Red Flags: Barriers to Optimal Auditory Development, Part I
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Jane R. Madell, PhD
Joan Hewitt, AuD
Sylvia Rotfleisch, MSc

Introduction
Cochlear Americas’ Commitment to Educational Outreach
Our Presenters

Jane Madell, Ph.D.  
CCC-A/SLP, LSLS Cert. AVT

Joan Hewitt, AuD, CCC-A

Sylvia Rotfleisch, MSc

RED FLAGS:  
Barriers to optimal auditory development  
Part 1

HOPE  
22 April 2013  
Jane R. Madell, PhD  
Jane@JaneMadell.com  
Joan Hewitt, AuD  
jhewitt@projecttalk.org  
Sylvia Rotfleisch, MSc  
sylvia@hear2talk.com
THIS IS A TWO PART WORKSHOP

- Part 1 discusses audiology issues
- Part 2 discusses speech-language issues
- Ideally the course should be one two-hour course
- We recommend that attendees view both courses

GETTING STARTED

- Things are fine for most kids
- Why are some kids superstars and other kids not?
- Why the huge variation among kids who seem to be equal?
- We know that not all kids do equally well, but why?
LOOKING FOR EXPLANATIONS

• Some things are clearly a problem:
  – Not hearing as well with technology
  – Not getting appropriate therapy
  – Parents not involved
  – Developmental issues
• BUT sometimes everything is lined up and kids are still not achieving what we would expect

PHILOSOPHY

• If a child is not making appropriate progress, there is a reason!
• We have an obligation:
  – To figure out why
  – To try and address the problem
• All clinicians/team members need to work collaboratively to make this successful
• We must include parents as critical team members
• It is almost always possible to succeed
WHY AUDITION IS IMPORTANT?

WHY IS LISTENING CRITICAL?

- Hearing is the most efficient way to develop spoken communication and literacy
- *Hearing* = *auditory brain development*
- It is not really about the ears – *it is about the brain!*
- Technology is really a *brain access tool*
- Acoustic access to intelligible speech is critical for development of the auditory brain
  - The auditory cortex is involved in speech perception and language processing in humans
THE MOST BASIC RED FLAGS

RED FLAGS: BASIC behavioral observations

• Child not tolerating technology
  – Child resistant to wearing technology
  – Behavior management issues related to technology
• Behavioral observations
  – No response/poor response to sound
  – Hypersensitive to sound
  – Involuntary eye blinks/facial stimulation when wearing devices
RED FLAGS: BASIC behavioral observations

• IF CHILDREN HEAR WELL WITH THEIR TECHNOLOGY, THEY SHOULD WANT IT ALL DAY, EVERY DAY!!

• Parents (or other family members, especially grandparents) are concerned about progress
  – Parents are often hesitant to express concerns
  – If parents are concerned we need to take their concerns seriously
    • Are they realistic?

INTERVENTIONAL RED FLAGS OR IS THE INTERVENTION APPROPRIATE?
RED FLAGS: Ineffective Intervention

- Audiologists need to recognize ineffective intervention
- Child and family are enrolled in ineffective intervention if the intervention:
  - Involves the child without involvement of the parents and family
  - Does not monitor technology every day
  - Does not follow a normal developmental model
  - Does not stress the development of audition as the basis of all speech and language
  - Promotes visual language development (lipreading, sign language)

Audiologists support effective intervention

- **Hearing loss** limits access to speech and language; thus, the **hearing loss** creates the delayed speech and language
- Effective therapy
  - Defined auditory component
  - Auditory skill development in appropriate sequence is the focus of therapy
  - Auditory abilities are developed through the auditory modality
  - Parental guidance and coaching is provided at every session for transfer to all settings
Audiologists support effective intervention by:

• Teaching technology monitoring / checking
  – Who is checking it daily?
    • Do parents, clinicians, and teachers have appropriate listening technology (hearing aid stethoscope, CI earbuds, CI listening check)?
    • Do parents know how to use the technology?
    • Do clinicians and teachers know how to use the technology?

Audiologists support effective intervention by:

• Teaching technology monitoring / checking cont.
  – What is being done to check technology daily?
    • Ling sounds?
    • Other discrimination?
    • Close and far?
    • Will a drop in function be recognized?
  – Who is helping the child recognize and report technology malfunction?
Audiologists support effective intervention by:

- Evaluating signs of difficulty reported by clinicians/parents
  - No or poor response to high frequency stimuli
  - Distorted vowel production
  - Dropping certain consonants consistently
  - Speech sound deterioration
  - Mishearing
    - Increased “what?”
  - Reporting static
  - Any sudden and/or dramatic change in performance

Audiologists support effective intervention by:

- Monitoring parent education and training:
  - PARENTAL INVOLVEMENT AND EDUCATION ARE CRITICAL!!
  - Auditory based therapy model
  - Parents need to be involved in the therapy sessions and trained in sessions
  - Therapy for 1, 2 or even 3 hours does not replace parental involvement and reinforcement 24/7
Audiologists support effective intervention by:

- Confirming that equipment is working
  - Accepting responsibility for technology malfunctions
  - *When in doubt, CHANGE IT OUT!!!!*
- Ensuring that the child is:
  - Hearing throughout the frequency range
  - Hearing soft speech
  - Hearing in noise

Audiologists support effective intervention by:

- Discouraging visual speech
  - Focus on audition and limiting vision
    - Understand the strengths of auditory access for speech-language development
    - Understand the limitations of vision to access speech
  - Eliminate exaggerations
    - If it seems unnatural, it is probably going to create a problem
SPEECH/LANGUAGE RED FLAGS OR IF INTERVENTION IS APPROPRIATE, WHAT PROBLEMS INDICATE IT’S TIME FOR ADDITIONAL HELP?

RED FLAGS: Speech Production

- Poor voice quality
- Developing consonants in the appropriate sequence
- Identify consonants that are consistently absent when they are age appropriate
- Problems with phoneme development
- Inappropriate or abnormal production of consonants
RED FLAGS: Language Development

- Expectation: one year’s growth in one year
- Deterioration of speech skills
  - Production
  - Discrimination
- Language plateau or regression
NEVER ASSUME!!!!

• ALWAYS COLLECT DATA!!!
• Parent, teacher, and clinician data and documented observations are essential to appropriate remediation of the problems
• We must *test* to begin to determine what is affecting progress

IF A CHILD HAS APPROPRIATE PARENTAL AND INTERVENTIONAL SUPPORT, THEN RED FLAGS POINT TO TECHNOLOGY ISSUES.
TECHNOLOGY ISSUES FOR HEARING

• The most important use of our hearing is for speech and language perception
• Very simply, speech and language perception issues result from one or more of four situations:
  – I did not understand because it was too quiet
  – I did not understand because it was too loud
  – I did not understand because it was not clear
  – I did not understand because I do not have the language development

WHAT DOES TECHNOLOGY TELL US ABOUT HEARING?

• Real ear measures and CI mapping do NOT tell you what the child is hearing!
  – Real ear only tells you what is reaching the eardrum
  – CI MAPs/NRT only tell how much electrical stimulation is being provided
  – Real ear and CI MAPs tell you nothing about what the auditory brain hears!!
### IF HA AND CI PROGRAMS DO NOT TELL US WHAT A CHILD HEARS, THEN WHAT DOES?

- Children provide us with accurate and reliable information about what they hear:
  - When we observe and understand their behaviors
  - When we listen to what they say and how they say it
  - When they complete detailed audiological testing with an experienced pediatric audiologist
  - Parents, interventionists, teachers, family members, and friends are essential to this process

### FOR A DETAILED AUDIOLOGICAL EVALUATION, WHAT DO WE NEED TO TEST?

- Unaided thresholds
- Thresholds with technology – Right (R), Left (L), and Binaural (B)
- Speech perception with technology
  - 50 dB HL (normal conversation) - R, L, B
  - 35 dB HL (soft conversation) – B (R, L if possible)
  - 50 dB HL +5 S/N Ratio, B
**RED FLAGS: Audiological Evaluation**

- Audiological red flags with technology:
  - Hearing very soft sounds
    - Thresholds 0-15 dB HL, especially for young children
  - Not hearing soft conversation
    - Thresholds 35 dB HL or poorer
  - Poor speech perception at normal conversational level (50 dB HL)
  - Poor speech perception at soft speech level (35 dB HL)
  - Poor speech perception at loud speech level (70 dB HL)

**RED FLAGS: Audiological Evaluation**

- Audiological Red Flags cont.
  - Poor single word speech perception with good sentence recognition
  - Good single word speech perception with poor sentence recognition
  - Poor single word speech perception with poor sentence recognition
  - Speech perception testing completed with inappropriate test materials
WHAT RED FLAGS INDICATE SPEECH IS TOO SOFT? HOW DO WE ADDRESS THESE?

RED FLAGS: UNDER AMPLIFICATION and UNDERSTIMULATION

Patient consistent with technology usage, BUT:

<table>
<thead>
<tr>
<th>HEARING AIDS</th>
<th>COCHLEAR IMPLANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt. consistently removes technology</td>
<td>Pt. consistently removes technology</td>
</tr>
<tr>
<td>Pt. turns up volume</td>
<td>Pt. turns up volume and/or sensitivity</td>
</tr>
<tr>
<td>Pt. relies on visual input</td>
<td>Pt. relies on visual input</td>
</tr>
<tr>
<td>Pt. does not turn or respond to name</td>
<td>Pt. does not turn or respond to name</td>
</tr>
<tr>
<td>Vocalizations do not change with technology</td>
<td>Vocalizations do not change with technology</td>
</tr>
<tr>
<td>Pt’s voice is loud</td>
<td>Pt’s voice is quiet or whispered</td>
</tr>
<tr>
<td>Listening/speech/language development is slow or</td>
<td>Listening/speech/language development is slow or non-existent</td>
</tr>
<tr>
<td>non-existent</td>
<td></td>
</tr>
<tr>
<td>Speech perception at 70dB HL is 12% better than</td>
<td>Speech perception at 70dB HL is 12% better than at 50dB HL</td>
</tr>
<tr>
<td>at 50dB HL</td>
<td></td>
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</tbody>
</table>
UNDER AMPLIFICATION and UNDERSTIMULATION

• RX:
  – Check to ensure technology is working appropriately
  – Audiological testing to verify unaided/aided hearing thresholds
  – Aided speech perception testing at 35dB HL
  – Phoneme perception testing
  – Reprogramming to increase amplification/stimulation for soft speech, normal conversation, and possibly loud sounds as needed
  – Trial with different technology
  – Cochlear implant evaluation if using hearing aids

CASE STUDY: UNDER AMPLIFICATION

5.5 yr old boy aided at age 3.6