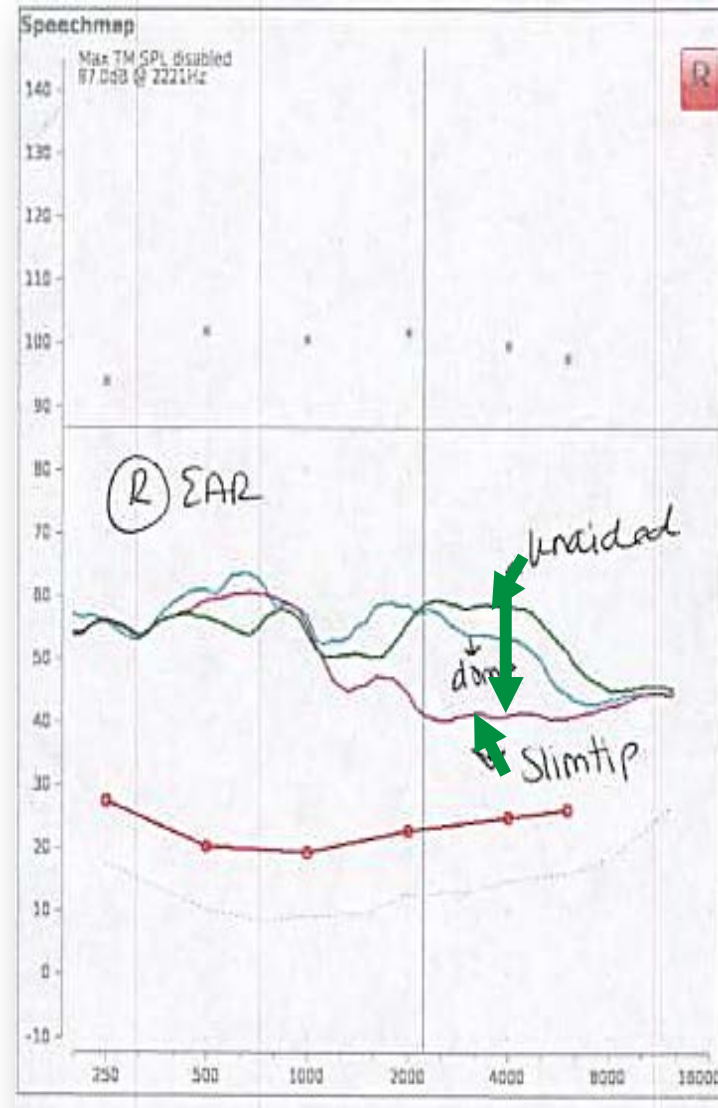


Contralateral Routing of Signal (CROS)

- 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

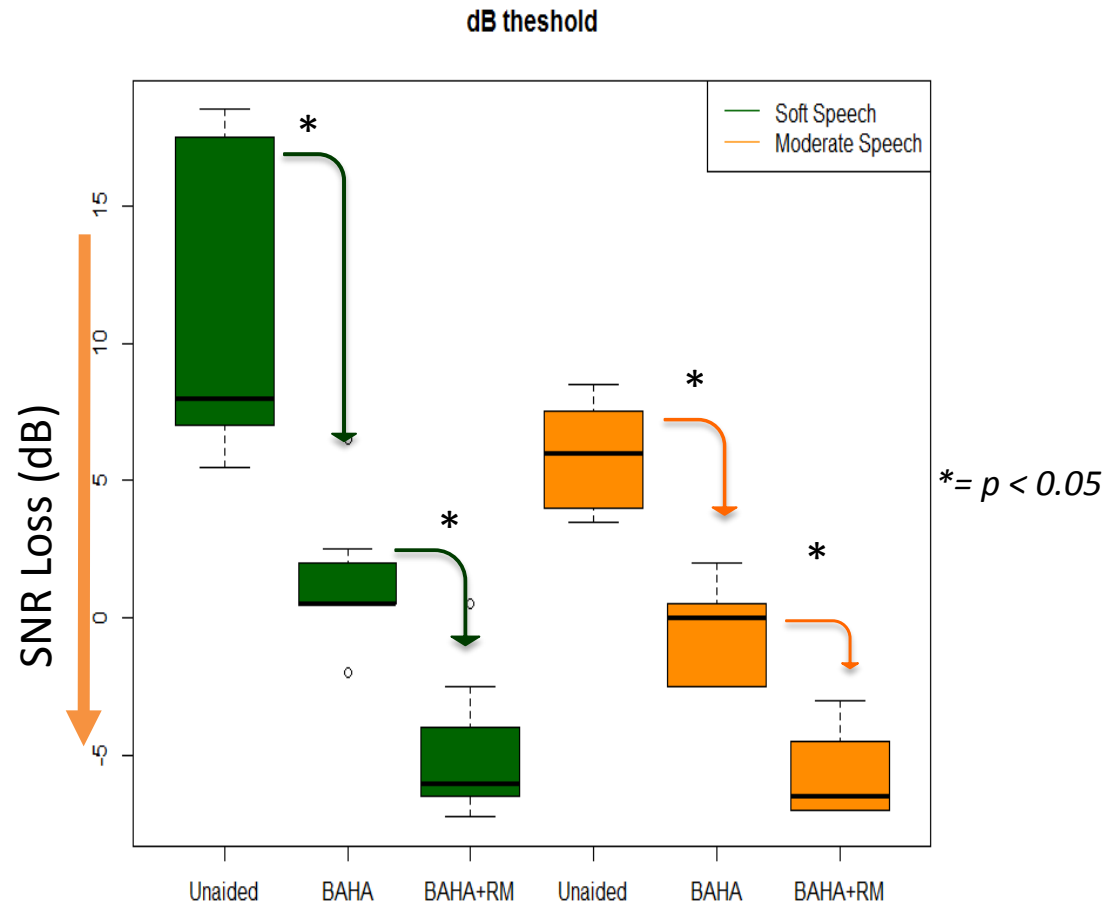
- Goal is to provide consistent access to speech and overcome adverse listening environments
- Involves significant investment in education of all care takers
 - Parent buy in
 - The complications of managing toddlers
 - Is the FM/DM connected? Is it coming out of the ear?
 - Associated cost
 - Good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

FM/DM

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.



Morgenstein, et al. Presented at 6th International conference on Bone Conduction Hearing and related Technologies, 2017



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



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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



UNC

DEPARTMENT OF OTOLARYNGOLOGY/
HEAD AND NECK SURGERY

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?

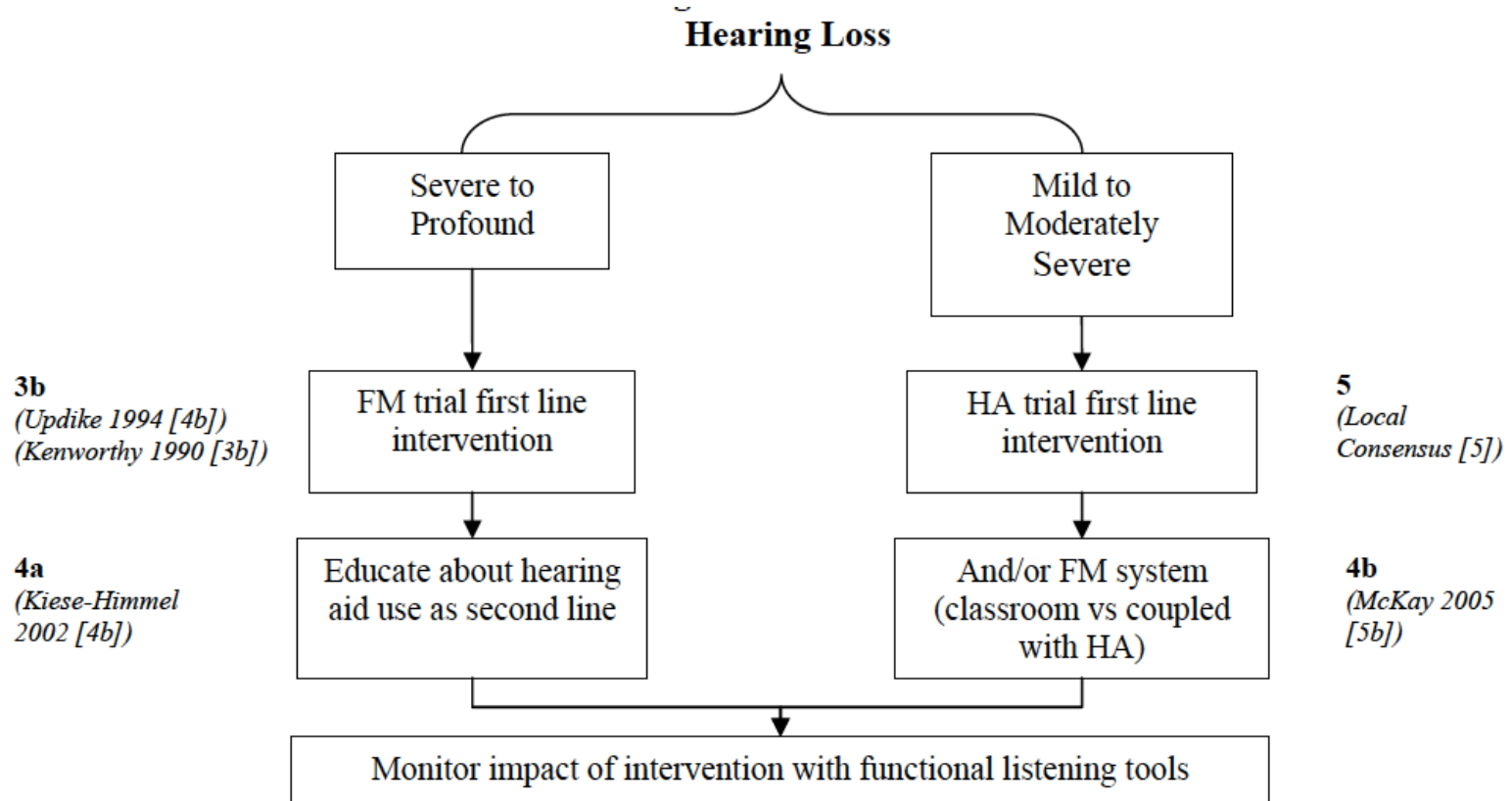
What other information might be helpful?

- 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?

- Ontario Protocol for the Provision of Amplification (2014)
- AAA Clinical Practice Guidelines Pediatric Amplification (June 2013)
- Cincinnati Children's Hospital Best Evidence (BESt) Statement (2009)
- National Workshop on Mild and UHL (2005)
 - CDC and Marion Downs Hearing Center

Date published/posted: August 20, 2009



Best Evidence Statement (BEST)

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

Summary of Evidence for Audiologic Candidacy
AAA Clinical Practice Guidelines
Pediatric Amplification (June 2013)

- *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.

Definition of “aidable” hearing
Ontario Protocol for the Provision of Amplification (2014)

...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

CROS



Retrieved from:

https://www.hear.com/fileadmin/media/usa/CROS_US.jpg

American Academy of Audiology

Pediatric Amplification Protocol (2003)

- 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.

National Workshop on Mild and UHL(2005) Technology Considerations

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.*

Ontario Protocol for the Provision of Amplification 2014

- ...both the American Academy of Audiology and the American Speech-Language-Hearing Association (ASHA) cite 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 is 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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