



Carle Foundation Hospital

Expanding Children's Hearing Opportunities (ECHO)

How does speech develop?

Babies learn to talk by being talked to and by listening to the people around them talk. The first sounds babies make are those often associated with eating, swallowing, breathing or crying. These sounds eventually become more varied and deliberate as the infants begin to experiment with their voice, motivated by listening to their own sounds. With listening experience, babies begin to recognize familiar patterns in the sounds they hear around them, especially the sounds of spoken language directed to them. As they listen to these sounds, they begin to repeat the patterns in their own vocal play.

The first patterns a baby recognizes and begins to use are melody, timing, and duration patterns. These pattern differences can be heard in the coos and gurgles of 2-4 month old infants. Next, a child starts to more intentionally produce vowels or vowel-like sounds. At this point babies will often play contentedly for periods of time, making long sustained squeals and coos. Later, at about 6-8 months, they begin including consonant sounds in vocal play and start to babble (making sounds such as "dadada" or "bababa" or "mabudaguday"). At this point, babies are becoming very familiar with the sounds in their language and how to produce them. They begin to compare their own speech sounds to that of their mothers, fathers, and others around them. They begin to imitate, often quite accurately, the sounds or patterns that they've heard the most frequently. This is when the first words often appear. Usually these first words are sounds previously babbled during vocal play; for example, "mama," "dada," or "baba" (for bottle). This change often occurs when a child is 10-12 months of age.

With increasing practice and listening experience, children continue to improve, develop and refine their speech skills by continually listening to their own speech and comparing it to more adult-like models. This process continues throughout the early childhood years so that by the time children reach 3-4 years of age, their speech is easily understood by most people. Additional speech refinement then occurs into the early elementary school years.

How might hearing loss affect my child's speech development?

Hearing is an integral element of learning to speak. At a simplified level, infants learn speech by listening to and comparing the sounds they make to the sounds they hear the people around them make. Over time, children modify their speech so that



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their sounds become closer and closer to, and then finally match, adult speech. (See also, "How does speech develop?") When children have hearing loss, they miss auditory information needed to carry out this process and develop understandable speech.

Speech is made up of a variety of complex frequencies (or "pitches"). To hear these auditory characteristics of speech, children must be able to hear low pitch sounds, middle pitch sounds and high pitch sounds. If unable to do so, it is likely that they will make errors in their speech production. Because children must be able to hear the sounds of speech to accurately say them, the errors children make can, to some extent, be predicted by what they can hear. If a child hears well in the low and mid-frequency ranges but hears only some high frequency information, his speech will probably have natural melody and pitch patterns. He will also produce most vowel sounds correctly. He may have difficulty though saying some consonant sounds--especially soft, high frequency sounds like "s, f," or "th" (as in "three"). He might also confuse sounds that are similar in how they are produced but differ in where they are made in the mouth (such as "p" versus "t" versus "k"). If a child hears well in the low frequency range but not the mid or high frequencies, he can often match pitch, melody, and timing patterns of speech but would have difficulty producing both vowels and consonant sounds (like being able to match the tune of a song but not being able to sing the words clearly).

Properly fit hearing aids or a cochlear implant can make it possible for children with hearing loss to hear the sounds of speech needed for them to be able to learn how to say the sounds. Consistent use of the hearing aids or cochlear implant along with speech and listening training is usually necessary.

How might hearing loss affect my child's language development?

As with speech development, children rely on hearing and listening to learn language. When children have hearing loss, it can be difficult for them to learn the patterns and rules of spoken language because they don't hear them well or miss them altogether. With mild hearing loss, the children's language skill development may follow expected patterns of development but may occur at a slightly slower rate than for peers who have normal hearing. By the time they are in elementary school though, they have often learned to compensate enough so that their skills are fairly similar to those of their classmates. Differences in pragmatic language skills (social language and play skills) might still be seen however because many of



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these skills are learned by watching and listening to those around us interact. When children have hearing loss--even if it's only mild -- their ability to hear and learn from these interactions is reduced so they may have more difficulty learning the rules of social language than their normally hearing peers do.

When children have moderate to severe hearing loss they often have difficulty learning the shorter or softer sounds in the language. Examples of these kind of elements include articles such as "a, an" or "the," pronouns such as "he, she, me, I," and "you," and word endings such as -ing (e.g., looking), --ed (e.g., "looked"), or 's/-s (e.g., mommy's shoe; shoe versus shoes). With profound hearing loss this is even more the case.

Hearing aids or a cochlear implant can make it possible for children to hear the sounds of speech allowing them to develop spoken language.

This is true even when a child has a severe to profound hearing loss. The earlier in life a child is identified with hearing loss and properly fit with hearing aids or a cochlear implant, the better his or her opportunity is to develop normal or near normal spoken language skills.

Given the difficulty children with severe to profound hearing loss can have in developing language, many parents choose to use a visual mode to help their child learn language. Cued Speech or total communication (TC) are frequently chosen options for this purpose. (See, "What communication options are available for my child?")