



HEARING LOSS IN CHILDREN



WHAT IS HEARING LOSS?



A hearing impairment refers to all degrees of hearing loss. Types of hearing loss are classified by where in the ear the problem occurs and the severity of loss.

Why is it important to have my newborn baby screened for hearing problems?

Children learn how to talk by hearing and imitating the sounds of people around them. If your baby has a hearing problem, the use of a hearing device early on and other communication options can help avoid speech delays and problems. Two to four out of thousand babies born have severe to profound hearing loss. So, every parent and caregiver should be watchful of the signs of hearing loss in his/her child and seek a professional diagnosis. Hearing loss can increase the risk of speech and language developmental delays.

Children who are born with hearing problems can usually be diagnosed with a hearing screening. All babies should have a hearing screening within 1 month after being born. Many hospitals screen newborn babies for hearing problems. If your newborn baby has not had a hearing screening, talk with your doctor.

INDICATORS FOR HEARING LOSS

During pregnancy

- Mother had German measles, a viral infection or flu.
- Mother drank alcoholic beverages.

Newborn (birth to 28 days of age)

- Weighed less than 3.5 pounds at birth.
- Has an unusual appearance of the face or ears.
- Was jaundiced (yellow skin) at birth and had an exchange blood transfusion.
- Was in neonatal intensive care unit (NICU) for more than five days.
- Received an antibiotic medication given through a needle in a vein.
- Had meningitis.
- Failed newborn hearing screening test.

Family

- Has one or more individuals with permanent or progressive hearing loss that was present or developed early in life.

Infant (29 days to 2 years)

- Received an antibiotic medication given through a needle in a vein.
- Had meningitis.
- Has a neurological disorder.
- Had a severe injury with a fracture of the skull with or without bleeding from the ear.
- Has recurring ear infections with fluid in ears for more than three months.

RESPONSE TO THE ENVIRONMENT (SPEECH AND LANGUAGE DEVELOPMENT)

Newborn (Birth to 6 Months)

- Does not startle, move, cry or react in any way to unexpected loud noises.
- Does not awaken to loud noises.
- Does not freely imitate sound.
- Cannot be soothed by voice alone.
- Does not turn his/her head in the direction of your voice.

Young infant (6 months to 12 months)

- Does not point to familiar persons or objects when asked.
- Does not babble, or babbling has stopped.
- By 12 months does not understand simple phrases by listening alone, such as “wave bye-bye,” or “clap hands.”

Infant (3 months to 2 years)

- Does not accurately turn in the direction of a soft voice on the first call.
- Is not alert to environmental sounds.
- Does not respond on first call.
- Does not respond to sounds or does not locate where sound is coming from.
- Does not begin to imitate and use simple words for familiar people and things around the home.
- Does not sound like or use speech like other children of similar age.
- Does not listen to TV at a normal volume.
- Does not show consistent growth in the understanding and the use of words.

WHAT ARE THE SIGNS OF A HEARING PROBLEM IN A YOUNG CHILD?

Signs of hearing loss in very young children may not be easy to notice. Hearing problems may not become obvious until children are 12 to 18 months of age, when they should begin saying their first words. Children who can't hear well often respond to their environment by using their senses of sight and touch, which can hide their hearing problems.

Answer the questions in this article about your child to identify signs of a hearing problem. If you answer "no" to any question, ask your family doctor if your child should be checked for hearing problems.

BIRTH TO 4 MONTHS OF AGE

YES / NO

- Is your baby startled by a sudden loud sound, such as a cough, a shout, a dog bark or a hand-clap? _____
- When sleeping in a quiet room, does your baby move or wake up at the sound of voices or nearby noises? _____
- When your baby is crying or fretful, does he or she seem to calm down, even for a few seconds, when you speak while out of his or her sight, when music starts or when there is a sudden loud noise? _____
- At 3 to 4 months of age, does your baby sometimes turn his or her head or move his or her eyes toward a sound? _____
- Does your baby seem to recognize his or her mother's voice better than other voices? _____

4 TO 8 MONTHS OF AGE

YES / NO

- Does your baby turn his or her head and eyes toward a sound when the sound is coming from outside your baby's peripheral (side) vision? _____
- In a quiet setting, does your baby's expression change or do your baby's eyes widen at the sound of a voice or a loud noise? _____
- Does your baby enjoy ringing bells, squeezing noisemakers or shaking a rattle? _____
- By 6 months of age, does your baby seem to talk or babble back to people who are speaking or making noises? _____
- By 6 months of age, does your baby's babbling include 4 different sounds? _____

8 TO 12 MONTHS OF AGE

YES / NO

- Does your baby turn directly and quickly toward a soft noisemaker, to the calling of his or her name, or to a shush that is outside his or her peripheral (side) vision? _____
- Does your baby's voice go up and down in pitch when he or she is babbling? _____
- Does your baby make several different consonant sounds (such as m, b, p, g) when he or she is babbling? _____
- Does your baby seem to enjoy music and respond to it by listening, bouncing or singing along? _____
- Does your baby understand the command? _____

If you have checked one or more of these indicators, your child might have hearing loss and you should take him or her for an ear examination and a hearing test. This can be done at any age, as early as just after birth.

If you did not check any of these factors but you suspect that your child is not hearing normally, even if your child's doctor is not concerned, have your child's hearing tested by an audiologist and when appropriate, have his or her speech evaluated by a speech and language pathologist. The test will not hurt your child.



DOES MY BABY HAVE HEARING LOSS?

Parents and grandparents are usually the first to discover hearing loss in a baby, because they spend the most time with them.

If at any time you suspect your baby has a hearing loss, discuss it with your doctor. He or she may recommend evaluation by an otolaryngologist-head and neck surgeon (ear, nose and throat specialist).

Hearing loss can be temporary, caused by earwax or middle ear infections. Many children with temporary hearing loss can have their hearing restored through medical treatment or minor surgery.

However, some children have sensorineural hearing loss (sometimes called nerve deafness), which is permanent. Most of these children have some usable hearing, and children as young as three months of age can be fitted with hearing aids. Early diagnosis, early fitting of hearing or other prosthetic aids, and an early start on special education programs can help maximize a child's existing hearing. This means your child will get a head start on speech and language development.

WHAT ARE THE TYPES OF HEARING LOSS?

1. Conductive hearing loss

- A conductive hearing loss results when something interferes with sound waves traveling through the outer and middle parts of the ear. Causes of conductive hearing loss include:
- Complete blockage in the outer ear by wax or infection in the middle ear (otitis media)
- Damage to the tiny bones in the middle ear.

2. Sensorineural hearing loss

- A sensorineural hearing loss results from a problem in the innermost part of the ear or in the auditory nerve (the term auditory refers to hearing). Causes of sensorineural hearing loss include:
- Abnormal development of the inner part of the ear and other genetic conditions
- Diseases, such as meningitis and rubella
- Tumors
- Physical injury to the inner ear.

Sensorineural hearing losses are permanent. Sometimes the problem with the inner ear also causes problems with balance. Children with both hearing and balance problems may have mild delays in the development of their motor skills.

3. Mixed hearing loss

- A child may have both a sensorineural hearing loss and a conductive hearing loss. This type of hearing loss is called a mixed loss.

WHAT ARE THE LEVELS OF SEVERITY?

Hearing losses are also classified by their severity: mild, moderate, severe, and profound. The level of severity is determined by the loudness of sound that a child can hear without a hearing aid. The loudness of sound is measured in decibels (dB).

- **Mild:** Children with mild hearing losses can hear sounds of 20 to 40 dB or louder. They may have trouble hearing faint or distant speech. The most common cause of a mild hearing loss is fluid collection in the middle ear, a conductive hearing loss.
- **Moderate:** Children who have moderate losses of hearing can hear sounds louder than 45 to 60 dB. They need speech to be loud. It is hard for these children to understand speech in group situations.
- **Severe:** Children with severe losses can hear sounds of 65 to 85 dB or louder. They can hear only loud voices one foot or less away, or loud sounds in the environment.
- **Profound:** Children with profound hearing losses may hear loud sounds of 90 dB or more, but they may be more aware of vibrations than sound. The term deaf usually applies to children with profound hearing losses or to children with no hearing at all.

Children with hearing loss that crosses two levels of severity are given the label of both; for example, mild to moderate hearing loss, or moderate to severe.

HOW AND WHEN SHOULD MY CHILD BE TESTED?

Early testing is important in helping a hearing-impaired child adapt to the hearing world. Every child who may have a hearing loss needs thorough testing of his hearing and middle ear function. A child is never too young to have a hearing test.

An audiologist performs hearing tests. He or she is specially trained to recognize and evaluate hearing. If necessary, an audiologist can fit your child with a hearing aid.



TESTS FOR NEWBORNS AND INFANTS UNDER ONE YEAR.

Hearing tests are painless, and they normally take less than half-an-hour.

Newborns are tested with either the otoacoustic emissions (OAE) test or the automated auditory brainstem response (AABR) test. During the OAE test, a microphone is placed in the baby's ear. It sends soft clicking sounds, and a computer then records the inner ear's response to the sounds. In the AABR test the child must wear earphones. Sensors are placed on his/her head to measure brain wave activity in response to the sound.

For infants over six months of age, the diagnostic auditory brainstem response and the visual reinforcement audiometry (VRA) tests are commonly used. The diagnostic auditory brainstem response test is similar to the AABR test, but it provides more information. The VRA test presents a series of sounds through earphones. The child is asked to turn toward the sound, then he/she is rewarded with an entertaining visual image.



TESTS FOR OLDER CHILDREN AND ADULTS

Children between two and four years old are tested through conditioned play audiometry (CPA). The children are asked to perform a simple play activity, such as placing a ring on a peg, when they hear a sound. Older children and adults may be asked to press a button or raise their hand.

All children should have their hearing tested before they start school. This could reveal mild hearing losses that the parent or child cannot detect. Loss of hearing in one ear may also be determined in this way. Such a loss, although not obvious, may affect speech and language.

Hearing loss can even result from earwax or fluid in the ears. Many children with this type of temporary hearing loss can have their hearing restored through medical treatment or minor surgery.

In contrast to temporary hearing loss, some children have nerve deafness, which is permanent. Most of these children have some usable hearing. Few are totally deaf. Early diagnosis, early fitting of hearing aids, and an early start on special educational programs can help maximize the child's existing hearing.

After a hearing loss is diagnosed, health care professionals will try to find out the cause of the hearing loss. They will also look for related problems or disabilities. Additional tests may include blood tests, an EKG, and a CAT scan (a special x-ray) of the middle and inner ear.



Results from these tests help determine the best treatment and educational strategy for your child. Tests can be taken in a special center for assessing disabled children, or by a team of professionals your pediatrician selects. The professionals may include an otolaryngologist (a doctor who specializes in the ear, nose, and throat problems), an ophthalmologist (an eye doctor), a developmental pediatrician, a geneticist, a speech/language pathologist, a psychologist, and a learning specialist.

Hearing-impaired children need regular hearing and ear exams. Typically, audiologists see younger children more frequently than older children because their ear canals are growing and changing shape. Young children may often need new ear molds for holding the hearing aid in place.

Call your child's doctor if there is any sudden change in your child's response to sound, especially from a cold. The change may signal a middle ear problem. A buildup of fluid in the middle ear could worsen your child's hearing loss. Most doctors put ventilating tubes (ear tubes) in children who have a sensorineural hearing loss and fluid in the middle ear. Any additional hearing loss may make a big difference in what a child can hear. A child with ear tubes can continue to use hearing aids.

WHAT IS THE TREATMENT ?

A child's early years are very important for learning and the development of language. Treating hearing impairment early makes a big difference in how well a child functions later in life. The audiologist tries to provide the best use of a child's remaining hearing. She or he designs a treatment plan for your child. This plan consists not only of making sound louder with hearing aids, but also hearing and language training, and parent support and training.

1. HEARING AIDS

Hearing aids do not restore hearing. They are loudspeakers that help get the best sound possible to your child's ear. The aid makes sounds louder, not clearer. It may distort some sounds.

A very important aspect of treatment is teaching your child how to hear better; for example, by ignoring noises in the environment and paying attention to voices. Make sure that you talk to the audiologist about what sounds your child can hear with and without a hearing aid, the effects of noise on your child's hearing, and how to keep the hearing aids in the best working order.

Children of all ages can use hearing aids. The aids even help young infants.

2. COCHLEAR IMPLANTS

The cochlea is the part of the ear that turns the vibrations we call sound into electrical signals. The brain then interprets the signals into meaningful sounds such as speech. Some children with hearing loss may benefit from an electronic device called a cochlear implant (CI).

A CI consists of three parts: a microphone, a microcomputer, and a cochlear electrode. The microphone, worn behind the ear, sends the sound to a microcomputer. The microcomputer is connected to the microphone by a wire and is worn in a pouch attached to the belt. It turns the sound into an electrical code which is sent by radio wave to the cochlear electrode. The wire electrode is surgically implanted through the skull behind the ear into the cochlea. The cochlear implant does not give the child normal hearing. However, the child may be able to interpret the signals produced by the implant after he or she gets used to the signals and what they mean.

Children as young as 12 months may be able to have a cochlear implant. The cost of the implant ranges between 5,00,000 to 20,00,000. The surgery and language training costs another 50,000 to 70,000. There is only a 1% failure rate and a 2% to 3% chance of complications from surgery.

The results of an implant may vary from child to child. Most all children who get an implant have improved hearing and oral language abilities. How much your child improves will depend also on the therapies given after surgery, not only on the type of device that was implanted.

Cochlear implants were once only used in children with profound hearing loss. Now, they are being used for children with less severe hearing loss as well. Your team of doctors and hearing specialists will help you decide if an implant is right for your child. After the implant is put in, your child will need to have intensive language training and will still need the therapies listed below.

3. THERAPIES

Language training programs for hearing-impaired children are offered as early as infancy. Parent-infant programs help parents provide an environment rich in language for their child.

Hearing-impaired children use a variety of ways to communicate. You will need to decide which way works best with your child.

