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Auditory Development Series: Factors that Impact Listening Outcomes

August 3, 2015
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Learning Objectives

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- Participants will be able to understand the intrinsic and extrinsic factors that impact listening and spoken language outcomes
- Participants will be able to describe three categories of listening and spoken language outcomes
- Participants will be able to discuss appropriate communication pathways for... communication development



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Structure vs. Function

- Audiologists and/or Surgeons tasked with Structure
provide surgical correction, amplification or cochlear implants to assist or bypass poor or absent Structures
- Teachers of the Deaf/Hard of Hearing, Speech-Language Pathologists, Audiologists tasked with Function
teach child how to develop auditory and verbal skills and coach the parent/caregiver on how to be a part of this process

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Structure



- SYNCHRONY CI System:
- MED-EL SYNCHRONY implant
- RONDO or SONNET audio processor with FineTuner

- Variety of hearing aids



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Function: Auditory Development

- Detection: hear it
- Discrimination: tell one sound from another
- Identification: identify what the sound is
- Comprehension: understand meaning and make complex associations

- Erber, N. (1982). Auditory Training. Washington DC: Alexander Graham Bell Association, pp. 92-94.

Outcomes (Expectations)

- Ability to develop auditory and oral-verbal skills, listening and spoken language skills, listening and talking
- Not everyone who receives a cochlear implant will have the same outcomes
- Expectations should be held high to ensure that each recipient reaches their individual potential
- Use as a counselling tool to identify and discuss factors that may impact outcomes
- Necessary to teach children who are profoundly deaf to listen

Communication Options Communication Options and Educational Placements

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Comprehensive guidebook for parents
and early interventionists

- Non-biased
- Describes definition, primary goals, language development (receptive), expressive language, hearing, and family/primary caregiver responsibilities and guidance
- Discusses and defines communication and educational options
- Available from MED-EL by request or free download



Source: BEGINNINGS for Parents of Children
Who are Deaf or Hard-of-Hearing, Inc.
ncbegin.org

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Communication Options American Sign Language Visual Approach

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- Bilingual approach which includes development of ASL and English
- ASL is natural, manual/visual language that has its own grammar and linguistic principles
- English is addressed through the use of teaching strategies for English as a Second Language

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Communication Options
American Sign Language
Primary Goal:

- To acquire age-appropriate internal language as basis for learning a second language and opportunities for academic achievement
- To provide a basis for learning written and, when possible, spoken English as a second language

Communication Options
Auditory-Verbal
Auditory Approach

- Emphasizes spoken language development through listening through one-on-one therapy and use of residual hearing with optimal amplification
- Child does not rely on visual cues
- Encourages individual decisions about amplification



Communication Options

Auditory-Verbal

Primary Goal:

- To develop spoken language through listening by following the stages and sequence of typical development
- To develop the skills necessary for successful mainstreaming in school and integration into the hearing community
- Early, consistent and appropriate use of hearing technology is critical to this approach

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Communication Options

Cued Speech

Combined Approach

- Auditory-visual communication approach that combines system of hand cues with the natural mouth movements of speech, specifying each sound
- A hand shape (consonant groups) at a location (vowel groups) cues a syllable

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Communication Options

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Cued Speech

Primary Goal:

- To provide clear communication in spoken language of the home
- To develop the phonemic language base to achieve full literacy in conversation, reading and writing
- To support speechreading, speech and auditory skill development
- Early, consistent and appropriate use of hearing technology is important to this approach

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Communication Options

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Auditory-Oral

Combined Approach

- Teaches child to use remaining hearing through amplification and the use of speechreading/natural gestures/visual cues to aid the child's understanding of language
- Use of any form of sign language communication is not encouraged

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Communication Options

Auditory-Oral

Primary Goal:

- To develop spoken language through listening and visual cues
- To develop spoken language and communication skills necessary for school success and integration into the hearing community
- Early, consistent and appropriate use of hearing technology is important with this approach

Communication Options

Simultaneous Communication

Combined Approach

- Educational philosophy that uses spoken language and sign language simultaneously
- Uses an English-based sign language which can include speech, speechreading, fingerspelling, natural gestures and the use of residual hearing



Communication Options

Simultaneous Communication

Primary Goal:

- To provide a bridge to the development of spoken language in the very young child
- To provide communication between the child and his/her family, teachers and peers using sign language
- To support integration into both the hearing and the Deaf communities
- Consistent and appropriate use of hearing technology is strongly encouraged

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For ease of this presentation have divided recipients into two groups

- Children: Those who have developed minimal to no language or have had progressive loss and have developed further language skills; around age 5 to 7; **habilitative** approach
- Older recipients: Those who have developed at least functional aural-oral skills and fall into the audiological candidacy range; teenagers and older; use a **rehabilitative** approach



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Children and Influencing Factors- Intrinsic

- Age/Duration of deafness
- Pre/post lingual deafened
- Medical findings
- Neural survival
- Etiology
- Cognition
- Additional disabilities



Children and Influencing Factors- Extrinsic

- Functional use of hearing aids
- Communicative intent
- Available habilitation services
- Educational program
- Child's behavior (i.e., focus/attention)
- Parental involvement
(i.e., compliance with follow-up, stressors, support)



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Older Recipients Influencing Factors- Intrinsic

- Duration of deafness
- Medical findings
- Etiology
- Cognition
- Additional disabilities



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Older Recipients and Influencing Factors-Extrinsic

- Functional use of hearing aids/residual hearing
- Compliance with amplification
- Available habilitation services
- Commitment to practice
- Family dynamics
including social situation



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ChIP: Children's Implant Profile-Modified

- Hellman, S.A., Chute, P.M., Kretschmer, R.E., Nevins, M.E., Parisier, S.C., & Thurston, L.C. (1991). *The Development of a Children's Implant Profile*. *Am Ann Deaf*, Apr;136(2): 77 – 81.
- Others have modified to meet their specific implant center's needs
- Profile usually divided into 5 sections
- Rate each item in the section (usually as no concern, some concern, great concern)
- Overall profile of areas of that impact expectations-strengths and concerns

Implant Profile Adults Areas

- Medical (physical health, radiological, duration of deafness)
- Audiology (degree of hearing loss, functional use of amplification/residual hearing, audiologic history)
- Speech-Language (auditory receptive and verbal expressive language, speech production, visual language skills (speech reading, sign language, reading))





Implant Profile Adults Areas

- Family (family structure and support, understanding and expectations and of hearing loss and technology)
- Habilitation (availability of services, knowledge and skill of service providers)



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Implant Profile Children's Areas CHIP

- Chronological Age: younger is less concerning
- Duration of Deafness: smaller amount of time is less concerning
- Medical/Radiological: any structural concerns with regard to electrode insertion (radiological); any additional medical concerns



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ChIP Areas

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- **Audiological Assessment:** degree of hearing loss, ability to test, functional use of amplification/residual hearing, audiologic history
- **Speech & Language Abilities:** non verbal and verbal receptive and expressive language, speech development, child's attention/behavior for language development

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ChIP Areas

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- **Multiple Handicap:** other issues that may affect ability to develop auditory and spoken language skills
- **Family Structure & Support:** family follow-up compliance with recommendations, family stressors
- **Educational Environment:** educational placement, knowledge and skill of service providers, parent participation

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ChIP Areas

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- Availability of Support Services: what does the child have access to for habilitation
- Expectations of Family/Child: understanding of expectations related to hearing loss and technology
- Cognitive Ability: child's level of developmental functioning
- Learning Style: how "teachable" is the child?

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Expectations

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Through experience and without being judgmental have recognized three general descriptive categories applicable to recipients of all ages:

- **Comparable** aural-oral skills to individuals with typical hearing
- **Functional** aural-oral communication
- Aural-oral skills that **assist** in communication

Range within each category

Quality and quantity of habilitation may catapult individual into higher category or relegate individual to lower category

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Comparable Communication

Children would be expected to develop aural-oral skills that are comparable to peers with typical hearing; deafness is the only challenge; skill development can take place in the natural environment-top down; academic learning in the mainstream with minimal to moderate support services

Older recipients would be expected to develop aural-oral skills appropriate for their age or to levels acquired prior to hearing loss; ability to converse easily in situations including some background noise, and on the telephone

Comparable Communication

- Communication pathway could focus on the development of spoken language through listening
- Auditory-verbal therapy and auditory oral approaches would be appropriate
- Able to access communication without need for manual (sign language or cued speech)

Functional Communication

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Children would be expected to develop aural-oral skills but not to level of peers with typical hearing; not done with ease and require intensive support; other mild to moderate issues may be present, particularly language issues; expected to enter “modified mainstream”-requires intensive support services and some children may be enrolled in specialized classes initially (i.e.,: resource specialist, English as a Second Language); use simultaneous top down/bottom up approach

Older recipients would be expected to have increased ability to converse in some situations; have increased vocabulary and language; increased ability to speech read; improved vocal tone

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Functional Communication

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- An appropriate communication pathway would focus on the development of spoken language through listening but may include multi-modality approaches additional visual strategies such as speech reading, reading, gesture cues)
- This may include: Auditory-Verbal, Auditory-Oral, Cued Speech or Simultaneous Communication (with equal emphasis on manual and listening communication-if family not committed to being fluent in manual then should not use these approaches)

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Case Study: Child age 5 years 9 months

- Audiological testing at 5 years 9 months of age utilized Play Audiometry but child required intensive training to learn task
- Child uses some gesturing/pointing to communicate with some made up signs-does not attempt to read lips; generally follows pointing or routines but no interest in other types of communication attempts (signs, reading, pictures)

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Assist to Communication

Children would be expected to develop some aural-oral skills to assist communication but primary communication will be through visual means; usually deaf plus or outside suitable range of implantation so keep whole child perspective-realistic expectations; require multi-modality approach, require self-contained classroom; reaching point of personal best will be slow and laborious process; educational program should include consideration of primary disability

Older recipients would be expected have increased ability to speech read; have environmental sound awareness and speech awareness but much difficulty comprehending speech

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Assist to Communication

- An appropriate communication pathway would emphasize a multi-modality learning approach – senses other than hearing are the primary learning modality-required to access communication
- This may include: American Sign Language, Cued Speech, Simultaneous Communication and techniques (but not approach) of Auditory-Verbal and Auditory-Oral; may also include AAC, PECS or other appropriate approaches specific to the individual's needs
- Appropriate to develop auditory and verbal skills to basic level (i.e., familiar words/phrases)

Participant Activity

1. Using the following Case Study, fill out the CHIP
2. Determine category child is most likely to fall in

Case Study: Child 4 years 1 month **MED^oEL**


- Child brought to audiologist with concerns that can no longer hear. Parents reported that up until about age 3 ½ child would follow very simple, routine directions and used some single and two-word utterances/approximations (speech was not clear) to communicate and then this started to decrease. At age 4 years 1 months audiological testing revealed profound bilateral SNHL. MRI showed no structural abnormalities.
- Family has many extended family members living close by and involved with the family.

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Case Study: Child 4 years 1 month **MED^oEL**

- Audiological testing at 4 years 1 month of age utilized Play Audiometry; child's results deemed reliable and valid
- Child uses some previously learned single and two word utterances but has not added to language in over 6 months; follows gesturing/pointing for understanding; appears to understand some lip reading of simple utterances in context
- Child does not attend any educational program or receive any habilitation services. There is a preschool program in the area who works with children who have hearing loss


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Case Study: Child 4 years 1 month

- Family has simple understanding of hearing loss and cochlear implants; but still need much counseling from audiologist
- Child plays appropriately with toys; attention is fleeting and needs much redirection to stay focused on a task that is parent driven

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Modified ChiP-example

The MED-EL Client Portfolio

2.4 Children's Implant Profile (ChiP)

Child's Name: _____

Date: _____

Date of Birth: _____

Team impressions of factors important to implant use and success	NO CONCERN	MILD TO MODERATE CONCERN	GREAT CONCERN
Chronological age			
Duration of Deafness			
Medical/Radiological			
Audiological Assessment			
Speech & Language Abilities			
Multiple handicap			
Family Structure & Support			
Educational Environment			
Availability of Support Services			
Expectations of Family/Child			
Cognitive Ability			
Learning Style			

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Resources

- LittLEARS® Auditory Questionnaire
- My LittLEARS® Diary
- Auditory Skills Checklist



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Resources

- Common Objects Token (COT) Test
- EARS® Evaluating Auditory Responses to Speech
- TeenEARS

For more information on resources, please contact me or your regions COM or visit www.medel.com



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Conclusion on Outcomes

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- Look at the whole individual-not just the ears
- Many factors in considering performance outcomes
- Some will have more of an impact than others
- Comparable, Functional, Assist
 - range within each category
 - may change categories
- Set expectations accordingly
- Consider communication options to meet individual's needs



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