


## Do You Hear What I Hear? A Hands-On Tutorial

**Jennifer Wickesberg, Au.D., CCC-A, LSLs Cert. AVT**  
Director of Audiology

**Kate David, Au.D., CCC-A**



**THE CENTER FOR  
HEARING  
AND  
SPEECH**

## The Center for Hearing and Speech



- 1947
- Houston School for Deaf Children
- Served 8 Children

## The Center for Hearing and Speech



- 2009 Served over 2500 children



## The Center for Hearing and Speech

Speech Clinic



Audiology Clinic



Melinda Webb School



Family Support Services





## The Center for Hearing and Speech Staff

**Administration**

- o Renée S. Davis Executive Director
- o Diane Tucker Director of Administration
- o Candice Hillpold Education/Speech Coordinator
- o Mary Ordaz Administrative Assistant (Front Desk)

**Audiology Clinic**

- o LaDra Canto Baysinger, Au.D., CCC-A Audiologist
- o Kate David, Au.D., CCC-A Audiologist
- o Marissa Mendrygal, Au.D., CCC-A Audiologist
- o Amparo Belancur Audiology Assistant
- o Ada Simon Audiology Coordinator
- o Sandra Alvarado Audiology Administrative Assistant

**Speech-Language Pathology Clinic**

- o Cristina Zúñiga, Ed. Forensicologist LSLs Cert. AVT Bilingual Speech-Language Pathologist Assistant
- o Hanna Dickson, M.A., CCC-SLP Speech-Language Pathologist
- o Amy Lee, M.A., CCC-SLP Speech Language Pathologist
- o Sara Norwood, M.A., CCC-A Speech-Language Pathologist

**Melinda Webb School**


- o Jody Castillo, B.S. Ed., CED Director of Education
- o Pamela Black, B.S. Ed. Teacher
- o Jill Cassidy, M.S. CCC/SLP Teacher
- o Kristi Voytas, M.S., CED Teacher
- o Kristi Ferguson, B.A. Ed. CED Teacher
- o Javiya Gray, CDA Teachers' Assistant
- o Jennifer Tompkins Teachers' Assistant

**Family Services**

- o Erin Laferty, B.S. Teacher
- o Margaret Williams, M.S., Teacher
- o LaToya Martin, M.S., Teacher
- o Patty Schmidt Teachers' Assistant
- o Rosalia Vázquez

**Library**

- o Layne Mason, B.A., M.L.I.S. Librarian
- o Natalie Vuckovic
- o Annie Barrera
- o Katharine Boyette



## Course Outline

- I. Previous Research on Listening Checks in Schools
- II. Current Research Findings at MWS
- III. Protocol for Daily Amplification Checks
  - Personal FM Systems
  - Hearing Aids
  - Cochlear Implants
- IV. Functional Listening Checks
- V. Hands-On Training




## Amplification Status in Educational Settings



## Amplification in Educational Settings

- In a mainstream classroom the majority of learning takes place through listening and speaking
- 45% of the school day involves children engaging in listening activities  
(French, K. & Loven, F., 2000)



## Listening Checks: It's the LAW!

- IDEA, 34 CFR 300.303
  - Requires schools to "ensure that the hearing aids worn by children with hearing impairments...are functioning properly."
  - HOWEVER.....  
The law does not state the frequency with which monitoring should occur.



## Previous Research Findings Hearing Aids

- Sixty nine percent of hearing aids in schools were functioning inadequately (Gaeth & Lounsbury, 1966)
- A high incidence of malfunctioning hearing aids worn by children has been repeatedly documented since that first article was published  
(Hanners & Sittton, 1974; Kember, McConnell, Logan, & Green, 1979; Porter, 1973; Zink, 1972)



## Previous Research Findings Hearing Aids

- Diefendorf (1974) found the number of malfunctioning hearing aids was reduced from 50% to 30% when a daily listening check program was instituted.



## Previous Research Findings Cochlear Implants

- Teagle and Moore (2002)
  - Daily listening and functional listening checks
  - Changing batteries and cords are practical repairs- parents should be notified of a malfunction as soon as possible
  - If the device is at risk of falling off, it should be removed
  - Students should wear the CI all waking hours



## Who is Responsible?

- Parents
- Educational Audiologists
- Speech-Language Pathologists
- Teachers
- School Nurse



## Who is Responsible?

- Parents



## Who is Responsible?

- Educational Audiologists
  - Most knowledgeable
  - Often overburdened by their case loads
  - 98% of educational audiologists supported the responsibility of ensuring that at least one person would be trained and help the hearing-impaired student with daily listening checks (English, 1991)



## Who is Responsible?

- Speech-Language Pathologists
  - Educational background suggests that they should have the expertise to provide assistance with amplification
  - 81% of SLPs feel that classroom and clinical practicum training in hearing instruments is necessary (Lass et al, 1989)



## Who is Responsible?

Studies have shown that SLPs are actually uncomfortable with all types of amplification and its maintenance.



## Who is Responsible?

69% of SLPs felt that their coursework and clinical practicum in the area of amplification was inadequate (Lass et al, 1989)

Nearly 48% of SLPs had clients who wore hearing instruments (Lass et al, 1989)

57% of SLPs reported not having a troubleshooting kit at their disposal (French, K. & Loven, F., 2000)



## Who is Responsible?

- Mainstream Teachers
  - Have never taken a class on hearing impairments
  - Never worked with a child with a hearing loss



## Who is Responsible?

- School Nurse
  - May have taken a class on hearing loss
  - Who is responsible to train her to troubleshoot all of today's technology?



## Who is Responsible?

How does this make you feel?



## The Melinda Webb School and Daily Amplification Checks



## Melinda Webb School

- Auditory Oral School
- Serves Children 18 months-6 years
- Goal is to prepare children to participate successfully in classes with their hearing peers.



## MWS Listening Check Protocol

- Audiologists, teachers and assistants perform listening checks in the morning prior to beginning classes
- Staff are provided with a listening kit which includes troubleshooting tools and materials for both hearing aids, FM systems and cochlear implants.
- Every child's amplification and personal FM's are checked to ensure correct settings as well as the function of the device



## MWS Listening Check Study

- Subjects
  - 23 Students
    - 5 bilateral hearing aid users
    - 5 bilateral cochlear implant users
    - 13 bimodal users



## MWS Listening Check Study

- Method and Procedure
  - Every child who arrived on time to school received amplification listening checks
  - Listening checks included
    - Testing battery
    - Listening to hearing aid and/or CI
    - Visual inspection of earmolds, cords, casings, and cables
    - Functional Listening

## MWS Listening Check Study

- Method and Procedure
  - Categories were created to document problems for both hearing aids and cochlear implants
  - Appropriate measures were taken to correct the problems
  - Documentation occurred for 30 days

## MWS Listening Check Study

### ○ Hearing Aid Results

Problems	Total Problems
<b>Hearing Aid</b>	
Dead battery	17
Low Battery	2
Hearing Aid not turned on	6
HA distorted	2
HA Intermittent	1
Wax in Earmold	17
Moisture in tubing	3
Tear/Crack in Earmold tubing	2
Retubed earmold due to misc.	10
Broken battery door	1
Changed mic cover	1
<b>Total HA Problems</b>	<b>62</b>



## MWS Listening Check Study

### ○ Cochlear Implant Results

Problems	Total Occurrences
<b>Cochlear Implant</b>	
Dead Battery	2
Wrong Program	4
Distortion (mic cover changed)	2
Bad Coil Connection	2
Not turned on	3
<b>Total CI Problems</b>	<b>13</b>



## Results

### MWS Listening Check Study

- 11.5% of hearing aid ears were malfunctioning
- 2.6% of CI ears had malfunctioning equipment
- Total of 7.3% of hearing aid ears and CI ears were not functioning properly

## MWS Listening Check Study

- o Why were our statistics so low?
  - Small sample size
  - Our parents are well trained in performing their own listening checks and visual inspections of their children's amplification



## MWS Listening Check Study Conclusion

Our protocol works and ensures that every child who is in school has functioning amplification!



## Why are listening checks important?



## Importance of Listening Checks Summary

- o Ensure that the speech signal the child is receiving is clear.
- o Alert you to malfunctioning equipment.
- o Properly functioning amplification is essential to the success of any hearing impaired student!



## Hearing Aid Listening Checks



## Hearing Aid – Listening Kits

- o Should Contain:
  - Hearing Aid Checklist
  - Battery Tester
  - Listening stethoscope
  - Extra Batteries
  - Air Blower
  - Wax pick
  - Ling cards
  - Ling Toys



## Hearing Aid Troubleshooting Kit



## Hearing Aid Checklist



## Listening Checks

- o Test Battery
- o Quick Method
  - Cup hearing aid in hand and listen for feedback
  - Listen to intensity/loudness of feedback



## Hearing Aid Batteries

- o Size 5: **RED**
- o Size 10: **YELLOW**
- o Size 13: **ORANGE**
- o Size 312: **BROWN**
- o Size 675: **BLUE**
- o Size 675 Implant Plus: **BLUE**

## Listening Checks

- o Listen to the hearing aid
  - Listen for:
    - o Sound Quality (Clear? Distorted?)
    - o Volume Changes
      - Some hearing aids may have deactivated or locked volume controls
    - o Intermittency
      - Press and pinch hearing aid case as you listen
      - Move toggles
      - Turn on/off
        - o Some hearing aids may have a start up delay



## Listening Checks

Listen For:

- Sound Quality
  - o Clear? Distorted?
- Volume Changes
  - o Deactivated or locked volume control
- Intermittency
  - o Press & pinch hearing aid case as you listen
  - o Move toggles
  - o Turn on/off



## Visual Inspection

- Hearing Aids
  - Casing Cracks
  - Rusty Battery Compartments
- Earmolds
  - Check For:
    - Clogged earmold tubing
    - Moisture in tubing
    - Tears in earmold or tubing



## Functional Listening Checks

- Traditional Listening Check
  - Methods
    - Ling Sounds (ah, ee, oo, ss, sh, mm)
    - Running Speech



## Video Hearing Aid Check



## Hearing Aid Troubleshooting Tips

- No Sound
  - Battery may be dead
    - Check battery and change if dead
  - Battery may be inserted incorrectly
  - Ensure instrument is on
  - Sound outlet may be plugged with wax
    - Use wax loop to clear debris
  - Microphone inlet may be plugged with wax
  - Microphone may be damaged due to moisture



## Hearing Aid Troubleshooting Tips

- Weak Sound
  - Battery may be weak
  - Sound outlet may be plugged with wax
    - Use wax loop to clear debris
    - Wash earmold
  - Microphone inlet may be plugged with wax
  - Hearing aid may be in wrong program
    - Verify with parent/audiologist which program the hearing aid should be in



## Hearing Aid Troubleshooting Tips

- Crackling Sound
  - Battery may be weak
    - Use battery tester
    - Change battery if needed
  - Hearing Aid may have moisture in it
    - Suggest parents use dry and store kit
  - Amplifier or microphone may be damaged
    - Audiologist will need to send hearing aid in for repair



## Cochlear Implant Listening Checks



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## Cochlear Implants

- Cochlear Freedom
- Cochlear Nucleus 5
- Advanced Bionics
- Med El



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## Cochlear Freedom



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AND  
SPEECH

## Cochlear Implant Listening Kits Cochlear

- Freedom
- Should Contain:
  - Battery Tester
  - Monitor earphones
  - Signal Check



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## Cochlear Freedom

- Batteries
- Microphone Check
  - Plug Monitor earphones into the accessory jack

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AND  
SPEECH

## Cochlear Freedom



THE CENTER FOR  
HEARING  
AND  
SPEECH

## Microphone Check

### o Methods

- Ling Sounds
- Running Speech

### o Listen For:

- Sound Quality (Clear? Distorted?)
- Will be only slightly amplified

\*Note: Listening earphones will turn off after 90sec.



## Video of Emily and the Cochlear Device



## Cochlear Freedom

### o LED Light

- Steady flashing -> Check screen for help message
  - o Slow flashing = batteries
  - o Fast flashing = other error
- Flickering with sound -> Good (this option may be disabled)
- No light -> CI is dead or the light may be disabled



## Cochlear Freedom

### o Help Messages

- H1- Batteries are dead
- H2- Batteries are low
- H3- Coil error
- H4- Sound/stimulation error
- H5- MAP corrupt
- H6- Wrong implant match



\*Note: Pressing any button will clear the help message.



## Cochlear Freedom

### o H1- Batteries are dead

- Change the batteries (ensure that *all* of the batteries are changed).
- Ensure that all of the batteries are inserted correctly – flat/positive side on the bottom).
- Change the battery holder (ensure new batteries are fitted)



## Cochlear Freedom

### o Help Messages

- H1- Batteries are dead
- H2- Batteries are low
- H3- Coil error
- H4- Sound/stimulation error
- H5- MAP corrupt
- H6- Wrong implant match



## Cochlear Freedom

- H2- Batteries are low
  - Replace/recharge all of the batteries.



## Cochlear Freedom

- Help Messages
  - H1- Batteries are dead
  - H2- Batteries are low
  - H3- Coil error
  - H4- Sound/stimulation error
  - H5- MAP corrupt
  - H6- Wrong implant match



## Cochlear Freedom

- H3- Coil Error
  - Check that the coil is fully inserted in the socket.
  - Check that the coil is correctly located over the implant.
  - Check for cable damage.



## Cochlear Freedom

- Help Messages
  - H1- Batteries are dead
  - H2- Batteries are low
  - H3- Coil error
  - H4- Sound/stimulation error
  - H5- MAP corrupt
  - H6- Wrong implant match



## Cochlear Freedom

- H4- Sound/stimulation error
  - Check using the lapel microphone
  - Change the processing unit
  - Contact the child's cochlear implant clinician



## Cochlear Freedom

- Help Messages
  - H1- Batteries are dead
  - H2- Batteries are low
  - H3- Coil error
  - H4- Sound/stimulation error
  - H5- MAP corrupt
  - H6- Wrong implant match



## Cochlear Freedom

- H5- MAP corrupt
  - Change program to another useable program
  - Change the processing unit
    - use backup processing unit
  - Contact the child's cochlear implant clinician



## Cochlear Freedom

- Help Messages
  - H1- Batteries are dead
  - H2- Batteries are low
  - H3- Coil error
  - H4- Sound/stimulation error
  - H5- MAP corrupt
  - H6- Wrong implant match



## Cochlear Freedom

- H6- Wrong Implant Match
  - Make sure the implant is on the correct ear
  - Make sure that the processor has not been switched with another child's
  - Check the serial number



## Nucleus 5



## Cochlear Implant Listening Kits Cochlear

- N5
- Should Contain:
  - Battery Tester
  - Monitor earphones
  - N5 Remote Assistant





## Nucleus 5

- Buttons
  - Lower Button
    - Short: Change program
    - Long: On/Off
  - Upper Button
    - Short/Long: Toggle in-built telecoil or accessory on/off
  - Upper AND Lower together: Lock/Unlock BTE


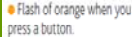






## Nucleus 5

Indicator Light	What it means
	You are turning on the processor
Short flash of green	You are changing programs. The # of flashes corresponds to the selected program (1-4).
Long flash of green	You are changing volume or sensitivity.
Flashes of green	You are changing from microphone to telecoil or accessory (or vice versa).
Flashes of green	The microphones are capturing sound.
Flash of green followed by a flash of orange	You are locking the processor's buttons.
Flash of orange followed by a flash of green	You are unlocking the processor's buttons.



## Nucleus 5


	The coil may be off OR your processor is not connected to the correct implant.
	The processor's buttons are locked.
	The processor's battery is VERY low.
	General Fault
	You are turning off the processor.



## Nucleus 5


### Locking and unlocking the battery module

To prevent children from removing the battery module from the processing unit, you can lock the battery module to the processing unit. To lock the battery module to the processing unit:



- Lift the accessory socket cover of the processor to reveal the lock. It is located below the accessory socket.
- Using a pair of tweezers or a screwdriver, push the latch to your left to lock the battery module.


To unlock, push the latch to your right.



## Nucleus 5

### Locking and unlocking the tamper resistant battery cover


To prevent children from removing the battery holder from the battery cover, you can lock the tamper resistant battery cover of the Standard Battery Module to the battery holder. To lock the tamper resistant battery cover:




- Insert the battery holder into the battery cover as shown.
- Using a screwdriver, gently rotate the lock in a clockwise direction until it is positioned horizontally.


To unlock, gently rotate the lock in an anti-clockwise direction until it is positioned vertically.

Do not overturn the lock as it could damage the lock.









## Advanced Bionics Harmony





## Cochlear Implant Listening Kits Advanced Bionics

- Harmony 
- Should Contain:
  - Battery Tester 
  - Advanced Bionics Direct Connect System
    - Earhook 
    - Cable 
  - Radio Shack Portable Amplifier and/or Headphones 



## Advanced Bionics Harmony

- Microphone Check
  - Requires an open program position
  - Direct Connect System & headphones/amplifier provides access to the processor microphone



## Advanced Bionics Harmony



## Advanced Bionics Harmony



Volume Control  
Typically worn at 12:00  
as shown by the dot

Program Switch  
3 slots  
#1 on the "bottom step"



## Advanced Bionics Harmony

Orange	Battery status
or	Good battery
	Low battery
	Change battery
Green	Microphone status
Flickers green in response to loud sounds	Good
	Indicates empty program slot suitable for performing microphone test
Red	Lock Status
(1 sec interval)	No lock
	Wrong implant linked
	Processor error condition (remove and reinsert battery to reset)



## Advanced Bionics Harmony

- LED Light
  - Orange = Battery Status
    - Flashes when turned on -> Battery charge
      - 3-4x = Fully charged
      - 2x = Sufficiently charged to power the CI
      - 1x = Battery is almost dead
      - No flashes = Batteries are entirely dead
    - Steady -> Battery is low \*
    - Flashes x2/3sec -> CI is not transmitting sound but battery is very low \*
  - Green
  - Red



## Advanced Bionics Harmony

- LED Light
  - Orange
  - Green = Microphone/system status
    - Flickering -> in response to loud sounds \*
    - Steady -> Mic test program slot
  - Red



## Advanced Bionics Harmony

### o LED Light

- Orange
- Green
- Red
  - o 1s blinks -> No lock with implant
  - o Rapid blinks -> Wrong CI/SP match
  - o Steady -> Fully remove and reinsert battery to reset processor



## Med-EI Opus2



## Cochlear Implant Listening Kits Med-EI Opus

### o Opus 2

### o Should Contain:

- Battery Tester
- Remote Battery Pack
- Speech Processor Test Device (SPTD)
- Headphones



## Med-EI Opus2

### Microphone Test Device



## Med-EI Opus2



## Med-EI Opus2

### Speech Processor Test Device





## Med-EI Opus2

### Speech Processor Test Device





## Med-EI Opus2

### Speech Processor Test Device

## Microphone Check


- o Methods
  - Ling Sounds (ah, ee, oo, ss, sh, mm)
  - Running Speech
- o Monitor SPTD Light
  - Should flicker with sound input
  - Gently pull and move coil cable to watch for intermittency in light while giving constant sound input (/a/)
- o Listen For:
  - Sound Quality (Clear? Distorted?)
  - Will be as amplified as volume setting on microphone test box



## Med-EI Opus2

- o Status Lights
 


	Electronic problem/ temporary processor disturbance. Program failure.
	Electronic problem/ program failure.
	Electronic problem/ temporary processor disturbance.
	Batteries are empty.



## Functional Listening Checks



## Ling Six (Seven) Sound Test



AH


OO


EE

S

SHH

M





## Functional Listening Checks

- o Ling Six Sound Test
  - Have the student sit at a distance of about 3 feet
  - Cover your mouth with a listening hoop or hand
  - Individually present each of the following six sounds: "mm," "oo," "ah," "ee," "sh," and "s."
  - Have the child respond to sound when it is audible



## Ling Sound Checks in Action



## Functional Listening Checks



## Functional Listening Checks

- o Ling 6 Sound Test
  - When a child demonstrates a change in sound awareness from an established baseline response, this may reflect:
    - A possible change in a child's listening potential that may require attention to his or her map, or an equipment issue that needs to be addressed



## Needs a new MAP?

- o Decrease in auditory responsiveness or change in attending behavior
- o Change in frequency of vocalization, voice quality, and/or vocal intensity
- o Gradual reduction in distance hearing
- o Increased requests for repetition, use of "what" or "huh"
- o Emergence of persistent disruptive or withdrawn behavior



## Needs a new MAP?

- Imprecise or “slushy” production of formerly mastered speech sounds
- Omission or confusion of constants that were formerly mastered
- Prolongation of vowels in speech production
- Previously known words produced with extra syllables added or syllables deleted
- Any signs of physical discomfort to sound, including eye/facial twitches



## Hands-On Training!



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