

HEARING IMPAIRMENT

Hearing loss, also known as hearing impairment, is a partial or total inability to hear. A deaf person has little to no hearing. Hearing loss may occur in one or both ears. In children, hearing problems can affect the ability to learn spoken language and in adults it can create difficulties with social interaction and at work. In some people, particularly older people, hearing loss can result in loneliness. Hearing loss can be temporary or permanent.

You already know that hearing is one of the five senses that allows us to perceive sound. Hearing impairment, or hearing loss, occurs when you lose part or all of your ability to hear. Other terms that are used to refer to hearing impairment are deaf and hard of hearing.

Hearing impairments are classified in terms of the severity and type of hearing impairment. The severity of the hearing impairment is categorized (or levels) based on the minimum sound that can be heard with your better ear. The higher the decibel (dB), the louder the sound.

With mild hearing impairment, the minimum sound that can be heard is between 25 and 40 dB. People at this level cannot hear soft noises and may have trouble following conversations in noisy settings.

With moderate hearing impairment, the minimum sound that can be heard is between 40 and 70 dB. People at this level cannot hear soft or moderately loud noises and may have trouble hearing unless they use a hearing aid.

With severe hearing impairment, the minimum sound that can be heard is between 70 and 95 dB. People at this level are unable to hear most noises and may rely on lip-reading and/or sign language, even with the use of a hearing aid.

With profound hearing impairment, the minimum sound heard is 95 dB and over. People at this level may only hear very loud noises and rely solely on lip-reading and/or sign language. Hearing aids are not effective.

Symptoms

The symptoms of hearing impairment depend on its cause. Some people are born without being able to hear, while others suddenly become deaf due to an accident or illness. For most people, symptoms of deafness progress gradually over time.

Some conditions may have hearing loss as a symptom, such as tinnitus or stroke.

The following signs may indicate a hearing problem in infants:

- Before the age of 4 months, the baby does not turn their head toward a noise.
- By the age of 12 months, the baby still has not uttered a single word.
- The infant does not appear to be startled by a loud noise.
- The infant responds to you when they can see you, but respond far less or do not respond at all when you are out of sight and call out their name.

- The infant only seems to be aware of certain sounds.

Hearing impairment in toddlers and children

These signs might become more evident in slightly older children:

- The child is behind others the same age in oral communication.
- The child keeps saying "What?" or "Pardon?"
- The child talks in a very loud voice, and tends to produce louder-than-normal noises.
- When the child speaks, their utterances are not clear.

Types and Causes

1. Conductive hearing loss is when a hearing impairment is due to problems in the outer ear, middle ear, ear canal, eardrum, or the **ossicles**, which are the tiny bones in the middle ear. When the sound is not being conducted properly through the ear, conductive hearing loss occurs. Most cases of conductive hearing loss can be corrected medically or surgically.

Causes of conductive hearing loss include:

- Fluid in the middle ear as a result of colds
- Otitis media, commonly referred to as ear infection
- Poor Eustachian tube function
- Perforated eardrum
- External otitis, commonly referred to as ear canal infection
- Allergies
- Earwax buildup
- Benign tumors or having a foreign body in the ear
- Structural abnormalities of the outer ear, ear canal, or middle ear
- Foreign object in the ear
- Osteosclerosis (a hereditary disorder in which a bony growth forms around a small bone in the middle ear, preventing it from vibrating when stimulated by sound)

2. Sensorineural hearing loss (SNHL), also referred to as nerve hearing loss, occurs when there is damage to either the auditory nerve or the cochlea, which is the inner ear. The hearing loss in SNHL is permanent, although it may be possible to treat it with hearing aids.

Causes of SNHL include:

- Exposure to excessively loud noise
- Head trauma or sudden air pressure changes (e.g., during airplane descent)
- Illnesses, such as Meniere's disease and meningitis
- Structural abnormality of the inner ear
- Tumors

- Aging
- Medication side effects (e.g., aspirin and Vicodin)
- Autoimmune inner ear disease
- Osteosclerosis, the abnormal growth of the bone that is in the middle ear
- Virus or disease attack

3. When conductive hearing loss and SNHL occur at the same time, it is referred to as **mixed hearing loss**. Mixed hearing loss occurs when there is both damage to the outer or middle ear and damage to the inner ear. Long-term ear infections can damage both the eardrum and the ossicles.

4. Central hearing loss occurs when there are problems within the brain that interfere with the ability to interpret or understand sounds. This is the rarest type of hearing impairment and the hardest to treat.

Causes of central hearing loss include:

- Damage to brainstem structures
- Severe head trauma
- Damage to the auditory nerves or the pathways that lead to them
- Brain tumors

Diagnosis:

Patients who suspect something is wrong with their hearing will initially go and see their doctor.

The doctor will talk to the patient and ask several questions regarding the symptoms, including when they started, whether or not they have gotten worse, and whether the individual is feeling pain alongside the hearing loss.

A physical examination

The doctor will look into the ear using an otoscope. This is an instrument with a light at the end. The following may be detected during the examination:

- a blockage caused by a foreign object
- a collapsed eardrum
- an accumulation of earwax
- an infection in the ear canal
- an infection in the middle ear if a bulge is present in the eardrum.
- cholesteatoma, a skin growth behind the eardrum in the middle ear.
- fluid in the ear canal

- a hole in the eardrum

The doctor will ask questions about the person's experiences with hearing, including:

- Do you often find yourself asking people to repeat what they said?
- Do you find it hard to understand people on the telephone?
- Do you miss the doorbell when it rings? If so, does this happen frequently?
- When you chat with people face-to-face, do you have to focus carefully?
- Has anybody ever mentioned to you that you might have a problem with your hearing?
- Do you find more people mumble today than they used to?
- internal you hear a sound, do you often find it hard to determine where it is coming from?
- When several people are talking, do you find it hard to understand what one of them is telling you?
- Are you often told that the television, radio, or any sound-producing device is too loud?
- Do you find male voices easier to understand than female voices?
- Do you spend most of each day in a noisy environment?
- Have you often found yourself misunderstanding what other people say to you?
- Do you hear rushing, hissing, or ringing sounds?
- Do you avoid group conversations?
- If you answered "yes" to most of the above questions, see a doctor and have your hearing checked.

General screening test

A doctor may ask the patient to cover one ear and describe how well they hear words spoken at different volumes, as well as checking sensitivity to other sounds.

If the doctor suspects a hearing problem, they will probably be referred to either an ear, nose, and throat (ENT) specialist or an audiologist.

Further tests will be carried out, including:

A tuning fork test: This is also known as the Rinne test. A tuning fork is a metal instrument with two prongs that produces a sound when it is struck. Simple tuning fork tests may help the doctor detect whether there is any hearing loss, and where the problem is.

A tuning fork is vibrated and placed against the mastoid bone behind the ear. The patient is asked to indicate when they no longer hear any sound. The fork, which is still vibrating, is then placed 1 to 2 centimeters (cm) from the auditory canal. The patient is asked again whether they can hear the fork.

As air conduction is greater than bone conduction, the patient should be able to hear the vibration. If they cannot hear it at this point, it means that their bone conduction is superior to their air conduction.

This suggests a problem with sound waves getting to the cochlea through the ear canal.

Audiometer test: The patient wears earphones, and sounds are directed into one ear at a time. A range of sounds is presented to the patient at various tones. The patient has to signal each time a sound is heard.

Each tone is presented at various volumes, so that the audiologist can determine at which point the sound at that tone is no longer detected. The same test is carried out with words. The audiologist presents words at various tones and decibel levels to determine where the ability to hear stops.

Bone oscillator test: This is used to find out how well vibrations pass through the ossicles. A bone oscillator is placed against the mastoid. The aim is to gauge the function of the nerve that carries these signals to the brain.

Routine screening of children

The American Academy of Pediatrics (AAP) recommends that children have their hearing tests at the following times:

- when they start school
- at 6, 8, and 10 years of age
- at least once when they are in middle school
- once during high school

Testing newborns

The otoacoustic emissions (OAE) test involves inserting a small probe into the outer ear; it is usually done while the baby is asleep. The probe emits sounds and checks for "echo" sounds bouncing back from the ear.

If there is no echo, the baby might not necessarily have a hearing problem, but doctors will need to carry out further tests to make sure and to find out why.

Treatment:

Help is available for people with all types of hearing loss. Treatment depends on both the cause and severity of the deafness. Sensorineural hearing loss is incurable. When the hair cells in the cochlea are damaged, they cannot be repaired. However, various treatments and strategies can help improve quality of life.

1. Hearing aids

These are wearable devices that assist hearing. There are several types of hearing aid. They come in a range of sizes, circuitries, and levels of power. Hearing aids do not cure deafness but amplify the sound that enters the ear so that the listener can hear more clearly.

Hearing aids consist of a battery, loudspeaker, amplifier, and microphone. Today, they are very small, discreet, and can fit inside the ear. Many modern versions can distinguish background noise from foreground sounds, such as speech.

A hearing aid is not suitable for a person with profound deafness.

The audiologist takes an impression of the ear to make sure the device fits well. It will be adjusted to suit auditory requirements.

2. Cochlear Implant

If the eardrum and middle ear are functioning correctly, a person may benefit from a cochlear implant.

This thin electrode is inserted into the cochlea. It stimulates electricity through a tiny microprocessor placed under the skin behind the ear.

A cochlear implant is inserted to help patients whose hearing impairment is caused by hair cell damage in the cochlea. The implants usually improve speech comprehension. The latest cochlear implants have new technology that helps patients enjoy music, understand speech better even with background noise, and use their processors while they are swimming.

3. Lip reading

Also known as speech reading, lip reading is a method for understanding spoken language by watching the speaker's lip, facial and tongue movements, as well as extrapolating from the data provided by the context and any residual hearing the patient might have.

People who became hearing impaired after they learned to speak can pick up lip reading rapidly; this is not the case for those who are born hearing-impaired.

4. Sign language

This is a language that uses signs made with the hands, facial expressions, and body postures, but no sounds. It is used mainly by those who are deaf. There are several different types of sign languages e.g. British Sign Language (BSL), American Sign Language (ASL) etc.