

HEARING LOSS

WHAT IS HEARING LOSS?

Hearing loss is a reduced ability to detect sounds. Many people try to describe hearing loss as a percentage. This is not the most accurate way to describe it. It is better to describe it by the type and the degree of hearing loss.

Hearing loss can happen when any part of the ear or auditory (hearing) system is not working in the usual way.

WHAT CAUSED MY CHILD'S HEARING LOSS?

Over 50% of infants born with hearing loss have no known risk factors for hearing loss.

Don't Blame Yourself! The cause of your child's hearing loss may never be known.

Some of the risk factors for hearing loss are:

- Family History of hearing loss.
- A syndrome that is known to have hearing loss.
- Craniofacial abnormalities, such as a cleft lip, palate, ear pits, or ear tags.
- Certain infections in the mother during pregnancy such as CMV (cytomegalovirus), toxoplasmosis, herpes, and rubella.
- Complications during birth such as prematurity or lack of oxygen.
- Admission to a neonatal intensive care unit for more than 5 days.
- Certain infections such as bacterial meningitis, mumps, measles or whooping cough.
- Recurrent ear infections.
- Very loud noise such as fireworks, loud music, or gun fire.
- Trauma, such as head injury.

These are some of the most common risk factors of hearing loss. Your audiologist or doctor can give you more information about other risk factors and causes of hearing loss.

TYPES OF HEARING LOSS

- **Conductive Hearing Loss-** Hearing loss caused by something that blocks sounds from getting through the outer or middle ear and being “conducted” to the inner ear. Some causes of conductive hearing loss include impacted wax, perforation (hole) in the eardrum, or middle ear fluid and/or infection. This type of hearing loss can sometimes be treated with medicine or surgery.

- **Conductive Permanent Hearing Loss –** Hearing loss caused by malformation of the outer ear, ear canal, or middle ear structures. This type of hearing loss can sometimes be corrected by surgery

- **Sensorineural Hearing Loss-** Hearing loss that occurs when there is a problem in the way the inner ear or hearing nerve works. Some causes of sensorineural hearing loss are hair cell damage or malformation of the cochlea. Sensorineural losses are generally perceived as a loss of clarity of sound, but not necessarily a decrease in loudness, and are more likely to be permanent.

- **Mixed Hearing Loss**- Hearing loss that includes both a conductive and a sensorineural hearing loss. An example of a mixed hearing loss is a child with permanent sensorineural loss and a temporary conductive loss due to middle ear fluid.

- **Auditory Neuropathy Spectrum Disorder** - Hearing loss that occurs when sound travels through the ear normally up to the cochlea, but doesn't reach the brain as an understandable input.

HEARING LOSS CAN ALSO BE DESCRIBED AS:

- **Unilateral or Bilateral**- Hearing loss is in one ear (unilateral) or both ears (bilateral).

- **Pre-lingual or Post-lingual**- Hearing loss happened before a person learned to talk (pre-lingual) or after a person learned to talk (post-lingual)

- **Symmetrical or Asymmetrical**- Hearing loss is the same in both ears (symmetrical) or is different in each ear (asymmetrical).

- **Progressive or Sudden**- Hearing loss worsens over time (progressive) or happens quickly (sudden).

- **Fluctuating or Stable**- Hearing loss gets either better or worse over time (fluctuating) or stays the same over time (stable).

- **Congenital or Acquired/Delayed Onset**- Hearing loss is present at birth (congenital) or appears sometime later in life (acquired or delayed onset).

TERMS USED TO DESCRIBE PEOPLE WITH HEARING LOSS:

- **hearing impaired** is used for a child with any degree of hearing loss. (Many people don't like this term and prefer to use the term *hard of hearing*.)

- **hard of hearing** is used if a child has a mild to severe degree of hearing loss.

- **deaf**, when spelled with a little or lower-case **d**, means "audiologically deaf." This term is used to describe a profound or severe to profound degree of hearing loss.

- **Deaf**, spelled with a capital or upper case **D**, is used by the Deaf Community to mean "culturally Deaf." A person can have *any* degree of hearing loss to be a member of the Deaf Community. Members of the Deaf Community communicate using sign language and have a culture that they identify as their own.

DEGREE OF HEARING LOSS

Degree of Loss	What it Means	Without Amplification and EI	With Amplification and Early Intervention
Mild	The softest sounds a child hears are at levels of 25 dB-40 dB. Softer sounds than these are not detected.	<ul style="list-style-type: none"> *Soft sounds such as a faucet dripping, birds chirping, and some speech sounds may not be heard. *Sounds that are moderately loud to a normal hearing person, such as speech, will be soft. 	<ul style="list-style-type: none"> *A child will have trouble hearing faint or distant speech and may have trouble hearing in a noisy environment. *A child may be able to recognize and understand soft sounds of speech and the world around them.
Moderate	The softest sounds a child hears are at levels of 40 dB - 65 dB. Softer sounds than these are not detected.	<ul style="list-style-type: none"> *Most speech sounds, and louder sounds such as a clock ticking, or a vacuum cleaner may not be heard. *A child may have limitations in vocabulary, language comprehension and language usage. 	<ul style="list-style-type: none"> *A child may have errors in his speech. *A child may be able to recognize and understand soft sounds of speech and world around them. *A child may be able to develop age-appropriate vocabulary, language comprehension and language usage.
Severe	The softest sounds a child hears are at levels of 65 dB – 90 dB. Softer sounds than these are not detected.	<ul style="list-style-type: none"> *Most speech sounds will not be understood, and other loud sounds such as a phone ringing or a dog barking may not be heard. *Spoken language comprehension and speech will not develop spontaneously. *A child with severe hearing loss will have mostly unintelligible speech. 	<ul style="list-style-type: none"> *A child may be able to detect and understand most sounds. *A child may be able to learn to understand and use spoken conversation, even though they will not hear speech the way normally hearing people do. *A child may need special accommodations, especially in school, to compensate for the challenges that distance and background noise present.
Profound	The softest sounds a child hears are at levels of 90 dB or more. Softer sounds than these are not detected.	<ul style="list-style-type: none"> *Very loud sounds such as an airplane flying overhead or a lawnmower will not be detected. *A child will rely on vision rather than hearing for primary communication. *A child will have unintelligible speech. 	<p><i>With Visual Language Only:</i></p> <ul style="list-style-type: none"> *Most children will need special accommodations to communicate visually. <p><i>With Hearing Aids Only:</i></p> <ul style="list-style-type: none"> *Many children still need visual communication to assist them in understanding spoken conversation. * Many children can detect moderately loud sounds and spoken conversation under ideal listening conditions (no background noise and facing the speaker). <p><i>With Cochlear Implants:</i></p> <ul style="list-style-type: none"> *Most children can detect sounds within the “mild hearing loss” range (see <i>Mild</i> in this table).

TYPES OF HEARING TESTS

If a child does not pass a hearing screening an audiologist may do diagnostic testing to find out more specific information about:

- If the child has a hearing loss
- Whether the loss is medically treatable
- Degree or amount and type of hearing loss

Different hearing tests may be done depending on the age of the child and the information the audiologist is looking for. The following is a description of different tests and the ages of children they work best with.

OTOACOUSTIC EMISSIONS TESTING (OAE, DPOAE, TEOAE)

How it is done: A small earphone is placed in the ear canal and sound is sent to the eardrum. When the inner ear hears the sound, an echo is sent back. A microphone in the earphone listens for the echo. A strong echo means the ear is working normally.

What it will show: Along with other diagnostic tests, the OAE can find a hearing loss that is greater than a mild loss that occurs in the inner ear. However, wax in the ear, a noisy test environment or fluid in the middle ear can cause an absent response to this test.

Who is it for: It is used for children of all ages.

AUDITORY BRAINSTEM RESPONSE (BSER, BAER, ABR)

How it is done: This is a more thorough test than the OAE described above because it tests both the ear and the brain's response to sound. This test must be done if the child is either asleep or sedated. Electrodes are attached to the child's head and tiny earphones are placed over or in the child's ears. Sounds are given through the earpiece and the electrodes measure how the child's brain responds. The audiologist will compare your child's hearing response to information gathered on infants and children with normal hearing. This test gathers specific information about the child's

hearing at different pitches and loudness levels.

What it will show: This test gives an approximation of the amount of hearing. If there is a loss, the type of hearing loss can be found.

Who it is for: This test is typically used for infants up to 6 months of age and for children who cannot respond to other types of hearing tests.

VISUAL REINFORCEMENT AUDIOMETRY (VRA)

How it is done: The child will sit either in a chair or on the lap of an adult in the sound booth. A toy that is of interest to the child is near the speaker where the sound will come from. When sound is introduced, the toy will light up. Children will learn to look at the toy in response to the sound. Children naturally turn to the sound source and this process uses that tendency. Earphones may or may not be used for this test.

What it will show: This test will give information about how your child hears different pitches at different loudness levels. Earphones are used to collect individual ear information. If earphones are not used, the information will reflect the better ear.

Who it is for: This test is used for children of about 6 months to about 2 years of age.

PLAY AUDIOMETRY

How it is done: Children learn to drop a block or perform some other tasks when they hear a sound. The child is rewarded for a correct response. Some listening activities may include stringing beads, building block towers, putting pegs in a peg board, putting pennies in a bank, or doing a puzzle. Earphones may or may not be used with this test.

What it will show: This test will give information about how your child hears different pitches at different loudness levels. Earphones are used to collect individual ear information. If earphones are not used, the information will reflect the better ear.

Who it is for: This test is used with children older than 17 months.

PURE TONE AUDIOMETRY

How it is done: Tones of different pitch and loudness levels are introduced to your child. Your child will indicate if they have heard the tone, usually by raising their hand. The tones are presented either through earphones or through a vibrator placed behind the ear.

What it will show: This test will give information about how your child hears different pitches at different loudness levels. Earphones are used to collect individual ear information. If earphones are not used, the information will reflect the better ear.

Who it is for: This test is used with children older than 48 months.

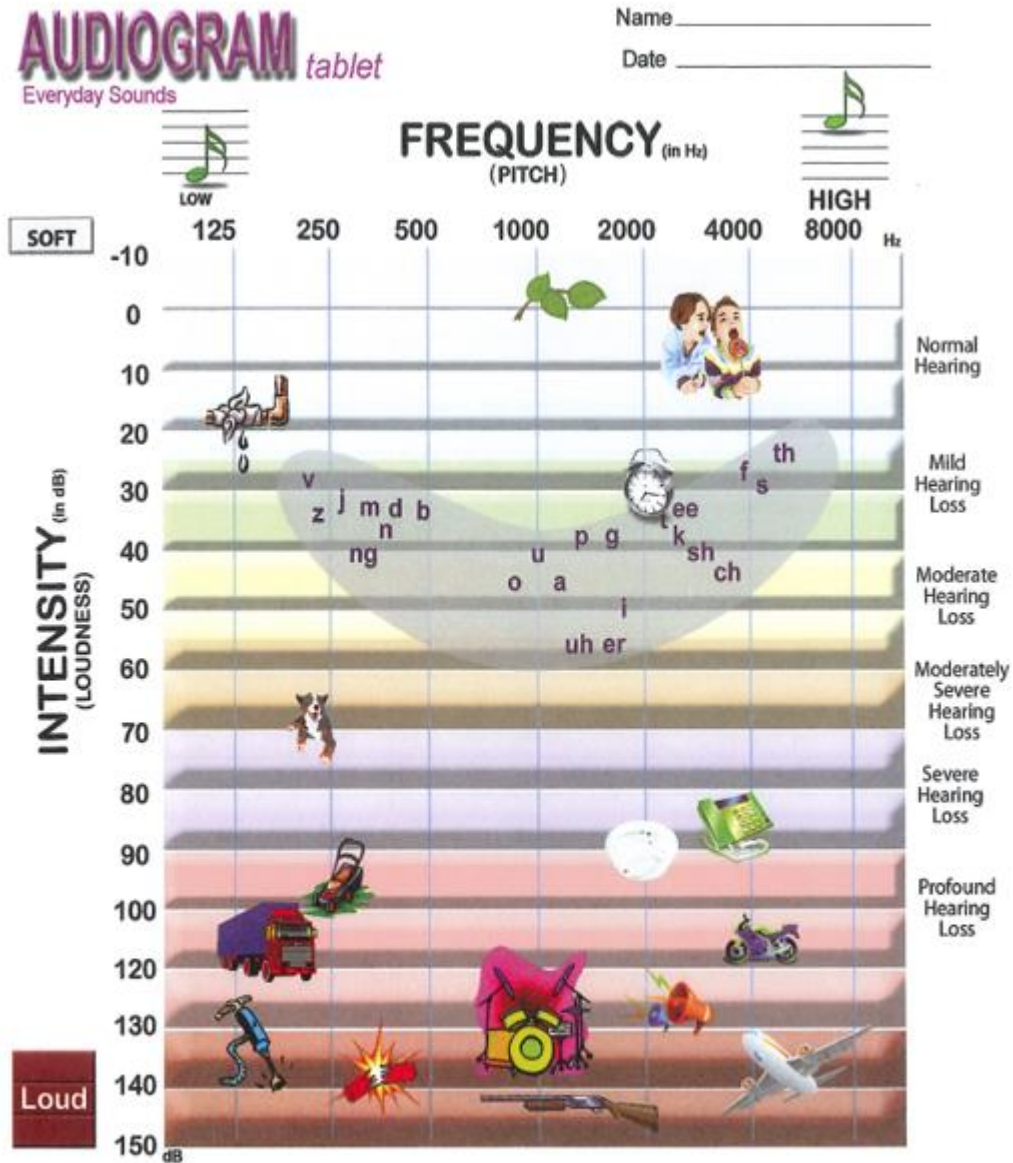
TYMPANOMETRY/ACOUSTIC REFLEXES

How it is done: A probe is placed in your child's ear and a signal presented. The signal can be a sound or change in pressure depending on what information the audiologist is trying to gather. The signal bounces off the eardrum and back to the probe. It only takes between 3-30 seconds per ear.

What it will show: Tympanometry will chart the way the eardrum is moving which shows how the middle ear is functioning. It determines if there is fluid in the middle ear or if the middle ear bones are working properly. It can determine if there is a hole in the eardrum or if the child's tubes are open. Acoustic reflex measure how loud the sound must be to cause the middle ear muscles to contract. Individuals with severe to profound hearing losses do not have these reflexes.

Who it is for: This test is used for any child where a middle ear problem is suspected.

WHAT IS AN AUDIOGRAM?



Exposure to sounds that are too loud and for too long may cause permanent hearing loss.

90 dBA	110 dBA	120 dBA	140 dBA
hair dryer	chain saw	pig squeal	gun
lawnmower	leaf blower	ambulance	balloon pop
table saw	car horn	jack hammer	firecracker

Hearing Screening tests at levels where we hear speech -If baby cannot hear at these levels then they will not be able to produce speech

Hearing Screening is the *Only* way to determine if a baby hears at the levels speech and language is produced.

An audiogram is a graph of the softest sounds your child hears. A few tips will help you understand the graph:

Across the top of the graph are the frequencies, or pitches.

- The frequencies are organized like a piano keyboard. The low tones are on the left and the high tones are on the right.
- An example of a low pitch is a drum and an example of a high pitch is a bird chirp.
- These pitches or frequencies are measured in Hertz (Hz).

Down the side of the graph is the intensity, or loudness of sounds.

- The sounds at the top of the graph are soft.
- The sounds at the bottom of the graph are loud.
- Loudness is measured in decibels (dB).

The marks on your child's audiogram represent the softest sounds your child responded to during the hearing test.

If your child wore earphones during the test, you will find **X**'s and **O**'s on the graph.

X = left ear

O = right ear

If your child didn't wear earphones during the test, you will find **S**'s on the audiogram.

S = speakers. When using speakers, only your child's better ear is tested.

If bone conduction testing was performed, you will see [,], < or > on the audiogram.

WHAT DOES AN AUDIOGRAM TELL ME?

Your audiologist will be able to explain your child's audiogram in full detail. Your child's audiogram can answer these questions:

- Is the hearing the same in both ears or is it different?
- How much hearing loss does your child have? (degree of hearing loss)
- Is there more hearing loss in some frequencies (pitches) than others?
- Is there a difference in air conduction and bone conduction hearing? (air-bone gap)