Auditory Learning and Cochlear Implantation for the Young Child with Multiple Disabilities

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Agenda
- The Big Picture / Issues
- Challenges in Assessment
- Challenges in Intervention
- Research
- Resources and References
- Other Cochlear Americas Resources

The Big Picture
- Approximately 40% of children with hearing loss have additional, identified special needs (GRI, 2003).
- This does not include children with undiagnosed learning difficulties or different learning styles.

Increase in number of these children accessing spoken language programs may be due to:
1. increased survival rates of ‘at risk’ infants;
2. Universal newborn hearing screening and early identification programs;
3. improved support for and access to early intervention programs that provide spoken language options;
4. advancement and availability of new technologies, such as digital hearing aids and cochlear implants.
Growth in CI Use by Age in U.S.

<table>
<thead>
<tr>
<th></th>
<th>F'00</th>
<th>F'01</th>
<th>F'02</th>
<th>F'03</th>
<th>% Growth F'00-F'03</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 Yrs.</td>
<td>400</td>
<td>570</td>
<td>670</td>
<td>675</td>
<td>+69%</td>
</tr>
<tr>
<td>3-17 Yrs.</td>
<td>900</td>
<td>990</td>
<td>1060</td>
<td>1150</td>
<td>+28%</td>
</tr>
<tr>
<td>Total Pediatrics</td>
<td>1300</td>
<td>1560</td>
<td>1730</td>
<td>1825</td>
<td>+40%</td>
</tr>
<tr>
<td>Total Adults</td>
<td>1500</td>
<td>1800</td>
<td>2350</td>
<td>2850</td>
<td>+80%</td>
</tr>
<tr>
<td>Total</td>
<td>2800</td>
<td>3360</td>
<td>4080</td>
<td>4675</td>
<td>+67%</td>
</tr>
<tr>
<td>% Growth vs. previous year</td>
<td>+20%</td>
<td>+21%</td>
<td>+15%</td>
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Industry Estimates

Average Age of Implantation - For Children Under 3 Years of Age

Source: Cochlear Americas Registration Database

Types of Special Needs:
All have a range of severity.
- Sensory (e.g., hearing, vision)
- Motor/Physical (e.g., Cerebral Palsy, Oral-Motor)
- Cognitive (e.g., Down Syndrome)
- Learning Disability/disorder (verbal, non-verbal)
- Behavioral & Emotional (e.g., ADHD/ODD)
Types of Special Needs:

- Communication (e.g., Autism Spectrum Disorder-ASD, PDD)
- Neurological (e.g., TBI, seizures)
- Medically Fragile / Chronic Illness (e.g., Cystic Fibrosis)
- Multicultural / Multilingual
- Socioeconomic
- Multiple Special Needs

GRI: 2002-2003 Data on Special Needs in Addition to Hearing Loss

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Learning Disabled</td>
<td>10.2</td>
</tr>
<tr>
<td>Cognitively Disabled (MR)</td>
<td>9.3</td>
</tr>
<tr>
<td>Attention Deficit Disorder</td>
<td>6.6</td>
</tr>
<tr>
<td>Cerebral Palsy</td>
<td>3.3</td>
</tr>
<tr>
<td>Low vision</td>
<td>2.8</td>
</tr>
<tr>
<td>Legally blind</td>
<td>1.6</td>
</tr>
<tr>
<td>Emotional Disorder</td>
<td>1.8</td>
</tr>
<tr>
<td>Other</td>
<td>12.7</td>
</tr>
<tr>
<td>(% &gt;40 due to some co-occurring)</td>
<td></td>
</tr>
</tbody>
</table>

Special Needs: Anyone - Any time

- May occur in any combination, with different degrees of severity
- May occur at any age (congenital/acquired -- e.g., meningitis, TBI)
- May be diagnosed at any age (less severe are typically diagnosed later)
- Newborns – syndromes, low birth weight
- Toddlers – developmental milestones (physical/communication)
- School age – reading and learning disorders/ differences
Team Approach

- Parents
- Pediatrician-Developmental Pediatrician
- ENT/ Otolaryngologist
- Pediatric Neurologist
- Psychologist (familiar with D/HH)
- Early Intervention Specialists/Special Educators
- Audiologists (Diagnostic, CI - other sensory aids, Educational)

Team Approach

- Speech-Language Pathologist
- Teacher of the Deaf and Hard of Hearing
- A-V Therapist
- Physical Therapist / Occupational Therapist (Sensory Integration specialization)
- Behavioral specialist/ABA Trainer
- Other Specialists (vision, reading, etc.)
- Aide/s

Challenges

- Assessment
  - Auditory Assessments and Functional Listening
  - Other Assessments
- Intervention
  - Placement, Accommodations and Instructional Techniques
  - Behavior Management and Social Skills
  - Counseling of Families
  - Unique Challenges for Implant Teams
Challenges in Assessment

Needs:

• On-site / close contacts with audiology program
• Active parent participation (test assistant)
• Comprehensive test battery approach

Audiologic Protocol

• Developmental / Medical case history
• Parent Observational Report
• Otoscopy & Acoustic Immittance
Audiologic Protocol

TEST BATTERY INCLUDING:
• ABR, OAEs
• Auditory Steady State Response (ASSR)
• BOA >> VRA >> Conditioned Play
  Audiometry

Functional Listening Assessment

Assess auditory functioning level on an auditory hierarchy:
• Detection
• Pattern Perception
• Some segmental Identification / Recognition
• Consistent Identification / Recognition
• Understanding / Comprehension
  (adapted from Erber, 1982)

Auditory Assessment

• Ling 6/7 Sound test
• ESP
• ANT, CAT, GASP
• SERT, APAL, APT-HI, SPICE
• Test of Auditory Comprehension (TAC)
Auditory Assessment

Word Recognition
- NU-CHIPS
- WIPI
- PBK-50
- NU-6
- Gardner lists
- CCT

- Meaningful Auditory Integration Scale (MAIS)
- Infant Toddler MAIS (IT-MAIS)
- Mr. Potato Head
- Multiple Lexical Neighborhood Test (MLNT)
- Lexical Neighborhood Test (LNT)

Other Auditory Assessment Tools

- HINT-C
- LIFE
- SIFTER/s (preschool, elementary, secondary)
- DIAL
- SPIN-R
- ELF
- CHILD
- CRISP
- COW
- CHAPPS
- Fisher’s
- SCAN

Contact DMG at goldbed@ccf.org

Hearing Loss

Auditory Function
Specialist Assessments

- Cognitive / Learning
- Vision
- Reading and Writing
- Attention Deficit/Hyperactivity Disorder
- Communication/ Speech and Language
- Psycho-social (child and family members including parents, siblings, grandparents, etc.)
- Neurological

Challenges in Intervention

Intervention Issues

Placement and Accommodations
- Appropriate to meet all child’s needs
  - May need individual and/or group instruction
- Accommodations should include:
  - Optimal listening environments & support for hearing loss
  - Support for other needs (e.g., physical, visual, etc.)
Intervention Issues

• Support for staff
  – information on hearing loss and other special needs
  – Information on cochlear implants, hearing aids, FMs & any other technologies (communication boards, etc.)
  – Time for assessment and group planning

Intervention and Instruction

• Goals must be individualized
• Lessons must be “goal driven”
• Many paths may lead to success
  – Modify materials, strategies -- teach accommodations
  – Break learning down into incremental steps
  – Repetition, computer technologies
• May need to be multisensory -
  But Remember ...
**Learning Challenges**

- Spoken Language Challenges (potential challenges --)
  - Phonology - speech production (Motor speech disorders, Dyspraxia, CP)
  - Pragmatics - social communication (ASD)
  - Semantics development and vocabulary retention (LD, PDD, MR)
  - Syntax and morphological markers (LD, ASD, PDD, MR)

*Some Solutions*: co-treating with oral-motor or feeding therapist; mini-steps, structured approaches (Association Method), ABA, home programs

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**Learning Challenges**

Especially for ADHD, ASD, PDD, MR:

- Content (new, making connections, retention)
- Cognition and Memory
- Literacy Development
  - Phonological awareness and phonic skills
  - Reading comprehension


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**Benefits of Cochlear Implants**

Greater auditory access to speech and spoken language across the speech frequencies provides children with hearing loss the opportunity to:

- Acquire listening skills (including better hearing in noise)
- Learn spoken language through listening
- Acquire speech more developmentally (more natural voices)
- Learn to read in a manner similar to hearing children (through hearing) (Robertson, 2000)
Monitoring Progress

Need to have ongoing assessment of:

- Intervention and its effectiveness
- Educational placement and whether it is appropriate
- Support services available / provided
- Child’s progress and use of cochlear implant and other technology

Diagnostic Teaching

- Measure skills frequently
  - Complete longitudinal videotape sampling
- Use “formal” diagnostic measures addressing AUDITION, SPEECH, LANGUAGE, LITERACY, COGNITION & COMMUNICATION
- Use “informal” diagnostic tools
- Continually assess the parents / family as well as the child who is deaf or hard of hearing

While it is important to have realistic expectations, children constantly surprise us.

Do not set limits!
Challenges in Behavior Management

Effect of HL and Special Needs

- May have additional social/emotional issues
- May have difficulty with acceptance
- May have difficulty finding a peer group
- May cause “acting out” for attention, power struggle, “getting even” (revenge), withdrawal
  (Dreikurs & Soltz, 1964)
- May need very specific behavior management program

Challenges in Counseling Families
Challenges in Counseling

- Similar emotional issues and grieving process (denial, anxiety, anger, guilt)
- Additionally - feelings of isolation from programs for D/HH children
- Burden of trying to find suitable program
- Dealing with large number of professionals
- Tend to remain in denial longer about HL or additional special needs (see Luterman, 2004)

Unique Challenges for Implant Teams

- Parents of children with additional special needs have shown interest in CIs
- Necessary to provide in-depth information to parents
- Increased need for counseling, especially related to realistic expectations
- Goal may not be open-set sentence recognition (but, some children exceed our expectations)
- Address role that additional disabilities may play in determining the outcome of rehabilitation
- Need team approach to maximize success (Bertram, 2004)

Unique Challenges for CI Teams
Post Implant

- Develop conditioned response to sound and to the Ling Six Sound Test
- Develop a specific response to each of the Ling Six Sounds (pointing / cue)
- Develop imitated responses to the Ling Six Sounds and expand to other vowels, diphthongs, and consonants
- Keep records of child's listening function, speech and spoken language (feedback from teacher/clinician to implant center)

Remember

Speech Production mirrors Speech Perception

Programming -- When to refer:

- Decreased speech perception abilities from previously demonstrated skills
- Decreased speech production abilities from previously demonstrated skills (notably vowel "slippage")
- Any report of "unusual" stimulation -- pain, buzzing, on-off, etc.
- Parent, teacher, therapist report
- Behavioral changes in the child
- Minimal progress over a period of time
Factors we still need to keep in mind:

- Age of implantation - earlier is better
- Habilitation - type & amount, earlier is better
- Listening environment, learning & carryover opportunities

Research

Limited Research Findings

- Children with additional cognitive delays do more poorly on speech perception scores than those without cognitive delays (Waltzman et al., 2000)
- Some children with cognitive delays demonstrate improved speech perception with a CI (Dettman et al., 2004)
Limited Research Findings

- Children with severe cognitive delays may have a wide range of speech perception abilities post CI (Dettman et al., 2004)
- Improvements post CI may not be able to be measured by formal tests (Dettman et al., 2004)
- ‘Quality of Life’ issues for children with additional special needs should be considered

Summary

- Approximately 40% of children with hearing loss have additional special needs
- Greater numbers are coming to spoken language programs and to “hearing” (thanks to CIs)
- TEAM Approach is essential
- Assessments may need various adaptations
- Intervention needs to be carefully planned, implemented, and closely monitored
- Families need special counseling
- More research is needed

Final Thoughts

As part of a collaborative team, we have a responsibility to meet the challenge of working with these children with special care, compassion and additional expertise.
**Resources**

- **Alexander Graham Bell Association for the Deaf and Hard of Hearing**
  - www.agbell.org

- **All Kinds of Minds**: Understanding differences in learning
  -- Dr. Mel Levine (Attention, Learning, Motor & Social Disorders)
  - www.allkindsofminds.org

- **American Academy of Child & Adolescent Psychiatry - AACP**
  -- ADHD, ODD, MR, LD, Mental Health - Eating, Depression, Attachment, Chronic Illness, etc
  - www.aacap.org/publications/factsfam/index.htm

- **Attention Deficit Disorders Association (ADDA)**
  - www.add.org

- **Health (ADHD, LD, Mental Health)**
  - www.athealth.com/Consumer/disorders

- **Learning Disabilities Association of America**
  - www.ldanatl.org

- **National Institute of Mental Health (ADHD, Autism & PDD, Mental Health)**
  - www.nimh.nih.gov

- **National Organization for Rare Diseases**
  - www.rarediseases.org

- **Non-Verbal Learning Disorders Association**
  - www.nldline.org

- **Pediatric Neurology (Autism, LD, Seizures, Links)**
  - www.pediatricneurology.com

- **The National Reading Panel**
  - www.nationalreadingpanel.org

- **United Cerebral Palsy**
  - www.ucp.org
### References from *The Volta Review* (Monograph) 2004


1. Luterman, David. *Counseling families of children with hearing loss and special needs*
2. Picard, Michel. *Children with permanent hearing loss and associated disabilities: Revisiting current epidemiological data and causes of deafness*
3. Schum, Robert. *Psychological assessment of children with multiple handicaps who have hearing loss*

### References (*The Volta Review* 2004)

4. O’Connell, Joanne & Casale, Kathleen. *Attention deficits and hearing loss: Meeting the challenge*
5. Chen, Deborah. *Young children who are deaf-blind: Implications for professionals in deaf and hard of hearing services*
7. Truax, Roberta, Foo Sue Fan & Whitesell, Kathleen. *Literacy Learning: Meeting the needs of children who are deaf or hard of hearing with additional special needs*

### References (*The Volta Review* 2004)

8. LeBlanc, Barbara. *A public school Cued Speech program for children with hearing loss and special learning needs*
11. Dettman, S., Fiket, H., Dowell, R., Charlton, M., Williams, S., Tomov, A. & Barker, E. *Speech perception results for children using cochlear implants who have additional special needs*
Additional References


Additional References


Additional References

Upcoming Online Sessions
www.cochlear.com/HOPE

• August 3, 2:00 pm ET
  Looking to the Future: Issues in Mainstreaming Children with Cochlear Implants
• August 9, 2:00 pm ET
  Early intervention and Cochlear Implant Centers: Partnership in Action
• New HOPE Online program to begin late September 2005

For Additional Information

• For inquiries directly related to this online session: perigoe_c2@yahoo.com or GOLDBED@ccf.org
• For general inquiries on HOPE: dsorkin@cochlear.com