

HEARING LOSS

*“If you want to lift yourself up,
lift up someone else ...”*

— Booker T. Washington



Introduction

More than 28 million Americans are deaf or hard of hearing, and thirty million more are exposed to dangerous levels of noise. Levels of hearing loss range from a mild but important loss, to a total loss of hearing or deafness. The most common cause of hearing loss in infants/children is otitis media, a middle ear infection that is found mostly in infants and young children. A large number of hearing impairments, or damage, is caused by factors in people's surroundings such as noise, drugs, and poisons. Many acquired sensorineural hearing losses, hearing loss caused by damage that occurs in the inner ear and/or nerve pathway to the brain, are also caused by a genetic history for hearing loss. (For more information, see the Genetic Counseling section). Important progress has been made in the last ten years towards understanding hereditary factors connected with the auditory (hearing) system.

It is important to remember when dealing with your deaf or hard of hearing infant/child, that hearing and listening are not the same. Parents often say to their infants/children "Listen to what I say" but not "Hear what I say." Hearing is a part of what the ears do. With listening, your infant/child has to focus and deal with the sound or speech that he/she hears. Then your infant/child must form a message from this. An infant/child's hearing may be normal but he/she may not know how to listen. If you have seen an audiologist (hearing loss specialist), you already know about your infant/child's hearing. The next step is to help your child find the power and fun of listening.



Fact Sheet

Hearing loss is the most common birth defect in newborns in America, and yet not all newborns are routinely tested for it.

- Approximately 1 out of 1,000 infants are born completely deaf, and another 2-3 out of 1,000 infants are born with some degree of hearing loss.
- The cost of educating a child with a hearing loss through high school today is over \$420,000.
- The combined expenses of deaf education and loss of productivity result in an average lifetime cost of over \$1 million per deaf individual.
- According to the American Academy of Pediatrics (AAP), infants/children that are found to have hearing loss, and receive early intervention (treatment) by six months of age will do much better with speech and language development/growth than infants/children found with hearing loss after six months of age.

Frequently Asked Questions

Are there many infants/children with hearing loss or am I all alone in this?

You are not alone. There are many infants/children with hearing loss and many who are deaf. Actually, approximately one child out of a thousand is born deaf. And nine out of ten of these children have parents who hear. Only about 1 out of 10 have parents who are deaf themselves.

Are there different types and degrees of hearing loss and does that make a difference?

Yes, there are several different types of hearing loss:

1. Conductive
2. Sensorineural
3. Mixed
4. Central

There are also different degrees of hearing loss:

1. Mild
2. Moderate
3. Severe
4. Profound
5. Total

Sensorineural hearing loss is permanent and is the result of something affecting the inner ear, or the nerve that deals with hearing called the auditory nerve. There are many different causes of sensorineural hearing loss, including congenital infections, medications, noise, and genetics. Congenital hearing loss is present in three to four out of every 1000 newborns and is detectable at birth through universal newborn hearing screening. Sensorineural hearing loss can also develop later in life for various reasons, one of which is excessive exposure to loud noise.

Conductive hearing loss is the result of something affecting the outer or middle ear, such as ear infections associated with fluid in the middle ear space. Middle ear infections are the second-most common reason children see doctors. Any time children have middle ear infections with fluid in their ears, they may

have an accompanying hearing loss. Other common causes of conductive hearing loss include excess wax, foreign bodies, swelling of the auditory (hearing) canal, or ear canals, eardrums, or middle ear bones that did not form correctly. In most cases, conductive hearing losses can be treated either medically or surgically, and are not permanent.

Mixed hearing losses are combinations of sensorineural and conductive hearing losses.

How common is hearing loss?

Hearing loss in young children is more common than you may think. About three to four out of every 1,000 infants born have some type of hearing loss. In fact, hearing loss is more common than all of the other illnesses (for example PKU, sickle cell anemia) for which all infants must be tested by law in the hospital.

Why did this happen to my infant/child?

In some cases, the cause of an infant/child's hearing loss may be easy to find. For example, there may be a family history of deafness, a congenital condition (present at birth), an illness, a syndrome, an accident, and/or a prescribed medication that may obviously be the cause of the hearing loss. In other cases however, there may be no obvious reason for the hearing loss, and you may never know the cause of your infant/child's hearing loss.

What does my infant/child's hearing loss mean?

Because there are many different kinds of hearing loss, it may mean different things for different infants/children. Hearing loss can be a temporary (passing) sound transfer problem caused by a blockage in the outer or middle ear (for example, middle ear fluid), or it can be permanent sensory damage (nerve damage that will not go away). A hearing loss may even be a combination of both of these things. How your infant/child's hearing loss will affect his/her language development/growth depends on many things. If the hearing loss can be fixed (for example, middle ear fluid), quick medical treatment is most impor-

tant. If the hearing loss is permanent (will not go away), the sooner the loss can be found and intervention (treatment and/or therapy) started, the better the chance for your infant/child's language development/growth. In all instances, active involvement of you as parents and other caregivers in early intervention is an important part of your infant/child's development/growth.

Will my infant/child's hearing get better?

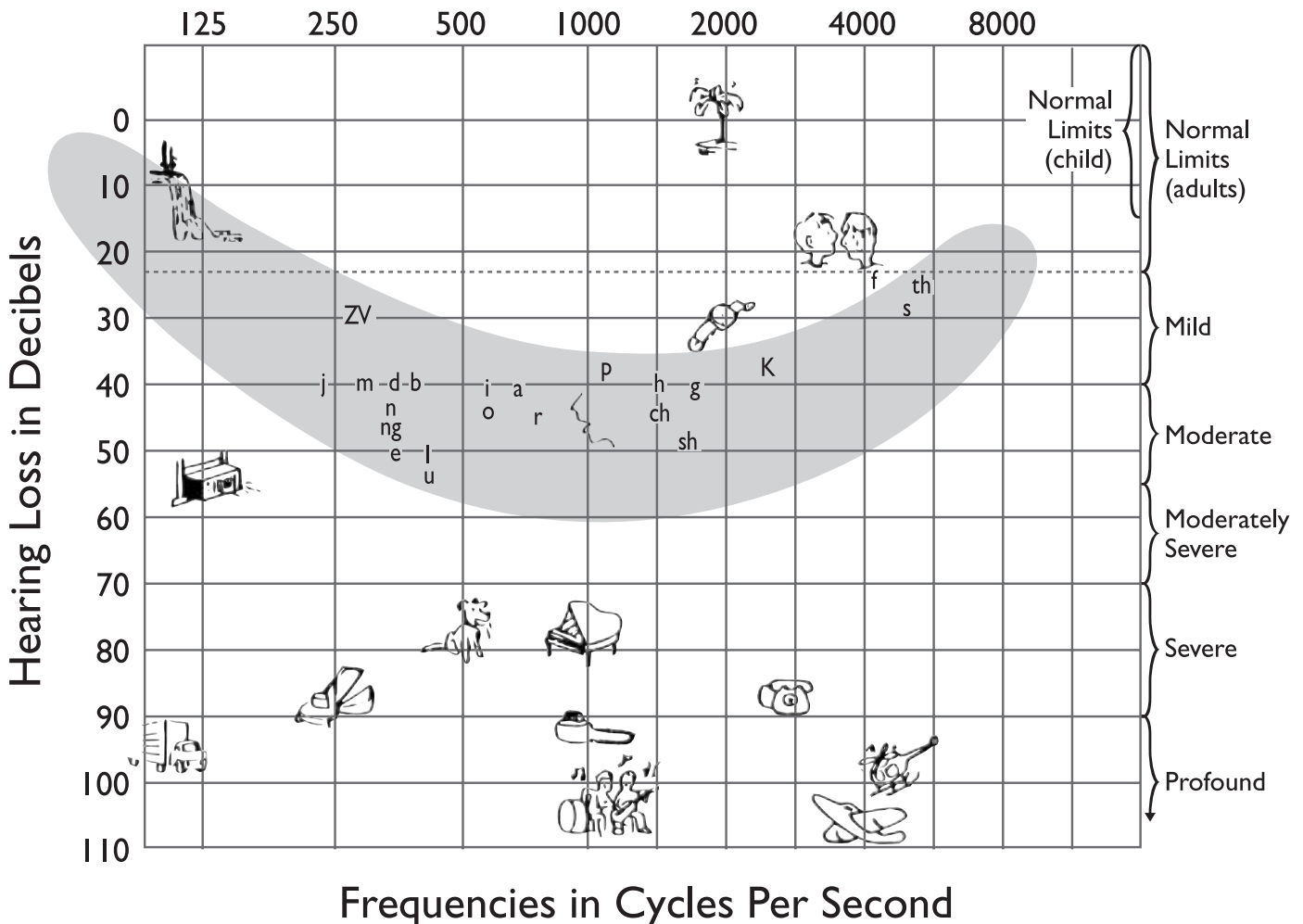
Whether or not your infant/child's hearing gets better depends on the cause of the hearing loss. If the loss is because of a medical problem, such as middle ear fluid, it may improve and may fluctuate (come

and go) with the reoccurrence (repeat) of the problem. If the loss is due to sensory or nerve damage, it will not improve.

What should I do if I think that my infant/child has a hearing problem?

Get in touch with your infant/child's doctor, let him/her know about your concern, and make plans to have your infant/child's hearing tested. This testing should be done as soon as possible and when your infant/child does not have a cold or an ear infection. Do not wait several months because finding your infant/child's hearing loss early is very important.

Comparison of the Frequency and Intensity of Various Environmental and Speech Sounds



These degrees of loss show the results of measurement of unaided hearing, or testing without a hearing aid.

DEGREE OF LOSS	DECIBELS	POTENTIAL EFFECTS
Minimal Hearing Loss	16-25dB	A minimal loss of some sounds. May have difficulty hearing quiet or distant speech especially in noisy environments.
Mild Hearing Loss	26-40DB	Can hear most speech sounds but likely to miss fragments of words, especially those that contain “s”, “f”, and “th”. With proper amplification, likely to understand all spoken communication especially at close distances.
Moderate Hearing Loss	41-55DB	Without amplification, 50-100% of speech sounds may be missed which may effect speech development unless optimally amplified. Proper amplification should enable listener to hear and discriminate all sounds.
Moderately Severe	56-70dB	Conversation cannot be understood, unless the intensity is very loud. Age of amplification, consistency of use, and intervention will determine speech intelligibility and/or language development.
Severe Hearing Loss	71-90dB	Without amplification, may be aware of loud voices near ear. Spoken language will not develop spontaneously unless modifications and interventions are taken. Without optimal amplification, should be able to detect all the sounds of speech and identify environmental sounds.
Profound Hearing Loss	91dB or greater	Aware of vibrations more than tonal pattern. May rely on vision rather than hearing as the primary avenue for communication and learning. Speech and oral language will not develop spontaneously without amplification and intervention. Speech intelligibility often greatly reduced and atonal voice quality likely.

The audiologist, and other professionals will be able to give you more information on types and degrees of hearing loss.

What can parents do to help with speech and language development/growth in their infants/children with hearing loss?

- Make sure your infant/child wears his/her hearing aid/s as directed by the audiologist.
- Speak to your infant/child often, including talks about everyday events and routines.
- Speak at normal levels, using natural gestures, and body language.
- Speak clearly.
- Say key words several times, giving your infant/child extra chances to listen to the words.
- Praise your infant/child after using his/her voice.
- Include song and variety in your voice to highlight key words, or to add meaning to the sentence.
- Give your infant/child time to respond.
- Encourage your child to be an active reader by reading to him/her books that he/she knows rhyming words, and/or words that are said over and over.
- Form schedules for daily activities. Talk about the activity using familiar words and language.
- Read stories together. Infants/children like to hear the same story over and over. After having heard a story often enough, your infant/child can start taking part by remembering and repeating words and sounds connected with that page.
- Sing songs together. Infants/children learn from hearing, rhyming, and saying things over and over.
- Say nursery rhymes.
- Form an experience/events book. Take a regular notebook or journal, and glue pictures of the people and happenings filling your infant/child's life (for example, photos of grandparents). Sit with your infant/child and talk about the book together. Play games with your infant/child like "pattycake" and "peek-a-boo".
- Build from what your infant/child knows to what he/she does not know. For example, if your infant/child knows the word "shoe," start talking about sneakers, boots, and slippers. Slowly your infant/child will understand that sneakers, boots, and slippers are all kinds of shoes.

Why is finding hearing loss in children early (early detection) so important?

Hearing is necessary for speech and language development (growth). The sooner a hearing loss is discovered, the sooner your infant/child can be

treated and the better language and speech he/she will develop.

Do my baby's ears hurt?

If an infant/child pulls his/her ear(s) often, it may be because of uncomfortable pressure or actual pain in the ear(s). The following things may mean your infant/child has an ear infection:

1. If your infant/child cries often
2. If your infant/child does not want to eat
3. If your infant/child has a fever

If your baby is suffering from any of these things, contact your healthcare provider as soon as possible.

How is hearing loss treated?

If there is some hearing, sounds can be increased by a hearing aid(s). If the loss is severe, children may also be taught other forms of communication such as sign language or lip reading. Speech and hearing therapists can teach you how to best communicate with your infant/child. An audiologist must first figure out where the hearing problem is (outer, middle, or inner ear) before deciding on the best treatment (for example, the use of hearing aids, seeing a doctor for more treatment).

Where can I get my infant/child's hearing checked?

If your infant/child was not screened at the hospital at birth, go to a licensed pediatric audiologist (a hearing loss professional who works with infants and children). Your healthcare provider can provide you with a list.

My infant/child has a hearing loss. Is there a way for me to hear a sample of speech the way he/she hears it?

The Alaska Early Hearing Detection and Intervention (EHDI) program offers a compact disc (CD) that can show different levels and kinds of hearing loss. It will help you understand what your infant/child hears, even though it won't be exactly what he/she is hearing. Contact the Department of Health & Social Services, Division of Public Health, Section of Maternal, Child & Family Health at (907) 269-3400 for more information.

Will my grandchildren also have a hearing loss?

If your infant/child's hearing loss is due to middle ear problems, the answer is probably not. If there is a family history of hearing loss however, genetics may be a factor, and an appointment with a genetics counselor is important. Contact your health care provider or the genetics clinic for more information. (To contact the Genetics Clinic call State of Alaska, Department of Health & Social Services, Division of Public Health, Section of Maternal, Child, & Family Health at (907) 269-3400.)

Can loud noises hurt infants/children's hearing?

Yes. It is important to protect whatever hearing an infant/child has. Very loud noises can damage your infant/child's hearing, and can do so permanently (forever). Keep your infant/child away from very loud headphones, rock concerts, video arcades, and other loud noises if possible. If you cannot keep your infant/child away from the loud noises, protective earplugs should be worn every time your child is around these noises. The number of people with hearing loss caused by loud noises is growing in this country. It is more important than ever to stay away from these loud noises, or using earplugs if staying away cannot be done.

What are "risk factors"?

A risk factor is a medical condition or event that is known to be connected with hearing loss. Just because your son/daughter has a risk factor does not mean that a hearing loss will definitely happen. A risk factor means that hearing loss happened in a very high number of children with one or more of the conditions that are risk factors. The list of hearing loss risk factors includes the following:

- Family history of childhood hearing loss
- Infection during pregnancy (rubella, cytomegalovirus/CMV, syphilis, herpes, or toxoplasmosis)
- Birth defects of the head and neck (for example, malformed outer ear)
- Low birth weight (under 3.3 pounds)
- Yellowing of the skin at birth (Jaundice, Hyperbilirubinemia)
- Bacterial meningitis (illness)
- Medications for the ear (Ototoxic)
- If an infant/child is on a respirator for more than five days (Mechanical ventilation)

- Apgar scores of 0 to 4 at one minute or 0 to 6 at five minutes. (This score is given at the time of birth to figure out the newborn's condition. The score comes from evaluating the newborn's heart rate, respiratory/breathing effort, muscle tone, reflex irritability, and color. A score of 0 -2 is related on each of the five items, the highest possible score being 10.)

Finally, a hearing loss may have no known cause. Nearly half of all infants with hearing loss have no known risk factors to explain their hearing loss.

Can my infant/child's hearing loss be corrected?

Hearing loss that is caused by a disorder in the middle or outer ear (conductive) can usually be corrected with medical treatment such as antibiotics or minor surgery. Hearing loss that happens because the auditory nerve (hearing part of the inner ear) is not working correctly (sensorineural hearing loss) cannot be corrected, but can usually be improved with the use of hearing aids or a cochlear implant. With a mixed hearing loss (combination of the hearing losses above), the conductive part of it may be managed with medical treatment, but the sensorineural part will not go away. (For more information, see the Terminology section.)

How can my infant/child have a hearing loss when the newborn hearing screening was passed?

Some hearing losses are congenital, which means they happen before or during birth. Other hearing losses are acquired, which means they happen after birth. Hearing losses that take place after birth can be because of:

1. Meningitis (illness)
2. Use of ototoxic antibiotics (medicine) during the hospital stay
3. Some genetic losses that are described by progressive hearing loss (hearing loss that gets worse as an infant/child gets older), and may not be picked up until later. In some cases, the effects of certain illnesses or antibiotics may not show until months later. If your infant/child had any of the risk factors, listed above, his/her hearing should be checked regularly even if the screening at birth did not show there was a hearing loss.

What is genetic counseling and why should I have it done?

According to the Joint Committee on Infant Hearing, the families of all infants/children with hearing loss for whom there is not a clear-cut cause should be given the option of genetic evaluation or review and counseling by a medical geneticist. Many people think that the main reason for such genetic evaluation and counseling is so the family can know about their chances of having other infants/children with hearing loss. Actually, the genetic evaluation shows much more important information that can be very important on how your infant/child is treated. For example, sometimes through a genetic evaluation a certain cause of an infant/child's hearing loss can be found. If this is the case, sometimes they can tell whether an infant/child's hearing loss will become worse. Also, for a large number of infants/children, deafness is only one of many medical problems the infant/child may have, and genetic testing may tell whether the infant/child is likely to have other problems with the heart, kidneys, or eyes.

What will my son or daughter who is deaf or hard of hearing be when he/she grows up?

No one can tell how a child will progress; each is unique. Most importantly is to focus on being with your infant/child NOW. Love, share, and learn to communicate and enjoy each other. Comfort can also be found with the knowledge that deaf and hard of hearing people are everywhere and doing nearly everything.

The range of individual differences among hearing people is also among deaf and hard of hearing people. For example, some earn PhD's, while others do not complete high school, some marry deaf partners and others marry hearing partners, and some have children while others do not.

The important thing now though, is to work with others to help your infant/child to learn language as fast as possible. All children, whether deaf, hearing impaired, or hearing, improve their academic and social development (growth) as they gain good communication skills. (For more information about how to help your infant/child, see the Parents and Advocacy sections).

“Here is my advice to you parents with deaf children. It is important for you to learn how to communicate with them and how to make them happy, not feel lonely. Just make them feel as they are a part of the family. Once in awhile they may take things personally and feel they are left out but you parents have to be patient with them. Telling them the truth is all that they want to know. Be honest with them, also yourself too. If they have sisters and brothers tell them about your child's hearing loss.”

— Jamon (age 14)

Frequently Asked Questions - Otitis Media/Ear Infections

What is otitis media?

Otitis media is an ear infection. Three out of four infants/children have had otitis media by the time they are 3 years old. In fact, ear infections are the most common illnesses in infants and young children.

Are there different kinds of otitis media?

Yes. There are two main kinds. The first type is called acute otitis media (AOM). This means that parts of the ear are infected and swollen. It also means that fluid and mucus are trapped inside the ear. AOM can be painful.

The second type is called otitis media with effusion (fluid), or OME. This means fluid and mucus stay trapped in the ear after the infection is over. OME makes it harder for the ear to fight new infections. This fluid can also cause problems with your infant/child's hearing.

How does otitis media happen?

Otitis media usually happens when viruses and/or bacteria get inside the ear and cause an infection. It often happens as a result of another illness, such as a cold. If your infant/child gets sick, it might hurt his/her ears, causing otitis media.

It is harder for infants/children to fight illness than it is for adults, so children develop ear infections more often. Research shows that other environmental factors, such as being around cigarette smoke, can cause ear infections.

What's happening inside the ear when my child has an ear infection?

When the ears are infected the eustachian tubes become inflamed and swollen. The adenoids can also become infected.

The eustachian tubes are inside the ear. They keep air pressure even in the ear. These tubes also help supply the ears with fresh air.

The adenoids are found near the eustachian tubes. Adenoids are clumps of cells that fight infections.

Swollen and inflamed eustachian tubes often get clogged with fluid and mucus from a cold. If the fluids plug the openings of the eustachian tubes, air and fluid get trapped inside the ear. These tubes are smaller and straighter in infants/children than they are in adults. This makes it harder for fluid to drain out of the ear and is one reason that infants/children get more ear infections than adults. These infections are usually painful.

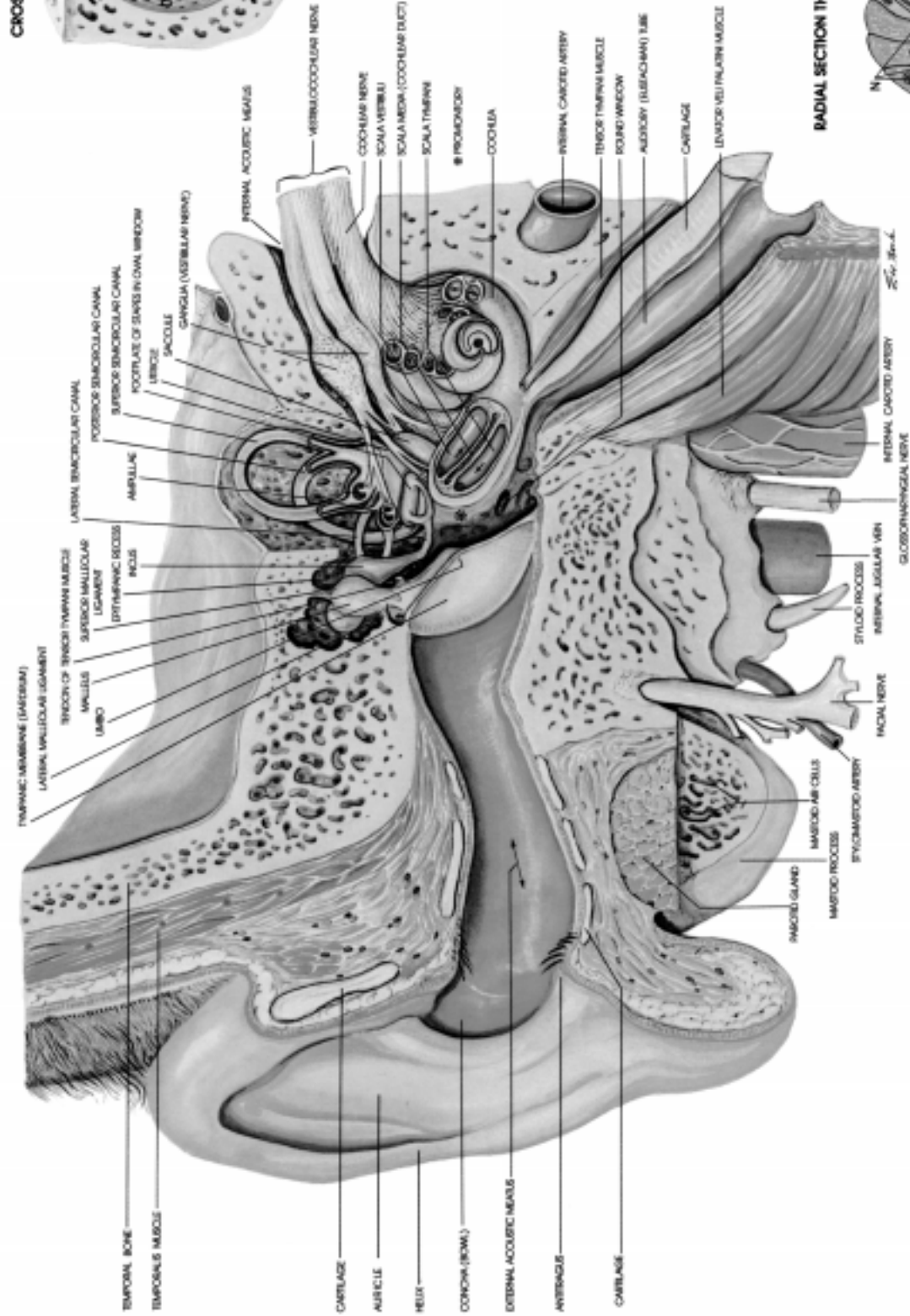
Adenoids are located in the throat, near the eustachian tubes. Adenoids can become infected and swollen. They can also block the openings of the eustachian tubes, trapping air and fluid. Just like the eustachian tubes, the adenoids are different in infants/children than in adults. In infants/children, the adenoids are larger, so they can more easily block the opening of the eustachian tube.

Can otitis media have an impact on my child's hearing?

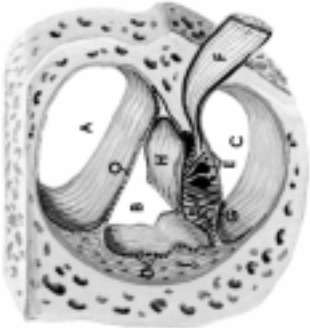
Yes. An ear infection (otitis media) can cause temporary (will go away) hearing problems. Temporary speech and language problems can happen, too. If left untreated, these problems can become more serious.

An ear infection affects important parts in the ear that help us hear. Sounds around us are collected by the outer ear. Then sound travels to the middle ear, which has three tiny bones and is filled with air. After that, sound moves on to the inner ear. The inner ear is where sounds are turned into electrical signals and sent to the brain. An ear infection affects the whole ear, but especially the middle and inner ear. Hearing is changed because sound cannot get through an ear that is filled with fluid.

ANATOMY OF THE HUMAN EAR

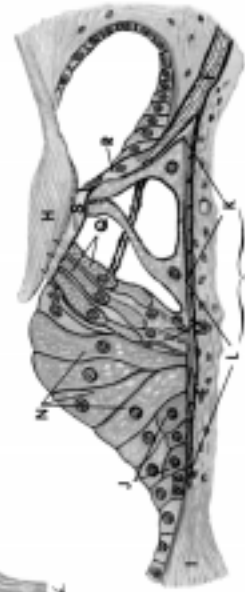


CROSS SECTION OF THE COCHLEA



- A - SCALA VESTIBULI
- B - COCHLEAR DUCT
- C - SCALA TYMPANI
- D - SERA VASCULARIS
- E - BASILAR MEMBRANE
- F - COCHLEAR NERVE
- G - ORGAN OF CORTI (DETAILED BELOW)
- H - ROTATIONAL MEMBRANE
- I - SPIRAL LIGAMENT
- J - BOTCHER'S CELLS
- K - ARCuate ZONE
- L - ROTONIS ZONE
- M - CELLS OF DEER
- N - CELLS OF HENEN
- O - RESONANT MEMBRANE
- P - BASILAR MEMBRANE
- Q - CORTI HAIR CELLS
- R - INNER HAIR CELL
- S - RETICULAR LAMINA

RADIAL SECTION THROUGH ORGAN OF CORTI



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How do I know if my child has an ear infection/otitis media?

It is not always easy to know if your infant/child has an ear infection. Sometimes you have to watch carefully. Your infant/child may get an ear infection before he/she has learned how to talk. If your infant/child is not old enough to say, “My ear hurts,” you need to look for other signals that there is a problem.

Here are a few signs your infant/child might show you if he/she has an ear infection:

- Tugging/pulling on ears
- Crying more than usual
- Fluid draining from ears
- Trouble sleeping
- Trouble keeping balance
- Trouble hearing
- Not reacting to quiet sounds

An infant/child with an ear infection may show you any of these signs. If you see any of them, call your health care provider as soon as possible.

How is and ear infection/otitis media treated?

Many health care providers suggest the use of an antibiotic (a drug that kills bacteria) when there is an active middle ear infection. If a child is feeling pain, the health care provider may also suggest something to lessen it, called a pain reliever. Following the health care provider’s instructions is very important. Once started, the antibiotic (medicine) should be taken until it is finished. Most health care providers will want to see your infant/child return for a follow-up examination, to see if the infection has gone away. Unfortunately, there are many bacteria that can cause ear infections, and some cannot be cured with just one antibiotic. This happens when antibiotics are given for coughs, colds, flu, or viral infections where antibiotic treatment does not work. When antibiotics stop working to kill the bacteria (bugs) in the body, those treatments do not work against infections. This means that several different antibiotics may have to be tried before an ear infection goes away. Antibiotics may also create unwanted side effects such as nausea, diarrhea, and rashes.

Once the infection goes away, fluid may remain in the middle ear for several months. Middle ear fluid that is not infected often disappears after 3 to 6 weeks. Neither antihistamines nor decongestants are sug-

gested as helpful in the treatment of ear infections at any stage in the disease process. Sometimes health care providers will treat your infant/child with an antibiotic to get rid of the fluid quickly. If the fluid lasts for more than three months and is connected with a hearing loss, many health care providers suggest putting “tubes” in the ears with the infection/s. This operation, called a myringotomy, can usually be done on an outpatient basis by a surgeon, who is usually an otolaryngologist (a doctor who specializes in the ears, nose, and throat). While the child is asleep under general anesthesia, the surgeon makes a small opening in the child’s eardrum. A small metal or plastic tube is placed into the opening in the eardrum. The tube ventilates, or airs out, the middle ear and helps keep the air pressure in the middle ear equal to the air pressure in the outside. The tube normally stays in the eardrum for six to 12 months, after which time it usually comes out on its own. If an infant/child has large or infected adenoids, the surgeon may suggest removing them at the same time the tubes are put into the ears. Removing the adenoids has been shown to limit the number of ear infections in some children, but not in those who are under four years of age. However, research has shown that removing a child’s tonsils does not cut down on the number of ear infections. Tonsillotomy and adenoidectomy may be correct for reasons other than middle ear fluid.

Hearing should be back to normal once the fluid is removed. Some children may need to have the operation again if the ear infection comes back after the tubes come out. While the tubes are in place, water should be kept out of the ears. Many health care providers suggest that a child with tubes wear special earplugs while swimming or bathing so that water does not get into the middle ear.

What will a health care provider do?

Your health care provider will check your infant/child’s ear. The health care provider can tell you for sure if your infant/child has an ear infection. He/she may also give your infant/child medicine. Medicines called antibiotics are sometimes given for ear infections. It is important to know how they work. Antibiotics only work against organisms called bacteria, which can cause illness. Antibiotics do not work against viruses, such as those connected with a cold.

In order to work, antibiotics must be taken until they are finished. A few days after the medicine starts working, your infant/child may stop pulling on his/her ear, and appear to be feeling better. This does not mean the infection is gone. The medicine must still be taken. If not, the bacteria can come back. You need to follow your health care provider's directions exactly.

Your health care provider may also give your infant/child medicine to lessen the pain, such as acetaminophen or aspirin.

How can I be sure I am giving the medicine correctly?

If your health care provider gives you a prescription for medicine for your infant/child, make sure you understand the directions completely before you leave his/her office. Here are a few suggestions about giving medicine to your child:

1. **Read.** Make sure the pharmacy has given you printed information about the medicine and clear instructions about how to give it to your infant/child. Read the information that comes with the medicine. If you have any problems understanding the information, ask the pharmacist, your health care provider, or a nurse. You should know the answers to the following questions:
 - Does the medicine need to be refrigerated?
 - How many times a day will I be giving my infant/child this medicine?
 - How many days will my infant/child take this medicine?
 - Should the medicine be given with food or without food?

2. **Plan.** Sometimes it is hard to remember when you have given your infant/child a dose of medicine. Before you give the first dose, make a written plan or chart to cover all of the days of the medication. Some infants/children may require 10 to 14 days of treatment.

Your chart might look like this if your infant/child's prescription is for 3 times a day with food:

3 TIMES A DAY WITH FOOD	BREAKFAST	LUNCH	DINNER
DAY 1			
DAY 2			
DAY 3			
DAY 4			
DAY 5			
DAY 6			
DAY 7			
DAY 8			
DAY 9			
DAY 10			

Put your chart someplace on the refrigerator so you can check off the doses at every meal. Be sure to measure carefully. Use a measuring spoon or special medicine-measuring cup if one comes with the medicine. Do not use spoons that come with tableware sets because they are not always a standard size.

3. **Follow Through.** Be sure to give all of the medicine to your infant/child. Make sure it is given at the right times. If your health care provider asks you to bring your infant/child back for a “recheck” or “follow-up”, do so on schedule. Your health care provider wants to know if the fluid in your infant/child’s ear/s is gone, and if the infection has stopped. Write down and ask the health care provider any questions you have before you leave his/her office.

Will my child need surgery?

Some infants/children with ear infections need surgery. The most common surgical treatment involves having small tubes placed inside the ear. This surgery is called a myringotomy. (For more information about the surgery, see “How is otitis media/ear infection treated?”.)

What about infants/children in daycare, pre-school, or school?

Even before your infant/child has an ear infection or needs to take medicine, ask the daycare program or school about their medication policy. Sometimes you will need a note from your health care provider for the staff at the school. The note can tell the people at your child’s school how and when to give your child medicine if it is needed during school hours. Some schools will not give children medicine. If this is the case at your child’s school, ask your health care provider how to schedule your child’s medicine.

What else can I do for my infant/child?

Here are a few specific things you can do to lower your infant/child’s chance of getting an ear infection:

- Do not put your child to sleep with a bottle
- Do not lay your child down flat with a bottle when your child is awake
- Do not smoke around your child. Tobacco smoke is bad for the delicate parts inside your infant/child’s ear.

The best thing you can do is to pay attention to your infant/child. Know the warning signs of ear infections, and be on the lookout if your infant/child gets a cold. If you think your he/she has an ear infection, call your health care provider.

What are the effects of an ear infection/otitis media?

Ear infections not only cause great pain, but may end in serious problems if they are not treated. An untreated infection can move from the middle ear to the nearby parts of the head, including the brain. Although the hearing loss caused by an ear infection does not usually last, if not treated it can lead to hearing loss that does not go away. Lasting fluid in the middle ear and constant ear infections can lessen an infant/child’s hearing at a time that is very important for speech and language development (growth). Infants/children who have early hearing loss from many ear infections are likely to have speech and language problems.

How does an infant/child’s health care provider diagnose ear infections/otitis media?

The simplest way to tell if your infant/child has an ear infection, is to look in his/her middle ear with an otoscope, a light instrument that allows the health care provider to examine the outer ear and the eardrum. Inflammation of the eardrum can mean an infection. There are several ways that a health care provider checks for middle ear fluid:

The use of a special type of otoscope called a pneumatic otoscope allows the physician to blow a puff of air onto the eardrum to test eardrum movement. (An eardrum with fluid behind it does not move as well as an eardrum with air behind it.)

A good test to see if the middle ear is working correctly is called tympanometry. With this test, a small soft plug is placed into the opening of the infant/child’s ear canal. The plug contains a speaker, a microphone, and a device that is able to change the air pressure in the ear canal, allowing for several measures of the middle ear. The infant/child feels air pressure changes in the ear or hears a few brief tones. While this test provides information about the middle ear, it does not tell how well the infant/child hears. A health care provider may suggest a hearing test for an infant/child who has many ear infections to figure out the amount of hearing loss. The hearing test is usually done by an audiologist, a person who is specially trained to measure hearing.

What research is being done on ear infections/otitis media?

Several avenues of research are being explored to improve the prevention, diagnosis, and treatment of ear infections. For example, research is better defining those infants/children who are at high risk for developing ear infections and conditions that make certain people more likely to get middle ear infections than others. Emphasis is being placed on discovering the reasons why some infants/children have more ear infections than other children. The effects of ear infections on infants/children's speech and language development/growth are important areas of study. Just

as important is research to create more exact methods help health care providers pick up middle ear infections. How the defense molecules and cells involved with immunity respond to bacteria and viruses that often lead to ear infections is also being studied. Scientists are reviewing the success of certain drugs currently being used for the treatment of ear infections and are examining new drugs that may work better, be easier to give, and be better at keeping new infections from starting. Most importantly however, research is leading to the vaccines that will keep ear infections from happening.



How Hearing Works - Sound Basics

Before you can understand hearing loss, you must first get a general understanding of how the ear functions normally. However, in order to understand how your ears hear sound, you need first to understand just what sound is.

An object gives off sound when it moves in matter. Most of the time sound is heard when it moves through the air in our atmosphere (surroundings). When something moves in the atmosphere, it moves the air particles around it. Those air particles in turn move the air particles around them, carrying the pulse of the movement through the air.

To see how this works, look at a bell. When you hit a bell, the metal moves - flexes in and out. When it flexes out on one side, it pushes on the air particles on that side. These air particles then hit the particles in front of them, which hit the particles in front of them, and so on. This is called compression. When the bell flexes away, it pulls in on the air particles around it. This forms a drop in pressure, which pulls in more air particles around it, forming another drop in pressure, which pulls in particles even farther out. This drop in pressure is called rarefaction.

We hear different sounds from different moving objects because of differences in the sound wave frequency. A higher wave frequency simply means that the air pressure movement switches back and forth more quickly. We hear this as a higher pitch. The level of air pressure in each movement controls how loud the sound is.

How the ear works

To understand how the ear works completely, you must first learn how the ear(s) hear. The ear has three sections:

1. the outer ear
2. the middle ear
3. the inner ear

The outer ear is the part that can be seen on the outside of the head, and collects and sends sound waves down the outer ear canal to the middle ear. The middle ear includes the eardrum and three tiny bones that send the sound to the inner ear. The inner ear contains the cochlea that includes the sensory cells for hearing. These sensory cells are called hair cells.

