

Newborn Hearing Screening



Two to three of every 1,000 children in the United States are born deaf or hard-of-hearing, and more lose their hearing later during childhood.

NIH-supported research suggests that the most intensive period of speech and language development is during the first three years of life — a period when a child's brain is developing and maturing. If a child is not exposed to language during this period due to hearing loss, he or she will have more difficulty developing spoken or signed language, and reading skills. In addition, during the early stages of life, the brain builds the nerve pathways necessary for understanding auditory information. For these reasons, identifying hearing loss as early as possible, by the time a child reaches three months of age, enables parents to pursue treatment options early so that a child can learn to communicate comparably with his or her hearing peers.

Yesterday

- Generally, only babies born with conditions that put them at high risk for hearing loss, such as low birth weight, were screened. This translated to roughly 50 percent of newborns with hearing loss – or 6,000 babies – being sent home each year with undetected hearing loss.
- On average, hearing-impaired children were first identified when they were 2 ½ to 3 years old. Many were not identified until they reached 5 or 6 years of age, long after the critical period for speech and language development had ended.
- Children with hearing loss often fell behind their peers in language, cognitive, and social skills.
- Hearing loss in infancy or childhood often resulted in difficulties later in life, including problems with listening and speaking skills, literacy skills, academic performance, and long-term job opportunities.
- In 1993, NIH held a Consensus Development Conference that, in a landmark move, endorsed the screening of all newborns for hearing loss before the child leaves the hospital. As a result of this

recommendation, an unprecedented state-by-state effort was initiated to promote the mandatory screening of newborns. Bolstering this effort was Congress's passage of the Newborn and Infant Hearing Screening and Intervention Act of 1999, which helps in the coordination and funding of statewide programs.

- In 1997, an NIH-convened expert panel recommended standard screening methods for use in nationwide newborn hearing screening programs – methods routinely used to this day.

Today

- In the year 2000, an NIH-funded study found that children with hearing loss who began receiving treatment at an early age demonstrated language skills that were comparable to their hearing peers, regardless of the degree of hearing loss.
- In a 2001 NIH-funded study, children whose hearing loss was identified by six months of age and who were enrolled in a treatment program scored significantly higher in language skills than children whose hearing loss was identified after six months of age. In addition, a 2006 study revealed that infants who begin remediation for their hearing loss before six months of age experience emotional and social development in parallel with their physical development.
- Researchers estimate that children who receive treatment early in life in the form of a cochlear implant can save \$30,000 to \$200,000 in special education costs by the time they graduate from high school because they are more likely to be placed into mainstream classrooms.
- All states have established Early Hearing Detection and Intervention (EHDI) (<http://www.cdc.gov/ncbddd/hearingloss/ehdi-programs.html>) programs. Of these, forty-three states plus the District of Columbia and Puerto Rico have mandated newborn hearing screening programs.

- Currently, more than 95 percent of all newborns born in the United States are screened for hearing loss shortly after birth.
- Many infants with hearing loss are identified at a few weeks of age, when appropriate treatment programs can optimize their long-term speech and language, cognitive, and social skills. Recent data from the Centers for Disease Control and Prevention (CDC) demonstrate that 77 percent of children confirmed to have a permanent hearing loss were enrolled in intervention programs by six months of age.
- NIH-supported scientists are actively working to understand the genes responsible for hereditary hearing loss. Hereditary or genetic causes account for approximately 50-60 percent of the severe to profound cases of childhood hearing loss. At present, more than 70 genes causing nonsyndromic hereditary hearing loss have been mapped to intervals on particular chromosomes. By studying how these genes function in the normal and hearing-impaired ear, scientists may learn how to prevent or lessen the effects of mutations in these genes.
- NIH-supported scientists identified a genetic mutation that causes Usher syndrome in Ashkenazi Jewish children. Babies with Usher syndrome are born deaf and gradually lose their vision. Scientists can now identify which deaf children possess this mutation so that those who have it can learn alternative ways to communicate before they lose their vision.
- As much as 20 to 30 percent of childhood hearing loss is caused by cytomegalovirus (CMV) infection, a common virus that is passed from a mother to her unborn child. Ninety percent of CMV-infected children show no symptoms at birth. In a large-scale clinical study, NIH-supported scientists are combining screening newborns for CMV infection with newborn hearing screening to improve our ability to detect and predict hearing loss in children.

Tomorrow

- While newborn hearing screening has become the standard of care in the United States, national data suggest that almost half of babies who do not pass their newborn hearing screens are lost to follow-up. EHDI researchers, federal and state program directors,

and policy-makers are actively developing programs to improve the rate and quality of diagnosis and intervention for these children.

- A multisite team of NIDCD-supported scientists is working to understand the capacity of infants and toddlers with hearing loss to develop auditory communication skills and is developing clinical tools to assess auditory capacity in these children.
- Another NIDCD-supported investigative team is studying young children with mild to severe hearing loss to determine the factors supporting the early development of speech, language, cognitive, and psychosocial skills. These factors include community of residence, parenting, and income.

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