

Cochlear Implants for Children with Blindness or Visual Impairments

Kathleen Stremel
Western Oregon University
Teaching Research Institute

Cochlear implant technology is an innovation that holds tremendous promise for use with children who are deaf-blind and has the potential to dramatically improve the developmental trajectory for many of these children. Children who are deaf-blind are an extremely heterogeneous group. More than 90% have at least one additional disability in addition to their combined hearing and vision loss. For intervention and educational programs to be successful, they must be carefully individualized. Research to determine the long term impact of cochlear implants with children who are deaf-blind and effective intervention strategies with this population is currently being initiated by the author and her colleagues. This article presents early findings and provides some strong general “indicators” of intervention strategies for children who are deaf-blind with cochlear implants.

Cochlear implant technology was approved for children with severe to profound hearing impairments in 1990 (ASHA, 2004; NIH, 1995). However, very few children with multiple disabilities were early recipients. Current studies have shown that outcomes for these children are very mixed (Bauer, Wippold, Goldin & Lusk, 2002; Bertram, 2004; Detman, Fiket, & Dowell, 2004) and performance variability is great (Geers, 2006). A number of reports have found a significant increase in the number of children, including those who are identified as deaf-blind, receiving implants (Stremel & Malloy, 2002; Waltzman, Scalchunes, & Cohen, 2000). Federally funded state deaf-blind projects have only recently been required to report the number of children in their states who are deaf-blind and who have cochlear implants. There are currently 478 children who have a cochlear implant with some degree and type of vision loss reported on the 2007 National Child Count Data (Table 1 - Schalock & Beaird, 2008). States report some difficulties in identifying children who have received cochlear implants, so these numbers are probably much higher than is documented.

Research is currently being conducted on the outcomes for children who are deaf-blind and who have cochlear implants (Cincinnati Children’s Hospital & Medical Center, 2007; The Teaching Research Institute’s Steppingstones of Technology projects, 2007). Over 100 children with deaf-blindness and cochlear implants have been assessed with a battery of auditory perception tests and receptive/expressive communication and language assessments. These children have a wide range of cognitive abilities, functional vision and medical conditions. Preliminary data analysis of these children show wide variations in:

- *characteristics* of the children receiving implants
- *frequency* of post implant “mappings” of the implant
- *age* at which children are implanted
- *consistency* with which implants are worn
- types and intensity of *post-implant intervention*
- level of *parent support*
- nature and amount of *training that families* receive

Preliminary data on the outcomes for these children also vary widely, from mere detection of sounds with little vocal output to auditory comprehension of adult conversation and intelligible connected speech. There is little doubt that the strengths that the child and family bring to the process have a positive effect on the outcomes. However, it is important to remember that the cochlear implant is only the “hardware” and that children do not automatically “hear” the electrical signal. They must learn to give meaning to the signal that they are receiving through repeated mappings of the implant and through individualized intervention and interactions.

INTERVENTION

Extensive curricula for habilitation are available for children with cochlear implants without vision loss (Flexer, 2001). The major strategies outlined in these curricula focus on visual stimuli and assume developed concepts about and knowledge of the world. Many children who are deaf-blind have limited concept development and may not even use basic gestures for communication. A number of the children with deaf-blindness in the current studies do not demonstrate knowledge of cause and effect relationships or an understanding of the functional relationships of objects. Therefore, there is a tremendous need to develop appropriate intervention content and strategies in order to increase the outcomes for these children post implant.

Indicators of effective intervention for children who are deaf-blind include:

- Frequent mappings of the device, especially within the first two years post implantation
- Consistent wearing of the implant across environments during all waking hours except for bathing, swimming, or playing on plastic equipment in which there might be static electricity
- Daily (or more) checks for device function
- Access to meaningful auditory environments
- Access to assistive technology and FM systems to decrease noise
- Direct teaching for both parents and children to detect and discriminate different environmental sounds in the home and community
- Framing meaningful sounds for the child with a “listen” cue
- Increasing the number of words that a child hears each day
- Increasing the number of conversational turns between the child and another person
- Individualized intervention for each child based on his/her vision, physical and cognitive skills (see Sidebar). Based upon the research in brain development, it is recommended to always “lead” with an auditory stimulus and then support the child to the degree needed in order to respond appropriately within an interaction.
- Providing intervention and teaching within ongoing and frequent routines and activities
- Providing frequent opportunities for any type of communication and expressive responses

- Expanding with a verbal word or phrase
- Providing a model for a verbal response
- Providing “auditory highlighting” and contingent consequences that frame the listening and/or verbal response
- Use of progress monitoring tools to determine if progress is being made or if modifications need to be initiated (Robbins, 2005)

Remember that intervention is first about communication; second, it is about language; and third, it is about speech. It is important to lead with the auditory signal, to support with whatever mode the child needs in order to respond, and to finish with the auditory. Nussbaum, Scott, Waddy-Smith & Koch (2006) define this as an “auditory sandwich.”

SIDEBAR

Considerations for Individualizing Interventions

1. Many children who are deaf-blind with cochlear implants will need to learn that words have meaning. Some may already know that signs or gestures have meaning and those prompts and cues can be used to support their learning.
2. Other children in the population will need to learn meaning through tactile, object or gesture cues as well as speech.
3. No matter what the system, it is recommended to stimulate the auditory center of the brain by saying the word first – lead with the auditory.
4. If the child does not understand the verbal word, use the prompt that he/she does understand and say the word again.
5. It is important to determine where a child is demonstrating anticipation or understanding. Depending on the situation, different prompts and cues may be needed. A child may begin to understand some gestures but still use touch cues for other activities.

References

- American Speech-Language-Hearing Association. (2004). Technical Report: Cochlear Implants. *ASHA Supplement 24*.
- Bauer, P.W., Wippold, F.J., Goldin, J. & Lusk, R.P. (2002). Cochlear implantation in children with CHARGE association. *Archives of Otolaryngology – Head & Neck Surgery, 128*, 1013 – 1017.
- Bertram, B. (2004). Cochlear implantation for children with hearing loss and multiple disabilities: An evaluation from an educator's perspective. *The Volta Review, 104*, 349 – 359.
- Chute, P.M. & Nevins, M.E. (1995). Cochlear implants in people who are deaf-blind. *Journal of Visual Impairments & Blindness, 297* – 301.
- Detman, S. J., Fiket, H., & Dowell, R.C. (2004). Speech perception results for children using cochlear implants who have additional special needs. *The Volta Review, 104*, 361 – 392.
- Flexer, C. (2007, November). *Auditory brain development: The key to listening, language and literacy*. Paper presented for the Kansas Speech, Language, and Hearing Association, Overland Park, KS.
- Geers, A. E. (2006). Factors influencing spoken language outcomes in children following early cochlear implantation. *Advanced Otorhinolaryngology, 64*, 50-65.
- National Institutes of Health. (1995). Cochlear implants in adults and children. *NIH Consensus Statement, 13, 2*, 1 – 30.
- Nussbaum, D., Scott, S., Waddy-Smith, B., Koch, M. (April, 2006). Spoken language and sign” Optimizing learning for children with cochlear implants. Paper presented at Laurent Clerc National Deaf Education Center, Washington, DC.
- Robbins, A. M. (2005). *Clinical red flags for slow progress in children with cochlear implants*. *Loud & Clear, 1*, 1-8.
- Schalock, M. & Beaird, S. (2008). National Child Count for Children Who Are Deaf-Blind. The Teaching Research Institute, Monmouth, Oregon (<http://www.nationaldb.org>).
- Stremel, K. & Malloy, P. (2006, Winter). Cochlear implants for young children who are deaf-blind. *Deaf-Blind Perspectives, 13(2)*, 1-5.
- Waltzman, S.B., Scalchunes, V., & Cohen, N.L. (2000). Performance of multiply handicapped children using cochlear implants. *American Journal of Otology, 21*, 321 – 335.
- Wiley, S., (2008). Summary of outcomes on current children with deaf-blindness. Steppingstones of Technology Innovation, Award H327A080045A.
- Wiley, S., MeinzenDerr, J., & Choo, D. (2008) Auditory skills development among children with developmental delays and cochlear implants. *Annals of Otology Rhinology and Laryngology, 117(10)*, 711-718.

