



Habilitation Outreach for
Professionals in Education

HOPE Note

Speech Development



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The benchmarks for speech development for a child with a cochlear implant are important to the teacher of deaf children and to the speech language pathologist responsible for monitoring speech acquisition. The following HOPE Note outlines general expectations for the systematic achievement of speech skills and the therapeutic approaches that can be used to acquire them.

For a child with hearing in the normal range, the sounds of speech are ever present in the environment from the first day of life and perhaps even before. The child begins to produce these sounds first reflexively, then with intention. Through listening to self and others, and as the vocal tract and articulators develop and become more in control, a child is able to match the sounds that are heard with the sounds that are produced. The child with hearing loss, however, does not have access to all of the sounds of speech. The child is less able then, to match the sounds that he produces to those that others make. Hearing aids are of benefit, but often do not provide enough of the acoustic features that are necessary to distinguish one sound from another. This results in distorted articulation in addition to language and auditory delays.

The Impact of Cochlear Implantation

Almost immediately upon activation, the cochlear implant affords the user access to all of the sounds of speech. With appropriate programming and auditory habilitation, an implant recipient will be able to discriminate between speech sounds, even those that differ in only one acoustic feature (e.g. voiced vs. unvoiced). With this ability, cochlear implant users can rely on their hearing to monitor their own speech, just as typically developing children can.

For children who receive cochlear implants, progress with articulation development, like auditory and language development, is dependent on a number of factors (i.e., length of deafness, participation in auditory habilitation pre-implant).

Keeping in mind the factors which may influence articulation development, the following general assumptions can be made:

- The younger the child when he receives a cochlear implant, the greater his potential for developing articulation skills in a manner more similar to typically developing peers
- The greater the benefit of hearing aids prior to cochlear implantation, the greater the child's potential for systematically acquiring articulation skills

- Children may have additional speech disorders, in addition to their hearing loss, which may influence their progress in speech development.

Following Typical Development

When working with a young child with a cochlear implant, the early focus of speech intervention should be on auditory development with exposure to speech sounds in a sequence similar to typical speech acquisition (i.e. cooing and babbling, vocal play). This is followed by development of the following suprasegmental and segmental aspects of speech:

- Duration, pitch and intensity
- Vowels and diphthongs
- Consonants (in the order of typical acquisition)
 - in single syllables with vowels
 - in repeated syllables with vowels
 - alternated with other consonants

Remembering that children may require months of auditory input before output of sounds occur, this stage of acoustic input should not be rushed. Pairing the sounds of speech with objects and actions as in the use of Learning to Listen Sounds (Estabrooks, 1998) will assure that speech will develop in a meaningful way rather than as an isolated skill.

For the older child with some prior level of speech development (perhaps one who has had limited benefit from hearing aids), the exposure to suprasegmentals and segmental features continues to be the suggested initial approach. However, remediation of speech sounds may be needed sooner and a more direct approach to articulation may need to be implemented. In conjunction with traditional approaches to articulation remediation, the following suggestions might be made to facilitate speech development using the newly available auditory input:

- An auditory cue/model should always precede a tactile or visual correction
- An auditory model should always follow a tactile or visual model
- Children will benefit from evaluating their own productions relative to those of others (e.g. listening to the speaker's model, and then listening to their own production to determine if the two were the same or different). This process is referred to as using the auditory feedback loop.

Overall Speech Intelligibility

For most children receiving a cochlear implant, mindful of their age at implantation and/or their prior auditory experience, the cochlear implant offers improved overall speech intelligibility as compared to deaf children using traditional hearing aid technology. Improvements in nasality, relief of vocal strain and greater control of volume are frequent benefits for users with extended periods of deafness once access to all of the sounds of speech is achieved. Enhanced auditory feedback allows cochlear implant users to better monitor the suprasegmental qualities of their own speech. This, in turn, contributes to improved rate of speech as well as more precise word and sentence boundaries. Additionally, once cochlear implant users develop segmental discrimination skills they are able to make use of their auditory feedback loop to compare their speech productions with those of others. This leads to closer approximations of target phonemes. Thus, as a result of the auditory benefits of speech perception afforded by the cochlear implant, children who receive their implants at an early age have the potential to develop speech that parallels that of their hearing age mates.

Related Resources

Caleffe-Schenck, Nancy (2007). *Sound Speech for Speech Sounds*. HOPE Online Library. Available at www.cochlear.com/HOPE.

Chute, P. & Nevins, M.E. (2006). *Clear Speech: The Possible Dream*, in *School Professionals Working with Children with Cochlear Implants*, San Diego: Plural Publishing.

Estabrooks, Warren (1998). *Cochlear Implants for Kids*. Alexander Graham Bell Association for the Deaf, Washington, D.C.

Estabrooks, Warren (1998). *Cochlear Implants for Kids*. Washington, D.C.: AG Bell Publications.

Ling, Daniel (1989) *Foundations of Spoken Language for Hearing Impaired Infants*. Alexander Graham Bell Association for the Deaf, Washington, D.C.

Therres, MK. (2007) *Learning to Listen: Starting to Speak*. HOPE Online Library. Available at www.cochlear.com/HOPE

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