

It's not what you say but what people hear

- ☞ When should I have my hearing checked?
- ☞ Do I need hearing aids?
- ☞ How do I determine which hearing instrument is best for me?
- ☞ How do I know I'm getting the most out of my hearing instruments?

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Preface

Your Hearing is Precious. Take Care of It!

Hearing contributes to a healthy, happy life. It is critical in more ways than most people know and your hearing is far too important to ignore. But for some reason, we tend to take our hearing for granted and often give slight or no attention to our auditory health. That's a shame!

At a minimum, everyone should have their hearing checked by a professional to establish a baseline. And if you suspect you are suffering hearing loss, then you should immediately seek help. Waiting only makes things worse, and there is help out there for you.

I enjoy and have dedicated my life's work to helping the hearing impaired. So, drawing on 35plus years of education and experience, I decided to write this book to help people appreciate the wondrous mechanics of good hearing. But I also sincerely hope you come to understand what hearing loss is, how it happens, and what can be done to treat it.

The damaging effects of untreated hearing loss are serious. This book elaborates on this and also explains hearing tests as well as the diagnosis of hearing loss. Plus, it addresses how you are evaluated, and if needed, fit with the proper device to maximize your hearing abilities.

Each individual's life and their hearing are unique. Hearing loss and treatment are very personal for most. But you need not be alone in dealing with it. Seek out help and benefit from face-to-face interaction with a certified specialist. A trained professional invested in providing you with precise, clear hearing can give you the high-level care you need. If you are like me, you take your health seriously, and that includes appropriate care for your hearing.

I hope you enjoy this book and that it helps you understand all that is encompassed in the miracle of hearing. Most important, I truly hope you learn how to care for your hearing so that you can live life to the fullest. Happy reading!

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CHAPTER 1

Introduction to Hearing Loss

Many take our hearing sense for granted. But hearing loss impacts the lives of approximately 48 million people in the United States. Plus, every day 30 million Americans are exposed to dangerous noise levels that can harm their hearing.¹ Hearing loss is the third most common health problem for older adults in the U.S., after arthritis and heart disease.

Further, about one in three people between the ages of 65 and 74 experience hearing loss, and nearly half of those over 75 have hearing issues.²

But it's not just the elderly, 14% of those between 45-64 have some type of hearing loss. Tinnitus (ringing in the ears) affects 50 million people in the United States.

It is also estimated that 15% of children between the ages of 6-19 have a measurable hearing loss in at least one ear. Even a mild hearing loss can cause a child to miss as much as

¹ <https://www.asha.org/policy/TR2004-00153/>

²

<https://www.nia.nih.gov/health/hearing-loss-common-problem-older-adults#:~:text=Hearing%20loss%20is%20a%20common,hearing%20doorbells%20and%20alarms.>

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50% of classroom discussion and 37% of children with only minimal hearing loss fail at least one grade.

As you can see, hearing loss is a widespread problem, for young and old. While the degree of hearing loss varies, it creates numerous problems that should not be ignored. For instance, conversations with friends and loved ones might seem difficult. It can also keep you from understanding your doctor's advice, detecting warnings or sirens, or hearing a ringing phone or doorbell chiming.

Those around you might even misinterpret your responses to them, or they might think you are ignoring them. Even worse, they may think you are suffering from mental decline, or are just being difficult.

And if that wasn't enough to convince you, your chance of falling can increase and the odds of loneliness or depression go up when you suffer from hearing loss.

So, hearing loss problems range from a small nuisance all the way up to being dangerous. Hearing loss impacts our lives far more than most of us are aware. Plus, discounting hearing loss and putting off a hearing test just makes the matter get worse over time.

However, there is some good news. Those suffering from hearing loss can usually be treated and helped with devices like hearing aids or surgical implants. Surgery and drugs may also be employed, depending on your condition. So, while hearing loss impacts many people, there are a number of proven ways to treat the problem.

It is worth repeating, good health includes proper hearing. Healthy ears are essential for good balance and affects how we interact with others. Hearing warns us of danger when there is an emergency. And much more.

So, anyone experiencing the signs of hearing loss should seek out appropriate care, immediately. With a proper diagnosis and treatment, chances are good you will be able to correct your hearing impairment and prevent further deterioration.

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CHAPTER 2

What Is Hearing Loss?

Basic Ear Anatomy

To discuss the various forms of hearing loss, we must first address the basics of your ear's anatomy. In general, it is made up three parts, the outer, middle, and inner ear.

The outer ear consists of the visible ear (i.e. the pinna) and the canal that leads down to the ear drum. The pinna is shaped to collect and direct sound down the canal to the middle ear.

The middle ear consists of the ear drum and a chain of bones that transfers sound vibrations to the inner ear. The ear drum is a membrane, the tympanic membrane to be precise, that separates and seals the middle ear. Sound vibrates the tympanic membrane which in turns (omit s) vibrates tiny bones, collectively called the auditory ossicles. These small bones amplify and transmit the sound from the ear drum to the inner ear through another membrane, the oval window.

The inner ear contains a spiral shaped structure called the cochlea, which resembles a snail that is filled with fluid. The cochlea also contains the organ of Corti, where sound is

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transformed into nerve signals. Sound transmitted from the middle ear acts through the oval window and vibrates the fluid inside the cochlea, which in turn stimulates microscopic “hair” cells inside the organ of Corti. Various hair cells are tuned so that different “hairs” respond to certain pitches and frequencies. When stimulated, these “hair” cells activate nerves at the base of the hair cells, and nerve impulses are sent to the brain along the auditory nerve. The brain then receives the nerve transmission and interprets the input from the roughly 15,000 “hairs” as sound.

The above explanation is a simplified summary, to be sure. But hopefully you can see that hearing is a truly amazing process. Our ear transmits sound through a complex chain and generates nerve impulses that get sent to the brain in a fraction of a second. For it to work properly, every piece in this chain, the outer, middle, and inner ear, all must do their job before a nerve can generate a signal for the brain to understand. Plus, the outer, middle, and inner ear are made up of multiple components and every part, including the nerves, must be in good working order for us to hear clearly.

Unfortunately, there are things that can go wrong, and when they do, hearing loss often results. Now that you have a little knowledge of the ear’s anatomy, we can dive a little deeper into the four types of hearing loss, their causes, and what you can do to treat them.

Types of Hearing Loss

A single phrase often covers a number of medical conditions. For example, “heart problems” can include valve issues, arrhythmia (i.e. an irregular, slow, or fast heartbeat), artery disease, etc. The same is true with “hearing loss;” there are different types.

In general, the four types are:

1. Sensorineural,

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2. Conductive,
3. Auditory Neuropathy Spectrum Disorder, and
4. Mixed.

Sensorineural Hearing Loss (“SNHL”)

Our inner ear includes many parts. The cochlea is filled with multiple fluids, and membranes separate three chambers. Inside the middle chamber of the cochlea, a unique body fluid acts on the organ of Corti. Inside this organ there are tiny hair cells that detect sound rippling in the cochlea fluid and the hair cells stimulate a nerve that sends transmissions to the brain. Damage to the inner ear components, especially the hair cells, from age, loud sounds, or disease can result in sensorineural hearing loss. And remember, we have two ears and SNHL can be experienced in just one or both ears.

It is possible to be born with sensorineural loss, but SNHL often sets in over time.

Age-related hearing loss (also known as presbycusis) is the most common cause of sensorineural hearing loss. The degree can vary from mild to severe or even profound, and will tend to worsen slowly over time, depending on the cause.

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In general, causes of SNHL include:

- Virus or disease.
- Drugs toxic to hearing.
- Heredity.
- Aging.
- Head trauma.
- Deformation of the inner ear.
- Exposure to loud noises, blaring music, explosions, etc.
- Autoimmune inner ear disease.
- Tumors.

Damage to the organ of Corti hair cells is usually permanent, and surgical correction is typically not an option.

Depending on the condition, medication might be employed in rare instances to address specific SNHL problems.

Amplification is most frequent form of treatment for this form of hearing loss. It can range from conventional hearing aids to cochlear implants.

Conductive Hearing Loss

The inability of sound to get through the outer and middle ear to reach the inner ear is referred to as conductive hearing loss. If you have this condition, it may be hard to hear soft sounds. Or, louder sounds may seem dull.

Conductive hearing loss is often seen with children who have recurrent ear infections or who insert foreign objects into their ear canal.

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But a buildup of wax can also block the ear canal. This can happen with individuals of just about any age. And ear drums can rupture when exposed to sudden, loud noises like firearms or explosions.

Typical causes of conductive hearing loss include:

Birth Related:

- Outer or middle ear deformities. (e.g. Some people are born without an outer ear, others may have a deformed ear canal. Or malformed bones in their middle ear can fail to transmit to the inner ear properly.)

Outer Ear Related:

- Earwax, or cerumen, trapped in your ear canal.
- Ear canal infection, called external otitis. Sometimes this is called swimmer's ear.
- Foreign objects wedged in the outer ear.
- Stenosis, or narrowing of the ear canal

Inner Ear Related:

- Punctured eardrum.
- Fluid in the middle ear caused by colds or allergies.
- Poor Eustachian tube function. The Eustachian tube connects your middle ear and your nose so fluid in the middle ear can drain out. If the tube fails, fluid becomes trapped in the middle ear.
- Head trauma which can cause ossicular chain gaps, breaking the connection between the bones of the middle ear.
- Ear infection, sometimes called otitis media. (Otitis is a general term for ear infections, and media denotes middle.)
- Otosclerosis, which affects a specific ossicular chain bone, the tiny bone known as the stapes, gets stuck in place.
- Abnormal growths or tumors that form within the middle ear, such as cholesteatoma or glomus tumors.

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Treatment of conductive hearing loss is possible and may include amplification, medication, or surgery.

Amplification can provide a solution in many cases. Either surgically implanted devices or conventional hearing aids may be used, depending on your condition.

Antibiotic or antifungal drugs are also used. They are often used to treat conditions like lingering ear infections or problematic middle ear fluid.

Surgical procedures may be used for reconstruction or repair of the ear canal and middle ear structures. Surgery can also address tumors that interfere with the transmission of sound.

Auditory Neuropathy Spectrum Disorder

Auditory Neuropathy Spectrum Disorder (“ANSO”) occurs when sound enters the ear normally and the outer, middle, and inner ear pass it on correctly. But due to damage of the auditory nerves, the received sound is not transmitted in a way that the brain can interpret.

ANSO is sometimes confused with SNHL. That is because ANSO deals with nerve damage and there are nerves at the base of hair cells in the organ of Corti, part of the inner ear. But to keep things simple, ANSO deals with the various auditory nerves, including the nerves connected to the hair cells. SNHL deals with all the other part of the inner ear, most often the hair cells in the organ of Corti.

Auditory neuropathy spectrum disorder can be inherited or acquired. But it is also interesting that about 50% of those with this condition have spent time in the neonatal intensive care unit.

Hearing aids and cochlear implants can be used to treat those with ANSO. But results are mixed as this does not correct the nerves’ failure to transmit sound information to the brain.

Causes of ANSD hearing loss include:

- Degradation or damage to the nerves at the base of the inner ear hair cells.
- Damage to the auditory neurons that transmit sound information from the inner hair cells to the brain.
- Inherited genes causing mutations or damage to the auditory system. Often causes faulty connections between the inner hair cells and the auditory nerve.
- Infections such as meningitis, encephalitis, mumps, jaundice, and acoustic neuroma; inflammatory conditions such as siderosis; autoimmune disorders like Guillain–Barré syndrome; and genetic mutations also have been reported in the literature.
- Progressive ANSD is often associated with genetic neurodegenerative diseases like Friedreich ataxia, Charcot–Marie–Tooth disease, or Leber's hereditary optic neuropathy, where auditory nerve decline is part of a generalized pattern of neural deterioration.

Mixed

As the name implies, mixed hearing loss is a combination of the above different hearing loss types. Most often, both conductive and SNHL occur at the same time. It means there is a problem in your outer or middle ear *and* in your inner ear.

Anything that causes a SNHL, conductive, or ANSD hearing loss can lead to a mixed hearing loss. An example would be a musician constantly exposed to loud music who also has fluid in his middle ear. Constant exposure to loud music causes damage to the hair cells in the inner ear, and maybe an infection has caused fluid to collect in the middle ear. The two together might make the hearing loss worse than it would be if only one of those problems existed.

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Audiologists can typically help you if you have a mixed hearing loss. The treatments are the same, or a combination of, treatments used to correct the three individual forms of hearing loss (see appropriate sections above).

When Does Hearing Loss Start?

We are all unique individuals and each of us ages differently. But in general, we risk losing our hearing with age and some people develop age-related hearing issues earlier than others. This age-related hearing loss is called presbycusis (or sometimes spelled presbyacusis).

But hearing loss can also be induced by what we do. Unfortunately, a large number of people are exposed to noises loud enough to damage their hearing while at work or play. We know attending loud concerts, or exposure to other loud sounds, damages our hearing. This has nothing to do with age, it depends on the amount of exposure to loud noises.

If we look at statistics, 1 in 14 of those 29 to 40 years old have a hearing loss and that rises to 1 in 6 of those 41 – 59 years old. This increasing rate continues for people who are in their 60s, when many begin to notice they are having trouble hearing conversations, till the odds are 50/50 for those over 75.

So, that gives you some idea of “when” hearing loss starts. But remember, it varies from person to person. For example, half of all those with hearing issues are still of working age. So, in general, anyone over 40 should pay attention to their hearing and look for signs that it may be faltering. As we get into our 50s and 60s, the odds of hearing loss jump, until in our 70s there is a 50/50 chance of experiencing hearing loss.

Damage to the tiny hair like cells in our inner ear is the most frequent cause of age-related hearing loss. This is not reversible, but amplification, or hearing aids, can overcome this type of hearing loss in many cases.

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So, if you see any signs of age-related hearing loss, see a professional and have your hearing checked. This can help you determine if you have developed some degree of hearing loss and whether you can benefit from the use of hearing aids.

Causes and Factors that Contribute to Hearing Loss

I touched on a number of the causes already in presenting the types of hearing loss. This included things like ear infections, head trauma, inherited disorders, exposure to loud noise or music, aging, and problematic fluid or wax in the ear.

Some of the more common causes can be summarized as:

- Damage to the inner ear. Aging and exposure to loud noise may cause damage to the “hairs” cells in the inner ear. Higher pitched tones may become muffled to you and it may become difficult to pick out words against background noise.
- Buildup of earwax, or other obstructions, which can block the ear canal and prevent conduction of sound waves to the middle ear.
- Ear infection and abnormal bone growths or tumors in the outer or middle ear.
- Ruptured eardrum (tympanic membrane perforation). Loud blasts of noise, sudden changes in pressure, jabbing the eardrum with a foreign object, and infection can cause your eardrum to rupture.

But I have yet to detail the other “factors” that may cause hearing loss. Many of these are things you are exposed to in everyday life. In some cases, they are so common that we take them for granted; we just accept them as part of our normal day without so much as a second thought. So, it is worth reviewing these other factors to make you aware of them, and the things you can do to help protect your hearing.

Most of us work, and **occupational noises** are common. But some jobs include persistent, loud noises as a regular part of the job site environment. Examples include farming, construction,

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or factory work. Jobs where loud noises exist on a consistent basis can lead to ear damage if ear protection is not used. Ear plugs are most common form of ear protection for most workers, and these can work well if properly fitted and used.

The same goes for when we kick back, have fun, or travel someplace for a break. Noises encountered on our own time can be dangerous to our ears, too. Exposure to **bursts of loud noise** such as from fireworks, firearms, and jet engines, can cause immediate, permanent hearing loss. Other recreational activities with dangerously high noise levels include snowmobiling, motorcycling, carpentry, metalworking, or listening to loud music. Use ear protection when necessary, and turn the music volume down to protect your ears.

Medications we use may be toxic to our ears and damage our hearing. Some drugs such as the antibiotic gentamicin, sildenafil (Viagra), and certain chemotherapy drugs, can damage the inner ear. Temporary effects on your hearing, like ringing in the ear (tinnitus) or hearing loss, can also occur if you take large doses of aspirin, other pain relievers, antimalarial drugs, or loop diuretics. Be sure to consult your doctor with all medications and follow their advice.

Certain illnesses also have a negative impact on our ears. **Disease or illness** that results in high fever, such as meningitis, encephalitis, mumps, and jaundice, may damage the cochlea. Mumps has also been found to cause hearing loss in 1% to 4% of patients. Vaccinations can be employed to prevent some diseases. You can also practice a healthy living style, good eating habits and exercise, to keep your body healthy and strong. A robust body can better defend itself against disease.

Vaping as an alternative to cigarette smoking is controversial, but it's a fact that nicotine isn't good for your hearing health. **Nicotine**, whether from cigarettes or vaping, is an addictive chemical that restricts blood flow to all parts of your body. This includes your inner ear where

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the delicate hair cells are found, the cells which interpret sound and activate a nerve to send a signal to the brain. Even e-cigarettes without nicotine might be hazardous to your hearing health. The mixture of flavorings, colorings and other additives which add to the e-cigarette's appeal contain a substance called propylene glycol, which is an alcohol-based solvent that has proven to be harmful to ears when used topically. Avoidance of all forms of smoking is best for a healthy life style.

Many of us know someone who suffers from **diabetes** a well-studied disease. Hearing loss is about twice as common in a diabetic as compared to non-diabetic adults. according to a new study funded by the National Institutes of Health (NIH).³ Further, those who are pre-diabetic are 30% more likely to have hearing impairment. Hearing loss increasingly seems to be related to other diseases like diabetes. Addressing and managing your diabetes also helps to protect your ears.

Several studies published in the last few years have also strongly linked **sleep apnea** to hearing loss. Medical professionals have yet to explain why, but they believe it's because the condition reduces blood supply to the inner ear, an intricate system which depends on oxygen to properly process sound. It's also possible that years of loud snoring could damage hearing. So, if you suffer from sleep apnea, get the proper treatment since it helps your ears, too.

Most of us enjoy an adult drink every now and then. But studies show that **alcohol abuse** damages the central auditory cortex, increasing the amount of time it takes your brain to process sound. Excessive drinking among young adults also can lead to problems processing lower frequency sound. And even one overindulgent night can create balance problems. That is due to

³ <https://www.nih.gov/news-events/news-releases/hearing-loss-common-people-diabetes>

alcohol absorbed into the fluid of the inner ear, which monitors balance. The alcohol can remain in the inner ear even after it is no longer present in the blood and brain. Drink in moderation.

The University of Pennsylvania discovered a relationship between **iron-deficient anemia (IDA)** and hearing loss. People with IDA are twice as likely to experience hearing loss compared to those without the disorder. Although researchers did not state that iron deficiency causes hearing loss, they did acknowledge the mineral's critical role in providing a healthy blood supply to the delicate hair cells of the inner ear. A good diet, and medical treatment if necessary, can not only help with IDA; it helps to protect your ears.

Stress can be hard on our bodies. But those who deal with **chronic stress** are at high risk of developing additional health issues. With regard to hearing, stress can create a circulation problem. Under stress, your body diverts oxygen to the muscles so you can react quickly if necessary. Most of the time, the body returns to normal oxygen levels after the cause of the stress is gone. However, when we experience acute stress, the body never receives the return to normal message. This means that other parts of the body, such as the hearing mechanisms of the inner ear, can be damaged from lack of proper oxygen and blood circulation.

Yes, that was a long list of contributing factors but that is the point. Your hearing is a complex, interconnected biological system. The many components of your hearing behave just like any other body part; they can be negatively impacted by many, many external factors. You should be aware of this fact and, when possible, eliminate these risk factors or take precautions like wearing ear plugs or coverings. Also, staying in good shape and eating well helps keep your ears in tip-top shape.

In short, respect your health and that includes your ears. Also, one last thing you can do to protect your hearing if you do suspect you might have lost some hearing ability, get tested. Putting it off can actually make the condition worse.

Hearing Loss Prevention

It may be an overstatement to say our ears are fragile, but it should be obvious by now that the various parts of the ear can be damaged. Plus, aging naturally induces SNHL. So, is it a lost cause? Can I do anything to protect my hearing? Those are great questions and the answers are no, it is not a lost cause. And yes, there are things you can do.

Let's start with the most obvious thing you can do. If you have high blood sugar, properly **care for your diabetes**. While the precise mechanism for how blood sugar damages the inner ear is not known, it is becoming clearer that high blood sugar is linked to hearing loss. Treating and controlling your high blood sugar also helps to protect your ears.

Protect your ears at work. Limiting the duration and intensity of your exposure to work-related noise is one of the best and easiest protective measures you can take. In the workplace, plastic earplugs or glycerin-filled earmuffs can shield your ears from damaging noise. Your employer may even supply ear plugs or muffs to you.

Turn the volume down. According to the World Health Organization, 1.1 billion teenagers and young adults worldwide are at risk for noise-induced hearing loss from unsafe use of audio devices. If you often listen to music with headphones or earbuds, use the 60/60 rule. The suggestion is to listen with headphones at no more than 60% volume for no more than 60 minutes a day. Earbuds are especially dangerous, as they fit directly next to the eardrum. If possible, opt for over-the-ear headphones. Don't forget that any loud music, not just music played through headphones, presents a risk for noise-induced hearing loss. If you're hosting a social

event, keep the music at a volume which won't force people to shout in order to hold a conversation.

Consider regular **hearing tests** if you work in a noisy environment or are frequently around loud noises. If you've lost some hearing, you can take steps to prevent further loss. The earlier you catch it, the better.

If you are exposed to loud noises for a prolonged period of time, like at a concert or a bar, your ears need time to recover. **Let your ears fully recover.** If you can, step outside for five minutes every so often in order to let them rest. Researchers have found that your ears need an average of 16 hours of quiet to recover from one loud night out.

It's common for people to use cotton swabs to clean wax out of their ear canals, but this is dangerous. **Stop using cotton swabs.** Inserting anything inside your ear canals risks damaging sensitive organs like your ear drum. If you have excess wax, you can clean around the canal with a damp towel—gently. You could also use ear wax removal solution over the course of a few nights. This softens the wax so that it will eventually flow out on its own. The best solution is always to seek a professional opinion and care when possible.

Take medications only as directed. Certain medications, such as non-steroidal anti-inflammatory drugs (NSAIDS) like aspirin, ibuprofen and naproxen, can occasionally contribute to hearing loss. Discuss medications with your doctor if you're concerned about the impact to your hearing and take them only as directed.

Excess moisture allows bacteria to enter and attack the ear canal. This can lead to swimmer's ear, or other types of ear infections, which can cause hearing loss. So, **keep your ears dry.** Be sure you gently towel-dry your ears after bathing or swimming. If you can feel water in the ear, tilt your head to the side and tug lightly on the ear lobe to coax the water out.

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You can also keep your ears dry and healthy with custom-fit swimmers' earplugs, which block water from entering the ear canal. They work for both adults and kids, and they are effective in preventing swimmer's ear. Make an appointment with your local hearing health professional to get fitted.

At one time or another, we all promise ourselves to head outside and get some **exercise as well as eating better**. But did you know that a good diet and working out is good for your ears? It's true. Walking, running, or cycling gets the blood pumping, and that includes your ears. It also helps to keep off unhealthy extra pounds. Staying in shape keeps the ears' internal parts healthy and allows them to work at their best.

Stress and anxiety have been linked to both temporary and permanent tinnitus (i.e. ringing in the ears). So, you need to **reduce stress**. High levels of stress cause a fight or flight response, which is an instinctual reaction that fills your body with adrenaline. This process puts a lot of stress on your nerves, blood flow, body temperature, and more. It's commonly thought that this added pressure can affect your inner ear and contribute to tinnitus symptoms. Find ways to relax in order to give your body, including your ears, a break.

Stay safe during recreational activities such as riding a snowmobile, going hunting, using power tools, or attending rock concerts can damage your hearing over time. Hearing protection and taking breaks from the noise can protect your ears around firearms, loud tools, or equipment.

Hearing loss develops gradually, so it's also recommended that you have **annual hearing checkups** with a hearing professional. That way, you can identify the signs of hearing loss early and take action. Taking action is important because untreated hearing loss, besides detracting from quality of life and the strength of relationships, has been linked to other health concerns

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like depression, dementia, and heart disease. Do your ears a favor. Contact your local provider and make an appointment as soon as possible.

Hearing Loss Description and Signs

People commonly lose hearing in a slow, gradual manner over time. It is one of the insidious things associated with hearing loss. It makes the condition hard to notice as your hearing slowly fades away. So, what does hearing loss sound and feel like? And what are the warning signs of hearing loss?

The classic symptoms for those experiencing age related hearing loss include difficulty hearing high frequency sounds, like a woman's or child's voice. With mild hearing loss, you may also struggle to hear spoken consonants like b, f, k, p, s, and t.

Another common sign shows up when you are in places with noisy backgrounds and lots of people. In restaurants or other social gatherings, you will find it hard to discern what people are saying to you.

Routine, daily sounds disappear when you are experiencing hearing loss. If you have to think hard to remember the last time you heard the refrigerator hum, birds chirping outside, or the beep from your Instant Pot, then you should have your hearing tested.

Also, if you feel tired after social events, it may be because of hearing loss. When you only hear bits and pieces, your brain must fill in the gaps to make things understandable. That requires intense focus, even more so when there are multiple people speaking. This mental effort can leave you tired, even exhausted, after socializing.

During conversations, you may also find yourself trying to read lips. Our body has a unique ability to use the other senses when one is faulty. Without knowing it, you may be

shifting your eyes from the speaker's eyes to their lips. So, pay attention to see if you are lip reading, it is a clear sign you should see a hearing professional.

Another sign has to do with something you feel. Sometimes hearing loss shows as a sensation that your ears are clogged. Yes, this can happen when there's too much wax or fluid in your ears. But if a doctor or specialist determines that your ears look clean and open, a hearing test may be in order. Age-related hearing loss can make certain sounds dull or muffled, and that may mimic the feeling of a clogged ear.

Also, little things about your behavior may tip you off that you are losing your hearing. Certain behavioral actions or routine tasks that seem hard can also be signs, and they include:

- Perceived mumbling of people speaking to you.
- Saying I hear but cannot understand.
- Struggling to follow conversation in groups.
- Avoiding noisy events like restaurants or parties.
- Increasing the TV or radio volume often.
- Asking others to repeat themselves.
- Difficulty hearing people behind you.
- Trouble speaking on the phone.
- Missing the doorbell or a telephone ring.
- Certain sounds appear strangely loud.
- Ringing in the ears (i.e. tinnitus).

If you notice any of the signs or behaviors discussed in this section, do not wait and have your hearing tested.

CHAPTER 3

Why Does Hearing Loss Matter?

The impact of hearing loss on our overall health is surprisingly complicated. But think about it, hearing is one of only five senses we possess. And the more we understand about our biological systems, the more we realize how the few senses we do have are intertwined. So, by extension, our hearing should have a large impact on our overall health. Don't believe it? Well, let's take a look at why good hearing does matter, and consider the impact of hearing loss.

If you try to function with untreated, impaired hearing, your **vocabulary suffers**. Various sounds and letters might be hard to differentiate. Each letter and verbal sound corresponds to a unique frequency range. When one cannot hear that range, it has two impacts. First, the sounds, letters, and words at those frequencies are harder to hear and become hard to understand, or may even be unidentifiable. Second, when the hearing impairment goes untreated, it gets worse over time. The sounds associated with problem frequencies lose their crispness. You may even skip over things like Ss, or leave off “ing” endings. Or, you may stumble over an entire word. The ear

and brain work together to help you produce words clearly. But if you no longer hear certain sounds, the brain's ability to reproduce these sounds accurately is reduced.

For some, this auditory loss may even impact their voice, to themselves and to others. In short, it can **change your voice** and how it sounds to others. It may also result in your talking louder than others. You may not realize it, but you may be **shouting at people**.

Hearing allows us to interact with and enjoy our surroundings. You might under appreciate the importance of hearing a song bird or a cat purring. But it lets you know they are there and often it brings us joy. Music and movies are designed to entertain us, and they rely heavily on using sound. We rely on our sense of hearing to inform us, to immerse ourselves in the things around us. Hearing helps us enjoy all that this world has to offer. If we cannot hear it, though, our quality of life is reduced. We are **robbed of the enjoyment sounds bring**.

When danger lurks, hearing is one of our warning defenses. It often lets us know a threat is lurking before we even see it. The growl of a dog or the clatter of a rattlesnake are unmistakable as threats. A siren makes us aware of an emergency and the need to get out of the way. Smoke and carbon dioxide detectors protect and wake us in the event of an emergency. But with hearing loss, our built-in **warning mechanisms are reduced** and our ability to respond is impaired.

Our hearing also allows to us locate sound origins But if you have one ear that hears less than the other, you will have **trouble locating the source**. Where the sound comes from can be an important piece of information in certain situations.

Hearing also plays a critical role at work. Hearing impaired individuals are **less likely to be promoted** and often they work at jobs below their skill set. This results in **lost wages** and a study by Sergei Kochkin in 2010 found a \$14,000 income difference between adults with good

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hearing and those with mild and severe untreated hearing loss. They also found that workers with untreated hearing loss can lose as much as \$30,000 annually. Further, the percentage of the **unemployed with hearing loss is higher** than it is for the general population. The impact of impaired hearing on careers is significant.

In order to communicate with others, we must clearly hear what other people say. Communication is after all a two-way process. But we do it every day, it is commonplace and we take it for granted. However, speech is one of the more complex sounds our ears and brain process. If we only get a portion of what is said, comprehending what is being relayed to us becomes a difficult chore. **Poor speech comprehension** is even worse in crowds. So, while good hearing allows us to interact and be social, impaired hearing diminishes this experience.

If you cannot hear properly, others can become frustrated and they may even start to avoid interactions with you. This is especially true where there is significant background noise. A party or restaurant can make conversation difficult or impossible. It may even progress to a point where you just **stop socializing** yourself as it becomes too much of a chore. Whether people avoid you, or you stop going out, the result is less socializing. Our need to socialize is well documented but hearing loss works to rob us of this required interaction.

Hearing loss also often leads to **strained relationships**. Others may think you are being difficult or ignoring them. Or you may not understand what they say to you. It can create a divide with loved ones or friends.

Damaged relationships and lack of socializing can also lead to **loneliness**. Multiple research projects have found links between hearing loss and loneliness.

So, as you can see the impact of hearing loss is quite significant damaging relationships, creating dangerous situations, and impacting your career. But there is more.

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In fact, it is linked to many other illnesses. When multiple illnesses are present at the same time, the patient is said to have comorbidities.

Comorbidities

The word comorbidity means that two or more chronic diseases or conditions are present together in a single patient.

As we discussed previously, hearing loss can cause loneliness, and loneliness often leads to depression. In one study, the odds of a person reporting **depression disorders** were 50% greater for every 25 dB of hearing loss. Further, the study found the odds of self-reporting depression symptoms increased 60% per 25 dB. These results indicate that hearing loss is independently associated with depression. In another study, the data again suggests a direct relationship of depression and hearing loss. Moderate-to-severe depression was 4.9% for people reporting excellent hearing, 7.1% for those with good hearing, and 11.4% for those reporting a little trouble or greater hearing loss.

Our ears are also a key component of good balance. If our ears malfunction, it can **diminish our sense of balance**. This makes falls more likely and can seriously impact your ability to walk, stand upright, and even sit up.

Falls can be serious and are the leading cause of fatal and non-fatal injuries among the elderly. When they occur, falls lead to significant health, social, economic, and emotional consequences. Also, in the senior population, falls often lead to fatal outcomes within the first 12 months after a fall with injuries. Loss of balance should not be underestimated. One research project even found **increased odds of falling**. The results showed a 40% increase in falls reported in the previous year for every 10 dB of hearing loss.

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Further, patients with low-frequency hearing loss might be considered “**at risk**” for **cardiovascular events**, and appropriate medical attention should be given. One study suggests that about 85% of diagnosed strokes were associated with individuals who had flat or low-frequency sloping hearing losses. Another study in Iceland found that those over 65 with hearing loss were at a higher risk of death from cardiovascular disease than those without hearing loss.

Many also suffer from **diabetes**. Researchers theorize this due to the fact that the vascular effects of diabetes interfere with the blood supply to the cochlea, which leads to sensorineural hearing loss. Specifically, high blood glucose levels may **damage cochlea tissue and nerves** impacting the biochemistry and neural functions inside the cochlea.

While it could be classified as a comorbidity, mental health has also been shown to be linked to hearing loss. A separate discussion of mental disorders is warranted.

Mental Disorders

Alzheimer’s can be devastating. But in the past few years, [researchers at Johns Hopkins](#) performed multiple studies to determine how hearing loss may influence cognitive decline. They met with a number of seniors over several years and tracked which ones developed Alzheimer’s, as well as the speed with which the disease advanced. In each study, patients with hearing loss exhibited higher rates of dementia. One of their conclusions was that those who began a study with hearing loss severe enough to interfere with conversations were 24% more likely than those with normal hearing to suffer from Alzheimer’s disease.

In another study, the researchers further found that those with hearing impairment experienced a 30- 40% greater decline in cognitive abilities. They also discovered another

correlation: the worse the hearing loss, the greater the odds of suffering dementia. In addition, hearing impaired adults developed cognitive decline 3.2 years earlier than others without hearing loss.

Yet another study in 2011 found adults with untreated hearing loss to be 2 to 3 times more likely to suffer dementia depending on the degree of hearing loss. The link of hearing loss to dementia becomes clearer over time.

This may also be the reason for other links to hearing loss that continue to be uncovered. For example, the hearing impaired have higher incarceration and hospitalization rates. The impact of cognitive decline is profound and the link to hearing loss should not be ignored.

The reasons for the links between hearing loss and dementia are not fully understood, but there are theories. They include both increased load on the brain to understand speech and social isolation. But there is another, more complex potential explanation: your brain reorganizes itself to cope with the hearing loss.

Cross-Modal Cortical Reorganization

Yes, that is an intimidating, long name. But in a nutshell, when hearing loss occurs, the mind has to overcompensate for the missing sense in some way. After all, we only have five senses, so losing one means a large amount of information is no longer present. So, your brain places added emphasis on the other senses like touch and vision. However, this can lead to fatigue and adversely affect concentration.

While this “compensation” can help hard-of-hearing people cope to some degree with their hearing loss, it also damages the brain.

When a person experiences hearing loss, the area of the brain that processes sound goes unused and starts to deteriorate. This can lead to added problems with processing and understanding speech and language.

Because the mind now must overcompensate for weakened brain functions, higher-level thinking is suspended to allow for speech understanding. This can lead to a host of other problems, including the acceleration of dementia.

We are still at the early stages of unraveling this complex process. But it also points to the importance of getting your hearing checked.

Treating your hearing loss may help combat cognitive decline, since in theory, when you hear better there is less stress on your brain and slower deterioration. So, if you see signs of hearing loss, get yourself tested. That is the first step to getting your hearing loss treated. Treatment not only helps you to hear better, it could help your mental health.

Infant Early Detection

Early detection has been touted already. But just in case you missed it, if you suspect a hearing loss, do not wait. Get a hearing test, now. The earlier you catch it, the better your odds of successfully treating your problem. And you prevent or slow further loss of hearing.

But that is not what we are talking about in this section. All infants should be screened for hearing loss not later than 1 month of age. It is often best to have them tested before leaving the hospital after birth.

Hearing loss can affect a child's speech development, language, and social skills. The earlier children with hearing loss are tested and treated, the more likely they are to grow and develop normally.

The hearing test is simple and not painful at all to the baby. Many babies often sleep during the evaluation. Plus, it only takes a few minutes, but it is vital to assess if a full hearing test should be performed.

If a full hearing test is needed, be sure to have it done before the baby reaches 3 months of age.

At any point you suspect your child of showing hearing loss signs, have them tested. Babies and children should reach milestones in how they play, learn, communicate and act. A delay in any of these milestones could be a sign of hearing loss or other developmental problem.

Signs of Hearing Loss in Babies:

- Does not startle at loud noises.
- Does not turn to the source of a sound after 6 months of age.
- Does not say single words, such as “dada” or “mama” by 1 year of age.
- Turns head when he or she sees you but not if you only call out their name. This sometimes is mistaken for not paying attention or just ignoring, but could be the result of a partial or complete hearing loss.
- Seems to hear some sounds but not others.

Signs of Hearing Loss in Children:

- Delayed speech.
- Garbled or unclear speech.
- Does not follow directions. This sometimes is mistaken for not paying attention or just ignoring, but could be the result of a partial or complete hearing loss.
- Often says, “Huh?” or “What?”
- Turns the TV volume up too high.

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Children who are at risk for acquired, progressive, or delayed-onset hearing loss should have at least one hearing test by 2 to 2 1/2 years of age. (Hearing loss present at birth that gets worse over time is known as acquired or progressive hearing loss. Hearing loss that develops after the baby is born is called delayed-onset hearing loss.)

Mild Does Better

Do not wait to treat mild hearing loss. Upon discovering a hearing loss, people typically wait an average of seven years to get help with hearing aids. During this time, the hearing loss progresses, it gets worse, and the brain "forgets" how to hear sound properly. People who procrastinate too long start to lose the ability to understand speech over time. Treating a hearing loss when it is mild gives you the best chance for success with hearing aids. That means you maximize your chances of rehabilitation now and in the future.

Recent studies have found that even mild degrees of untreated hearing loss can increase the risk of developing conditions such as cognitive decline, including dementia and Alzheimer's, compared to those with normal hearing. Even mild hearing loss can lead to increased social isolation, depression and risk for falls, not to mention difficulty in communicating with those around you on a daily basis.

Technology has advanced significantly and those with mild hearing loss can benefit greatly from the options available to patients today. Do not let hearing loss impact your quality of life, even if you have mild hearing impairment.

Excuses and Myths

With the importance of hearing properly becoming better understood, you may ask a question.

Why are we quick to get glasses or correct vision problems, but why does it take so long for many to address hearing problems?

Well, we cannot drive or read well with a vision problem. But we can with hearing loss. So, we may be quicker to get to the eye doctor out of need. However, there may be another reason. Our perception of hearing aids. There are many myths that linger even though technology advancements have long ago addressed many of the perceived issues. So, let's take a look at some of the more common myths.

Myth #1: Hearing Loss is Untreatable

While hearing loss is often irreversible, that does not mean it is untreatable. Glasses do not correct the problem in your eye, they correct for it. Hearing aids are no different. While they may not repair damage inside your ear, they can help you hear better. Amplification with hearing aids is by far the most recommended and effective treatment for hearing loss. In fact, 90-95% of people with hearing loss can be treated with hearing aids.

Myth #2: My Doctor Will Tell Me if I Need Hearing Aids

Actually, most busy general practitioners lack time to test for hearing loss. In a recent survey, only 23% of adults reported having their hearing screened during a physical exam. Even the Centers for Disease Control and Prevention (CDC) highlighted the issue, reinforcing to physicians the importance of catching hearing loss in the early stages. They reminded primary

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care providers to “make referrals to hearing specialists” when “patients show or report hearing problems.”

Myth #3: Hearing Aids are Too Hard to Use

In fact, today’s hearing aids have come a long way from those of just a few years ago.

Advancements in processing speeds and hearing science enable hearing aids to distinguish speech from noise, detect sound direction, and adjust to environments and specific sounds — all automatically. If fitted and programmed by a hearing professional to your unique hearing needs, your hearing aids can be worn all day with little fuss, attention, or adjustment required.

Myth #4: Hearing Aids Make Me Look Old or Stand Out

Today’s hearing aids are significantly smaller and more discreet than the old hearing aids and include options that fit deep in your ear canal, “invisible” to others.

Also, wearable communication and health-monitoring devices like FitBits and Bragi, along with the pervasiveness of headphones, have made body-worn accessories commonplace and even trendy.

“Old” is not a number, it is a perception. Adults who hear confidently and engage readily appear far younger than those who ask “what” all the time, don’t acknowledge when someone is talking to them, or disengage from the action.

Myth #5: Hearing Aids are Not Worth It

It’s one thing for us to tout the impact that hearing your best can have on quality of life, and quite another to hear it from people who’ve treated their hearing loss. There are an overwhelming

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number of testimonials that state the value and impact of hearing aids. The ability to hear clearly is taken for granted, and only when given a second chance, do people with hearing loss realize the value of hearing aids.

Myth #6: It's Not Me

It's not you; it's that outdated television set. Or the spouse who is always mumbling. Your first instinct is to pass the buck. It just does not occur to people that they have a hearing problem. If your hearing used to be good, why would you suddenly think it is failing? But that is poor reasoning, and wrong. Do not blame what you are trying to hear, the fault is more likely your hearing.

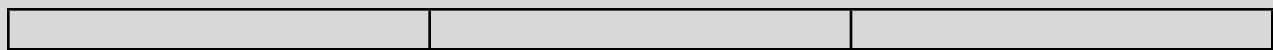
Myth #7: There's No Need to Worry Until I'm Older

While it's true that age is a strong predictor of hearing loss among adults, hearing loss can strike individuals of any age. According to the National Institute on Deafness and Other Communication Disorders (NIDCD), about 2 to 3 of every 1000 children born have a detectable hearing loss. About 15% of teenagers (12-19) have measurable hearing loss, and this number may be under-reported. According to the Centers for Disease Control and Prevention (CDC), roughly 5.2 million children and teens (ages 6–19) have suffered permanent damage to their hearing from excessive exposure to loud noise. Overall, approximately 15% of American adults (37.5 million) aged 18 and over report some form of hearing loss.

Myth #8: My Hearing Loss is No One Else's Business

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Many people with hearing loss may not understand how their hearing problem can make life difficult for those around them. It's not unusual for loved ones to feel anger and frustration when trying to communicate with someone who has untreated hearing loss. They may even eventually just stop interacting with you. Living alone with untreated hearing loss is an unnecessary hardship that can lead to social isolation, depression, and a host of other physical and psychological issues. Remember that your spouse, family members, friends, and coworkers want to communicate and connect with you. But if you cannot hear them, that is difficult or impossible.



CHAPTER 4

What is a Hearing Evaluation?

Your hearing healthcare professional will generally start by looking into your ears with a handheld scope, called an otoscope. They are looking for signs of abnormalities or medical conditions that could be contributing to your hearing concerns. In addition, it's possible you simply have a buildup of earwax that could be contributing to your hearing problem or it may prevent accurate testing and measurement of your hearing.

Then, your hearing will be tested. The testing procedure might vary between clinics and it may depend on your particular condition and concerns. For that reason, your testing might differ from other's who may have told you about their hearing test experience.

Your evaluation may include a pressure test to check the flexibility of your eardrum (and its ability to transmit sound). A tone test will be conducted to measure how softly you can hear tones of different pitches, the results of which are charted on an audiogram. Plus, speech tests

may be employed where you are asked to repeat words and/or sentences you hear at different levels.

Audiograms

By now, you have read multiple times that you should get your hearing tested if you suspect any type of hearing loss. A very common test you will likely get is an audiogram.

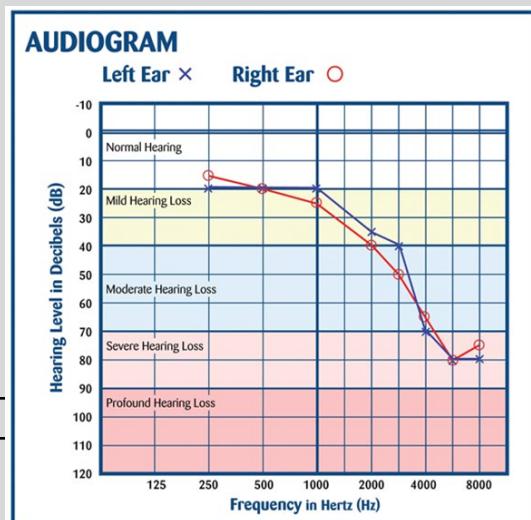
In the simplest of terms, this test exposes you to sounds at different frequencies and decibels. The frequency goes from low to high pitches, and the decibels range from low to high volume. A plot can then be generated that shows the lowest decibels at which you detect various pitches.

If you highlight the range at which we hear speech, you get a boomerang or banana shape on an audiogram plot, as seen in Figure 2. This is not surprisingly called the conversation banana.

When you have a hearing test, the audiologist will expose you to tones, covering the range of pitches played at various volume levels. This is done to determine the lowest decibel level at which you can detect the different pitches.

Also, each ear is tested independently. Your right and left ear are both tested at various pitches and the lowest decibel level you detect is plotted on the chart. Your right ear results are shown with an O and the left with an X.

So, after the test, you have a plot of your hearing abilities and can compare that to “normal” hearing levels. Results might look something like the sample plot seen in Figure 3.



It should go without saying, but a hearing **test** must be performed by a qualified specialist, an audiologist. This ensures your safety and reliable results.

Air Conduction

To assess each ear individually, audiologists usually use a headset and you will often be placed in a sound isolation room.

Tones are played for a particular ear and the sound from the speaker travels into your outer ear, through the middle, to the inner ear. That is how we hear most sounds, and audiologists call this air conduction.

The Xs and Os on an audiogram plot your ability to detect sounds using air conduction. It means that all parts of your ear are needed to detect the sound; the outer, middle, and inner ear.

But there is another way you can conduct a hearing test. A test method that bypasses the outer and middle ear, sending sound directly to the inner ear through your bones.

Bone Conduction

Instead of a headset, a bone oscillator can be placed just behind your outer ear, and sound can be sent directly to your inner ear. This allows the audiologist to generate a second set of results for your right and left ear. The left is usually marked with > and the right with <.

The bone conduction data allows a direct comparison to your air conduction results. If they are the same, it means sound travels through your outer and inner ear without resistance. It also means, that when hearing loss is detected by an audiogram, identical air and bone conduction results show SNHL is present. In other words, the hearing loss found during your audiogram is in your inner ear.

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However, if they differ, it is a sign of a problem in the middle or outer ear. A blockage in the ear canal, or fluid in the middle ear, can block or mute sound and this bone conduction test helps to isolate the problem.

Data like this helps the audiologist determine the precise nature of your condition for better diagnosis and treatment of your hearing loss.

Speech Audiometry

So, tones are played during a conventional audiogram test. But we communicate using words, and that is a different set of skills when it comes to hearing. For this reason, audiologists will often use speech audiometry. This helps them determine things like your speech recognition threshold (“SRT”) and word recognition score (“WRS”).

To conduct the SRT test, you are asked to identify various words that are played at different volumes. The audiologist will determine the lowest sound level (i.e. measured in decibels) at which you identify 50% of the words correctly. So, the results are reported as a range such as: SRT = 20 – 25 dB. The lower the decibels, the better your hearing is.

Another test used is the WRS (sometimes called speech discrimination score). In this test, you are read words at various volume levels, and percentage of correct answers is determined. The results are then plotted on a graph, the decibels on the x axis and the percent of words correctly identified on the y axis.

Normal hearing is indicated by an “S” shaped curve at the lower end of the intensity range. If you have conductive hearing issues, the curve will be similar, but moved a bit to the right (i.e. it takes a slightly higher volume to get through to the inner ear). A curve that never gets to 100% indicates cochlear issues. And an inverted curve indicates retro-cochlear problems (i.e. nerve related issues in the inner ear).

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Speech in Noise

For some, background noise can make a conversation almost impossible. This varies in individuals dealing with the issue, so it is important to understand each patient's needs when making out words in a noisy environment has become a problem.

Fortunately, there is a way to assess one's ability to hear in noisy conditions. Actually, there are a few tests.

Fixed signal-to-noise ratio ("SNR") tests measure the percent of words correctly identified while background noise is present. The SNR conditions are established by the clinician prior to the test, and remain unchanged throughout.

The advantage of the SNR test is that it provides a straightforward score, a single number. A patient can see their score both with and without certain hearing aids and it is easy to compare and understand the results.

But, a distinct disadvantage with SNR tests is that it is difficult to know where to fix the levels for the test. If the test is given at a very challenging SNR (e.g., -6 dB SNR), the results may underestimate the amount of benefit the hearing aids are providing the patient. If the selected dB level for the SNR test is too easy, the aided benefit may be overstated.

So, you must rely on the expertise of the audiologist when an SNR test is employed. This may make you wonder, is there another way to test speech in noise?

Yes, there are quick speech-in-noise ("SIN") tests. These are called quick SIN tests, because well they are quick.

A number of sentences are played while background sound is controlled at predetermined rates of SNR. As you might guess, the background noise increases with each sentence and it

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becomes harder to hear the sentences as the test progresses. The SNR loss is then calculated based on how well you repeated the spoken sentences.

Because the levels are predetermined, there is no guesswork and the SNR is obtained quickly. To help you understand SNR test results, the following may be helpful:

SNR Loss	Degree of SNR Loss	Expected Improvement with Directional Mics
0-3 dB	Normal/near normal	May hear better than normal in noise
3-7 dB	Mild SNR loss	May hear almost as well as normal in noise
7-15 dB	Moderate SNR loss	Directional microphones will help. Consider array mic.
> 15 dB	Severe SNR loss	Max SNR improvement needed. Directional mics ineffective. Consider FM system.

Articulation Index

An index was developed years ago to assess noise present in certain environments, like offices or car interiors, and rates the ability of people in these spaces to hear conversation. The method involves a fairly complex analysis, and some math, to get a number between 0 and 1, essentially the percentage of words that can be made out by a healthy, normal hearing person. This scale is referred to as the articulation index (“AI”).

It is not surprising to find that audiologists have attempted to use this technology to help patients who are not satisfied with how their hearing aids perform in noisy environments.

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The employment of AI, however, is not as easy to implement as some of the other tests available to audiologists. The math, in particular, can be a challenge.

An attempt to simplify the process using dots plotted on the patient's audiogram has been developed. It gives decent correlation to the actual calculations. This dot technique is easier and more approachable for the audiologists and it makes the technology more approachable.

Using AI can help solve one of the biggest challenges when fitting a patient with hearing aids. It can help people understand how certain hearing aids will benefit them in noisy situations.

Not being able to hear with background noise present is one of the biggest complaints about hearing aids. So, the ability to rate the patient's capacity to hear in certain environments with specific hearing aids using AI is a decided advantage.

Since AI considers the frequencies at which the human conversation takes place in the calculations, it helps get beyond some of the limitations of SRT and SNR tests. You can look at the use of AI as a method to identify the best form of amplification for your ears, and a way to maximize the use of your hearing aids, even in noisy places.

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CHAPTER 5

Degree of Hearing Loss

From the previous chapter, we learned about a number of different ways to test a person's hearing. But what do all these results mean? How do we classify the degree of hearing loss?

Well, in general, you will see it broken down into five to seven categories. Something like:

Degree of hearing loss	Hearing Loss Range (dB Hearing Level)
Normal	-10 to 15
Slight	16 to 25
Mild	26 to 40
Moderate	41 to 55
Moderately severe	56 to 70
Severe	71 to 90
Profound	91+

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You might have noticed the decibel levels in this chart also appeared on the audiogram chart. These ranges are generalizations, but they provide a quick and meaningful way to communicate what your hearing test results mean.

Normal (-10 to 15 dB)

Of course, normal means no loss and your hearing is good. Or, you are free from hearing loss.

Slight (16 to 25 dB)

With slight hearing loss, you may not even notice it. The things you might notice that are a little hard to pick up are whispers, dripping water, rustling leaves, and birds chirping.

Mild (26 to 40 dB)

People with a mild hearing loss often understand someone speaking to them if they are close to them, or if the room is quiet. But soft-spoken people and young children may be hard for someone with mild hearing loss to understand and noisy situations make conversation difficult. They may also think people are mumbling to them or their ears may feel plugged. With mild hearing loss, you often hear the loud, more intense vowel sounds but miss some of the softer consonant sounds. You may ask people to speak up or repeat themselves at times. Sometimes it also feels like there is something clogging or blocking your ears.

Certain consonants (/f/k/s/sh/) may seem very soft, and people with mild hearing loss will struggle to hear those sounds. This could lead them to think it is the people who are not speaking clearly or mumbling. However, the reality is often that your hearing that is struggling to hear those softer sounds.

Moderate (41 to 55 dB)

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In addition to missing softer consonant sounds, with moderate hearing loss the vowel sounds become more difficult to hear. People with a moderate hearing loss often comment that without hearing aids they hear, but can't always understand.

Moderately Severe (55 to 70 dB)

When you suffer from moderately severe hearing loss, without hearing aids speech is inaudible. Even with hearing aids, speech may be difficult to understand. Increasing the amplification doesn't always make it clearer.

Severe (71 to 90 dB)

Without hearing aids or cochlear implants, speech is inaudible.

Profound (91+ dB)

Without hearing aids, may be unable to hear very loud sounds like airplane engines, traffic, or fire alarms.

Audiogram Slope Descriptions

One last note on your hearing test results and the degree of hearing loss, you might hear names like ski slope or flat used to describe your audiogram plots. The slope of the line on your plot can be revealing about the degree of your hearing loss, and that is why your hearing specialist may refer to one of these names. So, a quick review of a few of the common audiogram slope names may be useful.

Ski Slope

The line on many audiograms is a line that slopes downward, left to right. It resembles a ski slope and it is the most common plot for those with hearing loss.

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But this particular plot also means that as the pitch gets higher, the sounds need to be louder in order for you to hear them. In short, you have trouble hearing higher pitched sounds.

This is often due to sensorineural hearing loss, or SNHR. It can be difficult to hear children's voices or high-pitched female voices if you suffer from this condition. Also, the ski slope often indicates you can often hear without difficulty in a quiet room, but it is very difficult to hear in a noisy place especially when there are many people talking.

Flat

Hearing loss which shows up as a relatively flat, but lower, line on your audiogram is called a "flat loss".

It means that your hearing is diminished such that for all frequencies, low and high, you need a higher volume than those with "normal" hearing. The lower the line on the audiogram, the louder the sound must be for you to hear it.

A flat loss is relatively uncommon and is often caused by a conductive problem rather than a sensorineural problem.

Reverse

You might have wondered when you read the ski slope description, can the down slope be from right to left?

The answer is yes, and on the rare occasions where it occurs, this is referred to as reverse-slope hearing loss. That is because, well the slope is reversed from the more common ski slope plot.

A plot like this reveals you cannot hear the lower frequencies well but detect the higher pitches more easily.



This is a somewhat rare condition and it can be hard to recognize on your own. But you will have trouble hearing lower pitched sounds, like a deep male voice.

The reason may be genetic, or inherited through a dominant gene. Another cause is Wolfram syndrome or Mondini dysplasia. Certain diseases or problems including sudden hearing loss, Ménière's disease, and viral infections can also cause reverse-slope hearing loss. Anything that causes a change in pressure of the fluid in the inner ear, called endolymph, can result in reverse-slope hearing loss. This change in pressure can be induced as a result of spinal or general anesthesia, intracranial hypertension, and perilymphatic fistula.

Reverse-slope hearing loss can pose a potential safety issue if left untreated. Since it is hard to detect on your own, regular hearing assessments are crucial, even if you don't perceive that there is a hearing loss issue.

Cookie Bite

If you have hearing loss in the middle range frequencies, your audiogram will be shaped like the letter U. This is also known as cookie-bite hearing loss, because it looks like someone took a bite out of the graph.

Cookie-bite hearing loss is due to an impairment in the cochlea or auditory nerve. It is not a conductive problem, such as fluid in the middle ear or earwax build-up.

A cookie bite hearing loss is often hereditary and is commonly first discovered when a child has a hearing test. If this is the case, the parents are usually tested and that sometimes reveals a cookie bite hearing loss in the mother or father. This kind of hearing loss is most often discovered when they have passed the age of thirty.

So, cookie-bite hearing loss can be congenital, something you're born with or develop over time due to genetics. But there are some infrequent reasons for cookie-bite hearing loss

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other than genetics. For instance, a rare benign tumor, known as vestibular schwannoma or acoustic neuroma, can lead to this mid-frequency hearing loss.

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CHAPTER 6

Of Note

Hearing vs. Understanding

There exists a distinct difference between hearing and understanding; they are not the same. As we have earlier discussed, hearing a sound requires all the parts of your ear to work properly. Further, to understand what you have heard, the sound must be transmitted properly to the brain. And once the brain receives that signal, it must process that information for you to understand it.

Too often, we underestimate how important brain processing is to understanding speech. In fact, the effort to process speech goes up exponentially compared to the effort to hear the sounds.

If you add background noise, or other distractions, it is possible to hear something but not understand it. Our brains perform functions and process huge amounts of data. But if there is too much going on, we cannot focus on everything.

It is a fact that we can only focus on one thing at a time. For those who are now screaming “I multitask all the time,” yes, you probably do. But your brain is rapidly switching

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from one task to another. So, technically, you are still focusing on only one thing at a time. And you are likely exhausted at the end of a work day because it causes your brain to work harder.

Have you ever turned down the radio in the car while trying to find a destination? Most of us have instinctively done this because we know our brain needs to focus. Background noise is just another thing that requires brain power, so removing it allows our brain to allocate more resources to find where you are going as you drive.

But here is the interesting part. If you really want to hear what a news announcer is saying about some big piece of breaking news, we might pull over to focus on listening to the radio. Same issue, our brain, as powerful as it is, focuses on one thing at a time.

When we need to really understand something, we instinctively tune out all else to focus on what is important. In both examples, driving the car and listening to the radio are both being done at the same time. But if the driving is most important to not get lost, we tune out the radio. However, when the radio is playing something we need to understand, we stop to eliminate the distraction of driving. It is a matter of what is most important for you to understand.

That includes what someone has said to us. If we are in a noisy public place, like say a restaurant, our brain overloads. You are reading a menu, trying to pick what you want for dinner with all kinds of activity going on around you, and it is buzzing with chatter and clinging plates. Even people with great hearing will struggle to understand in this environment at times.

If inner ear damage has caused a degree of hearing loss, then it is even harder to understand. You only get a partial message and your brain tries to fill in the blanks. This forces you to concentrate harder than usual on the speech, but unfortunately it often leads to an unintelligible message. This is where hearing aids can help.



Technology has allowed hearing aids to become quite advanced. Most contain processors inside that can still allow background noise to be heard, but they also make the speech more prominent and easier to pick out.

An audiologist can help you select a hearing aid with the best chance of correcting your hearing issues. They will also set them up and tailor them to your particular needs. With the right hearing aids, you can hear what is being said, all of it. So, your brain has a better chance of understanding what is being communicated to you.

It is not always a lack of hearing that prevents you from understanding, and you should keep that in mind before you blame your hearing aids. Even people with good hearing will struggle in very noisy, busy places to hear at times. If our brain is forced to concentrate on too many things at the same time, the words and sentences we hear cannot be understood.

But that also means you should consult with an audiologist and get the best hearing aids for your condition. Everyone is unique and so is the type of hearing aid that will work best for you. That includes proper customization to match your exact hearing loss conditions.

Hearing vs. Listening

We have all had it happen, someone speaking to us asks, are you listening to me? But have you ever wondered, what does it mean to listen? Is listening different than hearing? You need to know the answers to these questions if you want to communicate well with others.

In short, hearing is a physical process of transmitting sound waves through the outer and middle ear, to the inner ear, where the waves are transferred into a nerve signal that is sent to the brain. Think of it as a form of data collection.

The brain then collects and processes the data. It is how we understand what we hear. But listening means we concentrate on it, focus on it. Yes, we can choose what data we focus on.

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When it comes to speech, what we concentrate on is a very important part of how we communicate.

Researchers have gone so far as to identify two types of listening, active and passive. Everyone uses both types of listening, but not always at the right time.

A passive listener is not interested in contributing to the conversation. We often do this at work or school, but it is a poor way to communicate with people. Our minds may be thinking of other things, or we might be engrossed in some background music. The result, we never ask questions and contribute little or nothing to the conversation. In many cases, without realizing it, we miss bits and fill them in ourselves. In effect, we create a false story from what was said to us.

In contrast, an active listener asks questions and stays involved in the conversation. They are curious and engaged. If you are trying to solve a problem, active listening provides the interaction and clear messaging that is necessary. For effective communication, you need an understanding of all sides of the discussion. Without active listening, you will fail to find common ground or identify solutions to problems.

So, active listening helps with understanding. But it requires concentration, a concerted effort to ask questions and be curious. Of course, whenever possible, you will want to use active listening and there are a few things you can do to promote it.

1. Be curious.
2. Ask questions.
3. Do not jump into the discussion too early or cut others off.
4. Consider everything said thoughtfully.
5. Focus on the subject, refuse to be distracted by side issues.

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6. Admit when you are wrong and move on.
7. Avoid filling in gaps and needlessly making up stories.

As you can see, listening is a skill that we can hone. Of course, if you suffer from hearing loss, it is important to get the treatment you need. The passive listening problem affects those with good hearing, as well as those with hearing loss. But to properly listen actively, you do first need to hear and understand the messages being transmitted to you.

Processing Both Active and Passive Listening

The difference between passive and active listening is so profound, that our brain even processes the message differently depending on how we listen. And that impacts how we respond and act to what is communicated to us.

Researchers studying children found that when they were actively listening, the brain used more resources, including the attention and memory portions of the brain. So, they were more likely to remember conversations and details. This finding shows the importance of actively listening when trying to solve a problem or coming to a mutual understanding with someone.

Note, we can choose what to concentrate on. This means we can directly impact on how we listen, understand, and remember what people say to us. Active listening may take as little effort at times, but it also provides many benefits.

Effects of Maturing

Age related hearing loss is called presbycusis. We mentioned earlier that 1 in 3 people over 65 years old suffer some form of hearing loss. And of those over 75 years old, half experience some degree of hearing loss.

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The suspected cause has to do with damage to the hair cells in our cochlea that convert sound waves to nerve transmissions. Loud noises can damage these hair cells, but as we mature there may be age related damage, too.

The gradual loss of hearing presents one of the difficulties in growing old. If the loss is very slow, we do not notice it and wait too long to get help. So, if you think you might be showing signs of hearing loss, see a hearing specialist immediately.

Signs can include:

- Speech or others sounds are mumbled or slurred
- High-pitched sounds, such as "s" or "th," are hard to distinguish
- Conversations are difficult to understand, particularly when background noise is present
- Men's voices are easier to hear than women's
- Some sounds seem overly loud and annoying
- Tinnitus (ringing in the ears) may occur in one or both ears

Codependency

Hearing loss is obviously difficult for the patient, but it also impacts the loved ones around them. In some cases, a spouse or other loved one may even try to become the ears for those dealing with hearing loss.

Some “helpers” will try to repeat things their loved one may miss, interpret messages, and make them feel everything is normal. There is a need, or maybe an instinct, inside us that makes us want to make our loved one feel everything is alright. That there is no reason to seek help for their hearing loss.

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But this is a big mistake. It can make the helper a servant to them, causing an endless stream of demands of the helper. Even worse, a little voice inside may start saying this is wrong. The helper starts to realize; their loved one is dependent and needs a helper in order for them to understand and get through the day.

At some point the codependency is too obvious to ignore, and the helper has to ask if they are willing to break the cycle. This can be heartbreakin. For many, being needed by a loved one gives them purpose. It makes us all feel good to help others in need. But it also ignores or covers up the underlying hearing problem, and it makes things worse over time.

If you are in a codependent situation, you need to realize the hearing loss needs to be corrected. This may be hard to discuss with a loved one. But a good start is to first be honest with yourself. If you are not honest with yourself, you can never be honest with your loved one.

And you may need to be more honest than you think. Your loved one might think there is no problem. Those who believe there is no problem will see no reason to seek help. Let them know there is a problem. That stress, frustration and even negative feelings are part of your experience. It is all too common to find a loved one with hearing loss is oblivious to the feeling of their codependent. A good first step is to be honest with each other and admit, there is a problem.

Importantly, there is plenty of help out there for you. Audiologists and hearing specialists are aware of what you and your family are dealing with. They understand the challenges and the importance of returning as much of the hearing as possible using hearing aids. So, you do not have to solve the problem alone, but you do need to admit there is a problem before you can seek help from others.

For your reference, ask yourself if you experience any of the following:

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- Anger with your loved one for not getting help.
- Internal questioning on whether you are contributing to the problem.
- Annoyance with repeating yourself or filling in gaps.
- Resentment for being their ears.
- Thinking your loved one cares more about their self-image than their hearing.
- Thoughts or resentment about your loved one's vanity.
- Frustration with conversations where hearing loss related problems make it difficult.

If you experience any of these, you are likely a codependent. You need to take action and get your loved one the health care they need for their hearing.

Hearing Loss and Anger

An interesting article compared the hearing loss experience to those who face terminal diseases or severe disabilities. Those who face horrible sicknesses and challenges often go through five stages of loss. In case you cannot remember them, the stages of loss for terminal patients are denial, anger, bargaining, depression, and acceptance.

While not terminal, hearing loss also presents unique challenges. It is not visible to others, so it is harder for hearing people to know you are dealing with a disability. Plus, there is a misperception that hearing loss is a "mild" form of disability. Of course, they are wrong to assume this and they do not understand the challenges that those suffering from hearing loss face.

We previously discussed the depression caused by isolation and loss of social interaction caused by hearing loss. Depression is one of the five stages of loss.

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But another, earlier of the five stages of loss often shows when you are dealing with hearing loss - anger. This stage comes after denial, which many with hearing loss are also guilty of doing. Too many tell themselves, it is so minor I can ignore it.

Of course, they are wrong and eventually they become frustrated. Even worse, if you are dealing with some form of hearing loss you may start to ask, why me? Or, why don't others try to help to help me hear things? This path quickly leads to anger. Some will even become angry with their audiologist for not making them hear better.

But becoming mad and lashing out at others only makes matters worse. You need to work with others, especially your audiologist. To optimize hearing aids for your condition, you need to establish a good relationship and communicate with those helping you. Only through your solid feedback can an audiologist tune and hone your setup to get the most out of your hearing aids.

If a loved one with hearing loss exhibits anger, try to understand what they are going through. Put yourself in their shoes, offer help, and get past the anger to seek out and find the help needed from experts and doctors. You may have to go through the bargaining phase to get to acceptance. But in the end, you and your loved ones will be happier and live a more productive life.

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CHAPTER 7

Hearing Aids

Hearing aids come in many price ranges and sizes, and they offer a number of features as well as different methods of ear placement. Everyone's hearing loss is different as is the hearing aid that will work best.

So, we will begin with a description of the most common hearing aids that you may come across. Size is key consideration, and many patients want the hearing aid to be small, real small. Almost invisible. But the smaller hearing aids may not have enough power or features to work for your hearing loss issues. With that in mind, we will start with the smallest available hearing aids and work our way up to the largest.

Styles

Completely in the Canal (“CIC”) or Invisible in the Canal (“IIC”)

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As the name implies, this hearing aid is small enough to fit completely into your ear canal. It is molded to fit your ear and it works with mild to moderate hearing loss.

The CIC and IIC are the smallest and least visible hearing aid. Because it sits inside your ear, this is also the least likely to pick up wind noise. Another advantage, there are no parts or wires to snag and accidentally pulling out the hearing aid is unlikely.

However, the battery is very small and has a shorter life. Also, the tiny batteries can be hard to handle.

Feature wise, you will not find many extras like volume control or a directional microphone. This inside-the-ear hearing aid is also susceptible to earwax collection in the speaker.

In the Canal (“ITC”)

Next up in size is the ITC. It too is custom molded to your ear and comes in a variety of colors to match your skin. It partially fits in your ear canal and works well with mild to moderately severe hearing loss.

Because it sits inside your ear, there are no external parts or wires to get snagged or tangled. Accidental pulling these out is also difficult for this reason.

The ITCs are less visible than larger styles and includes features that the smaller CICs and IICs cannot incorporate. But adjustments may be difficult for most people due the small size of the ITC.

Like the CICs and IICs, the ITC is also vulnerable to ear wax clogging the speaker. So, you will have to clean these regularly.

In the Ear (“ITE”)

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You will find the ITE actually comes in two styles, the full shell and the half shell. These are custom fit to your ear and come in a variety of skin colors.

The full shell fills in most of the bowl-shaped area of your outer ear. As you might guess, the half shell fills only the lower part of this bowl-shaped area.

Both of these can help people with mild to severe hearing loss. They also come with more features than their smaller counterparts, such as volume control. Because they are a bit larger, some find these easier to handle and adjust.

The same is true for the larger battery. It too is easier to handle, but it also lasts longer.

Because it fits into your ear, the speaker can become clogged with ear wax and you will have to clean these regularly.

You may pick up more wind noise compared to smaller devices. Also, this hearing aid is more visible in the ear than smaller hearing aids.

Behind the Ear (“BTE”)

The BTE hooks over the top of your ear and sits behind the pinna. A tube then connects the hearing aid to a custom earpiece called an earmold that fits into your ear canal. The BTE comes in various colors and is easy to handle/use.

This hearing aid is appropriate for people of all ages and those with almost any degree of hearing loss.

Also, the BTE hearing aids have traditionally been the largest, though some newer mini designs are smaller and barely visible.

The BTE is capable of more amplification than other styles, but it may pick up more wind noise.

Receiver in Canal (“RIC”) or Receiver in the Ear (“RITE”)

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The RIC and RITE are similar to a behind-the-ear hearing aid. But the speaker or receiver is in the canal and a tiny wire, rather than tubing, connects the two pieces.

This hearing aid works with mild to severe hearing loss and comes in a variety of colors.

It is also easy to operate, there are no small, difficult to operate buttons or dials.

The advantage to this design is it puts less bulk behind the ear and it is less visible. But the part inserted into your ear is susceptible to ear wax clogging and you will have to clean the speaker often.

Open Fit

You may find the behind-the-ear hearing aid in an open-fit design. The difference from the BTE is the open-fit design uses a thinner tube. This design keeps the ear canal open so outside sound can enter as well, which allows low-frequency sounds to enter the ear naturally. Higher frequency sounds are amplified using the hearing aid.

This is a good choice for people with mild to moderate hearing loss. An open-fit hearing aid is less visible and does not plug the ear like smaller ITC hearing aids do. This also helps to make your own voice sound better to you.

Because they are a bit smaller, they are often a little more difficult to handle and adjustments may require you to work with small parts.

Features

Single Microphone

An important aspect of our hearing is directionality. Sound comes at us from all directions, and our ears work to pick up as much of the sound as possible. They even have the ability to help us identify which direction the sound emanates from. But hearing aids do not pick up sound like our

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ears do. Instead, they use a few different microphone technologies and arrangements to deal with directionality. So, microphone technology can vary from one device to another.

A single microphone hearing aid uses one microphone. This is usually a directional microphone, and it is designed to pick up sound from one direction. Normally the focal point is just in front of a person wearing the hearing aid.

This directional microphone works well in noisy environments and allows its wearer to focus in front of them without the distraction of background noise. That means you can hold a conversation at a party or crowded restaurant.

The obvious weak link is noises or sounds that are not in front of you are not picked up. But there is a new technology called adaptive directional microphones. These have the ability to change the focal point based on the sound and noise levels around you. The design is intended to allow you to clearly hear conversations in various environments, but also let you pick up other important sounds around you using only a single microphone.

Multiple Microphones

Another technology often used to address directionality incorporates an omnidirectional microphone together with a directional microphone.

An omnidirectional microphone picks up sound in all directions. For hearing conversation in a noisy environment, omnidirectional microphones alone are not the best choice. The background noise is caught and amplified the same as the speaker's voice.

But an omnidirectional microphone can be used with a directional microphone. When a sound from the side or behind you is caught, the hearing aid switches to the omnidirectional microphone and then it switches to the directional microphone for conversations. When set up

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properly, you can have a clear conversation in a noisy environment but also hear if another person were to cut in. Or you could pick a commotion off to the side of you.

So, multiple microphones working together help to bring you more of the sound around you. It helps ground you and immerse you in the conversations you have and the events you attend.

As technology advances, we are sure to see different arrangements with the various types of microphones, but the goal is always the same. Reduce background noise so that it is heard but does not drone out conversations so that you get maximum speech intelligibility.

Noise Reduction

Background noise reduces the ability to understand speech. The greater the noise, the greater the reduction in intelligibility.

However, hearing aids now have the ability to analyze what is being heard and filter out the background noise. The end result is noise reduction or cancellation.

When functioning properly, noise reduction allows someone with hearing loss to more actively participate in conversations because they clearly hear more of what is said to them. With these obvious benefits, it is not surprising to find noise reduction being built into more and more hearing aids.

Because it is filtering certain noises, the noise cancellation feature must be tuned properly and your audiologist is trained to help you find the best settings for your unique hearing loss problem. This is a critical step in getting this technology to work for you.

Also, because you are going to find yourself in various environments, some hearing aids have manual controls on the hearing aid that let you adjust the noise cancellation as needed, depending on where you are and how much noise is around you.

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Telecoil

Telecoils, sometimes called t-coils, are thin copper wires coiled inside a hearing aid. This copper coil allows the hearing aid to receive magnetic signals from various sources that can be transformed to sound you can hear on your hearing aids. The t-coils are easy to use when installed in a hearing aid and usually are activated by the simple touch of a button.

Surprisingly, this technology is old. It was originally developed for the land-line telephones to help those with hearing loss speak on the phone. While modern cell phones do not generate magnetic signals, many still have equipment built into them that can generate a magnetic signal. This allows your cell to still work specifically with t-coils inside a hearing aid.

But t-coils can also help you hear much more...

Loop System

Many public places have what are called hearing loops. This means they have the ability to broadcast wireless magnetic signals in a way that your t-coil can pick up and amplify what is being said right on your hearing aids. So, if you are inside a loop system, you can hear the audio in places like a church or auditorium clearly using your hearing aids.

With the implementation of the Americans with Disabilities Act (ADA), assisted listening must now be provided in public assembly areas without audio amplification. This includes places like courthouses, movie theaters, live theaters, and public classrooms.



Loop technology is also being installed more frequently in airports, public libraries, and healthcare facilities. Some states are even mandating that all new state funded projects must incorporate loops.

Look for the special sign to see if a hearing loop is installed. It is a white ear on a blue background with the letter T on the lower right.

You can also go online for lists of places that are loop accessible like loopfinder.com or time2loopamerica.com.

Hearing Instruments that Work Together

It is possible to find you need a cochlear implant in just one ear. It is often because one ear has different or more severe damage. Or it may be because insurance will only cover the cost of one.

But the ear without the implant may benefit from a hearing aid. In fact, it has been demonstrated that users with only one cochlear implant benefit greatly from wearing a hearing aid in the other ear.

With both ears receiving improved sound, users have reported things like superior sound quality, improved sound source localization, better speech recognition in noise, and more music appreciation.

So, to address the particular cause of your hearing loss, multiple hearing instruments may be necessary to work together and provide the best solution.

Band and Channels

These two terms are important to know when discussing hearing aids. But they are often misunderstood.

Channels are “sections” of the frequency range. So, a given number of channels splits the audible frequency range up into that many “parts,” from low to high pitches. For example, a hearing aid with eight channels will break up the audible range into eight parts. The more channels, the more detail, or granularity, your audiologist has to fine tune the way the hearing aid performs and what pitches to increase or decrease.

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The bands are what allow for volume control. Hearing aids may have a band for each channel or multiple bands per channel. Just like with channels, your audiologist or hearing specialist can adjust the volume in each band to meet your needs.

So, are more bands and channels better? To a point. Some say eight bands and channels is enough. At some point more bands and channels don't really provide a noticeable improvement. Speak with your audiologist or hearing specialist about the number of hearing channels and bands they feel are enough for your condition.

You want enough to have the fine tuning necessary to let you hear. But there is a point where additional channels and bands begin to provide diminishing returns.

Whistling and Feedback

If you wear hearing aids at some point you will experience whistling problems. This a common issue, even if most people are unaware of what causes it.

The most common cause of whistling in hearing aids is feedback. This occurs when sound intended for the ear canal escapes the ear and is picked up again by the microphone, where the hearing aid reamplifies it. Feedback sometimes sounds like squealing but with hearing aids it usually comes through as whistling.

Whistling is sometimes a sign that there's something wrong with your hearing aid. But it usually not a fault within the equipment. It could be as simple as the way you put the hearing aid in that morning. Or something in your day could cause the hearing aid to shift and leak noise. Sound could even bounce back from your surroundings in an odd way at times. It is normal and will happen on occasion, but should not be frequent.

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Many hearing aids come with feedback cancellation, but it is not always effective. To prevent feedback in your hearing aids, and the resulting whistling, there are some things you can do.

- Get your hearing aids fitted properly.
- Don't set the volume too high.
- Check the tube to the earmold (if used), it could be broken.
- Keep things clean. Too much earwax can cause problems.
- Reset microphones if they dislodge. (Your audiologist should perform this task.)

Bluetooth Connection

Today we take Bluetooth for granted. We connect keywords and other peripherals to our computers or phones without so much as a second thought.

But hearing aids also employ Bluetooth. So, you can connect your smartphone, TV, computer, and more to allow streaming clear audio directly to your hearing aids.

Bluetooth enabled hearing aids wirelessly connect you to your electronic devices and deliver you undistorted sound from those devices direct to your ear at a volume you can hear. This eliminates things like turning the TV volume up too loud for those with good hearing.

To work with hearing aids, “regular” Bluetooth technology requires too much power. To solve this problem, hearing aids use low energy Bluetooth (BLE). This technology reduces power consumption while maintaining communication range and reducing some delays.

BLE also solves another problem. Users usually need to connect two devices since they have two ears with hearing aids. But BLE does allow for this and provides a solution to this potential problem.

Television, Remote Microphones

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There are a number of accessories you can use with your hearing aids. Two of the more popular are:

1. Devices designed to connect you directly to your TV, and
2. Remote microphones that let pick up someone speech by placing the mic closer to them.

Some hearing aids will connect directly with custom devices that plugs into your TV or other electronics. They send the sound directly to your hearing aids to let your experience clear sound. Most are designed to use analog or digital sound inputs.

Hearing a speaker in large rooms can be a problem. As can talking to people in very noisy rooms. But there are wireless microphones you can place on or near the speaker, and pick up what they say right at the source. The sound is then sent directly to your hearing aids where it is amplified for you to clearly hear.

These remote microphones also work well in noisy places. You do not need to avoid your favorite restaurant, or other raucous places, when you can zero on the voices or sounds you want to hear using a remote microphone.

Brain and Body Score

Some hearing aids can connect to apps on a phone and provide you with some powerful tools. Among these, you will find that some hearing aids even help you monitor your health.

In one particular app, it even separates your body and brain scores. You can actually track your physical and mental health over time and see how you are improving.

The two scores are also combined into an overall score, giving you a overall view of your health. Technology now allows you to put your hearing aids to work in ways only imagined a

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few years ago. But now, they can help with physical and mental health, as well as letting you hear better.

This technology is available on particular hearing aids, so you need to make sure this feature is included on any device you consider if monitoring your brain and body health is important to you.

Fall Alert

We talked earlier about the serious threat that falls present for the elderly. But some hearing aids now include fall protection. If you fall while wearing your hearing aids, they will send an alert to get you the help you need.

You can select up to three contacts who are alerted if you do fall. Once they are alerted, they can call you to check and get help if needed. The alert also contains GPS information to make finding you easier.

In the event an accident occurs and the automatic alerts fail, there is also a manual alert that is activated by simply tapping the hearing aid when a fall or some other accident occurs.

Fall protection is not found on all hearing aids, so check the features for any device you consider if you want fall protection. Or ask your hearing specialist which hearing aids have a fall alert feature.

Translation

This may sound like it is right out of a science fiction movie, but yes hearing aids can also translate languages for you. And it is easy to use.

Simply select your native language and that of the other speaker. When you speak into your phone, what you say is translated and displayed on your phone. They can then read what you said.

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When they speak into your phone, it is again translated and presented in your language on the phone's screen. But it also streams what was said to your hearing aids so you can actually hear what they said, in your language.

If you travel or deal with other languages on a regular basis, this might be a good way to use your hearing aids to give you an advantage. But like some of the other advanced features we discussed here, it is only found on certain hearing aids.

Intelligent Assistants

As you have seen, some hearing aids offer more than just making sound louder to help you hear. Different models are manufactured with custom, powerful built-in tools.

In this age of personal electronic assistants, it is not surprising to find some hearing aids come with a personal assistant. Ask a question like "What's the weather?" and you will get an answer, right on your hearing aids.

But even more powerful, you can use this digital assistant to troubleshoot the hearing aids and accessories. An example would be to ask, "How do I customize my hearing aid settings?" With this tool, you can then make a number of adjustments on your own, without seeing your hearing specialist.

Need help in finding your misplaced hearing aids? Your phone can also help find your lost hearing aids. With your phone's assistance, you have a find my hearing aids tool, that lets you see the strength of the signal from the hearing aids. You know if you are getting "hotter" as the signal gets stronger and it leads you to the mislaid hearing aids.

You can also use your hearing aids to make the phone ring. This allows you to find the phone when you've misplaced it.

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So, with an assistant on your phone linked to your hearing aids, you have powerful “tools” at your disposal. Hearing aids with a built-in assistant, powered by an app on your phone, provide many ways to improve your quality of life.

Manufacturers and Brands

Conduct an internet search and it will seem like there are hundreds of hearing aid manufacturers. The number of names you see is actually overwhelming if you are trying to choose one.

But this is an illusion. You are seeing a number of different brand names. And the truth of the matter is six manufacturers make the vast majority of hearing aids under many brand names.

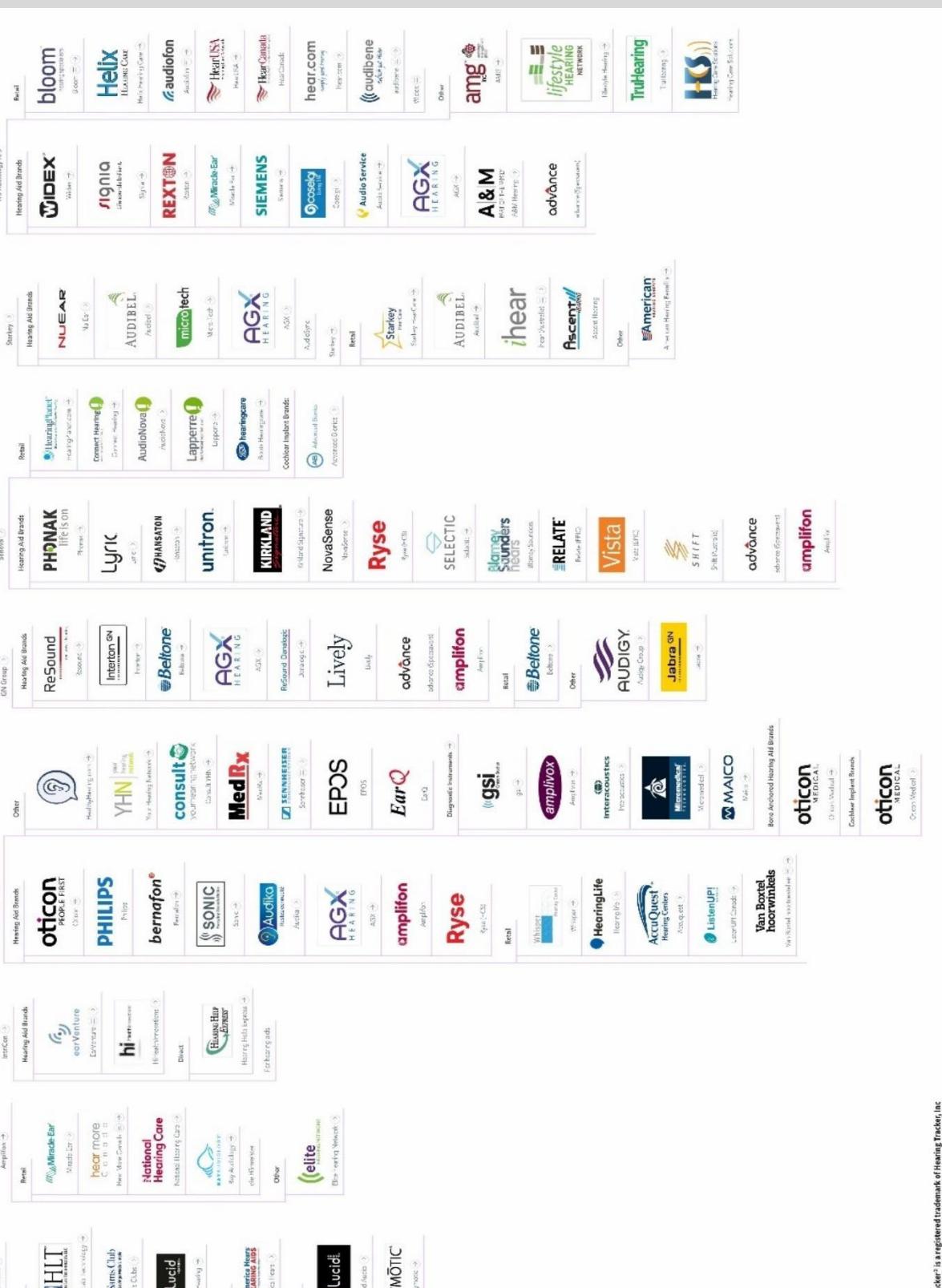
The “big” six as they say in the hearing aid industry are:

Manufacturer	Brands	% Market Share
Sonova	Phonak Unitron Hansaton	6%
WDH	Oticon Bernafon Sonic	6%
GN	Resound Beltone Interton	6%
Sivantos	Signia/Siemens Rexton	6%
Starkey	Starkey Micro-Tech NuEar	11%
Widex	Widex	8%

A matrix for the various company names and all their associated brand names follows.

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Over the counter/ internet sales

You would not buy over the counter prescription glasses since the need to have the lenses customized to your particular eye issues is critical. But if you think about it, you can buy reading glasses at your local pharmacy.

The hearing aid industry now faces a similar issue, because recently, over the counter (“OTC”) hearing aids have been made available to the public. These OTC products are affordable and easy to buy, but the hearing healthcare industry is engrossed in a hotly contested debate about their usefulness. So, what are the advantages and disadvantages of OTC hearing aids?

Well, we just touched on two key benefits already, OTC hearing aids are cheaper and easy to buy. You just need to make a trip to your pharmacy, or you can even order online. Also, once patients experience some benefits, they may be more inclined to finally see a hearing specialist and get better, properly fitted hearing aids.

However, there are some significant concerns. For a hearing aid to work well, it must be fit properly. Everyone’s ear is shaped differently, and most people cannot do this themselves. If the aid is improperly fit, you will not see much benefit.

Part of a “proper fit” involves finding the best settings to match your hearing loss issues. The bands and channels must all be set correctly for your hearing loss. But on your own, that is almost impossible. Many OTC buyers will even purchase hearing aids without getting a hearing test. So, they do not know what their hearing loss issues are. Plus, adjusting the setting takes some skill which most consumers do not have.

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Another concern is OTC hearing aids may discourage people from getting proper care. If a patient does not experience better hearing with the OTC product, it may discourage them from seeking help from a hearing specialist or audiologist in the future.

Plus, there exists an important disadvantage you need to keep in mind. These hearing aids are often bought to address the hearing loss, without a medical exam. But the hearing loss might be a symptom of a larger health issue that only a qualified professional can diagnose. That means that any underlying health issue is not found or treated.

So, OTC hearing aids may make hearing aids available to those who cannot afford them and offer some benefit to the millions of people who deal with hearing loss. But be aware there are significant downsides and keep these issues in mind when deciding if OTC hearing aids are right for you.

It is not an exaggeration to say the debate over OTC hearing aids in the hearing healthcare industry is likely to continue. Time and experience with the products will guide us in the role OTC hearing aids can and should play in the market.

Bundled vs. Unbundled

As the number of accessories and features associated with hearing aids increases, it becomes even more important to get the help of a qualified specialist. But how much care do you really need? Why pay for features, accessories, and office visits you do not need or will never use?

Those are good questions and the industry has responded to address them. When you deal with hearing loss, you do not just buy hearing aids. You also need services like hearing tests and fittings, as well as various accessories. All of which are part of getting the most from a very complicated and expensive device.

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One of the methods you may encounter involves “bundling” all the cost involved with buying hearing aids into a single price. That includes things like the hearing test, hearing aid evaluation, fit, orientation, training, and aural rehabilitation. Plus, you may need follow-up care for a number of years.

The advantages of bundling are many. It is a simple pricing structure and everything is included. You have peace of mind, nothing to worry about. The downside is you prepay for services that you may never use. And often, you pay upfront instead of spreading the payments out over time.

Unbundled means you pay as you go, for each service and item as you need them. This is similar to the way you receive eye and dental care. This lowers the up-front costs and some feel this is a more transparent way to buy hearing aids and aural care. Also, if you have used hearing aids prior and already have extensive experience with them, then going the unbundled route might make sense since you will likely need less help. But over time, many find the expense can end up being greater than the quoted bundled price.

Another variation between the bundled and unbundled purchase of hearing aids is the “partially” unbundled purchase. To be more transparent, some providers offer an itemized bundle for only the services and items and you want and need. This presents the pricing breakdown, so you know up-front, and you do not pay for features or items you do not want. It also usually includes the important follow-up visits. This makes the initial costs higher than an unbundled purchase, but lower than a fully bundled package. So, you get transparency and peace of mind that you will get the care you need. But you do not pay for future services you may never use. It depends on your needs and whether you want to eliminate the worry about getting and paying for future care.

It is important to note, hearing professionals know the importance of receiving help from a trained specialist. For this reason, they often like to see patients get some future services over the lifetime of your hearing aids bundled into the purchase. It allows them to provide the help you need, when you need it. Follow-up visits are critical to get the most out your hearing aids and to prevent your hearing loss from getting worse over time.

Third Party Plans

For far too many people, their health insurance does not include hearing related issues. Neither the visits and tests, nor the hearing aids, are covered under numerous health insurance plans. When faced with an expense that could run in the thousands, the absence of insurance becomes a major obstacle for the uninsured trying to deal with their hearing loss.

Insurance companies also know hearing loss can be expensive to treat. It is why they often exempt coverage. To fill this void in health care coverage, a number of specialized companies have sprung that offer an add-on as part of your health insurance. They are designed to get you the aural care you need, at a better price. These companies buy in bulk from the hearing aid manufacturers, and because of this, they keep the costs down.

It gets even more complicated in that the health care insurance companies often offer this service directly to customers. They want to keep their patrons happy, and they know lack of coverage for hearing loss is a problem. So, some will offer you custom services to help lower the costs of getting hearing aids, without you knowing it brings in a third party that specializes in hearing loss.

This is an important detail, though, as most of these third-parties specializing in hearing aids require you visit a doctor, hearing specialist, or hearing aid dispensary from a list of approved vendors. You *must* stay within their network. It is how they keep the costs down.

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This is a problem for some patients, since you may not be able to visit with a hearing specialist or doctor you like. If they are not on the approved list, you have to see someone else, period. However, you will likely save money by using the third-party plans and staying within their network. For some patients, these third-party plans work and provide access to care they could not otherwise afford. But for others, they feel limited by having to stay within the approved network.

Also, as a patient you need to do your homework to learn about the companies involved in the plan and the people providing you service. In many cases, the third-party plan will send you to a hearing aid dispensary. This means you may not have an audiologist or hearing specialist help you select and fit your hearing aids. For this reason, some feel hearing aid dispensaries are a roll of the dice. If you are concerned, specifically ask to see a certified audiologist or hearing specialist.

Telehealth

With today's sophisticated communication technology, we connect with others in more ways than ever. With the advent of video calls, telemedicine has become a reality. Today, you now have access to aural care without the need to go into the audiologist's office.

Simply using your phone, tablet, or computer, you can receive care via a video call. The hearing specialist will be able to help you with general support, training, and counseling. That includes discussing things like fit, which is especially important to those with new hearing aids. Plus, depending on the hearing aids you have, the audiologist may also be able to perform tasks like fine-tuning certain fittings and settings.

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Conducting visits with your audiologist via a video call is convenient for many people. But for some, it opens up better access to professional care when they cannot easily get into an office. Plus, it may even save a few dollars on things like gas money and taxis, or Uber.

For those who have trouble getting around, like the elderly, telehealth allows them to get the benefits of an office visit, right from their own home. This convenience makes it more likely for them to seek out help and to make more frequent “visits” with their hearing care specialists.

So, there are benefits to telehealth. But there is one issue to be aware of, privacy. Electronic communications can be compromised and your health care data can be exposed. The privacy and security of your information is important and without proper safeguards, trust in using telehealth will wane.

To address the issue, there are laws and regulations to protect your data. The Health Insurance and Portability and Accountability Act (“HIPAA”) outlines regulations that must be followed when it comes to any personal health data. And that includes video calls.

One of the safeguards you can take is to ask if the software used by your audiologist’s practice is HIPAA compliant. Many of the software packages used for hearing treatment are HIPAA complaint these days, but not all. So, it is worth verifying the software used by your provider to ensure it is HIPAA compliant.

CHAPTER 8

Getting a Hearing Aid

You have choices when it comes to where you go for your hearing loss care. But most of your options will fall into three main categories. These are audiologists; ear, nose, and throat doctors (“ENTs”); and dispensaries.

Dispensaries

~~Dispensaries exist to sell hearing aids. Employees are not required to have an education in audiology or hearing loss. Consequently, the experience and tools to match your hearing loss to a particular hearing aid is not as sophisticated or is absent. Because the employees are not educated or degreed in audiology, they are not permitted to treat children. They serve adults only.~~

~~Dispensaries are also not allowed to bill Medicaid or Medicare. For those who rely on this form of insurance to pay medical bills, this is something to know ahead of time. Plus, they may charge for the follow-up visits. In some cases, this added costs make dispensaries more expensive than the other options over the life of the hearing aids.~~

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~~Cochlear implants are not something dispensaries can provide examines for nor can they help in programming the implants.~~

~~Further, many dispensers are established by retail chains and big box stores and they are usually focused on generating sales, not on providing health care. So, in summary, you may spend a few dollars less upfront, but you get what you pay for. The level of care you receive will likely be less compared to your other options.~~

Ear, Nose, and Throat Doctor

ENTs are degreed doctors and their area of expertise is diagnosing and treating diseases and disorders in the head and neck. They can conduct surgery and are also able to prescribe medicine. Some may specialize in certain areas like allergies, sinus conditions, head and neck cancers, etc. But they usually do not specialize in hearing loss.

Interestingly, ENTs will sometimes include an audiologist in their practice. They recognize the similarities in the two disciplines while also acknowledging the significant differences. The audiologist brings the experience and knowledge in diagnosing and treating hearing loss, including the dispensing, fitting, and fine-tuning of hearing aids. This adds to what an ENT can offer their patients in-house.

But it also highlights the difference between an ENT and an audiologist. They are two distinctly different forms of health care, but they do work together often.

Audiologist

An audiologist is trained and degreed in aural health care. They are experienced in diagnosis, testing, evaluation, and treating hearing loss. The focus is on treating your particular condition and that often includes testing of hearing sensitivity and speech understanding. Plus, they will

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determine the condition and functionality of your inner and middle ear, as well as the auditory nerve.

Audiologists are required to have a Doctorate of Audiology obtained by graduating from a four-year undergraduate program followed by a four-year doctoral curriculum. As such, they are approved to see patients of all ages.

An audiologist is also expert in the design, selection, and fitting of hearing aids. It is a big part of what they went to school for and learned. They also are qualified to monitor for ototoxic drugs (i.e. prescribed medicines and over the counter drugs that cause damage to your ears). Chemotherapy, radiation, and other treatments can also be a potential threat to your auditory system, and the audiologist can help to monitor for these problems as well.

Your sense of balance is also associated with the ears, and audiologist can diagnose and treat disorders in your vestibular system. Falls are a serious threat as we get older and maintaining a good sense of balance is more important than many are aware.

Also, audiologists help handle ear wax issues and treatment. They are uniquely qualified to help you keep your ears healthy, as well as keep your hearing aids clean and in working order.

Young students rely on hearing to learn. So, audiologists are also qualified to design, install, and monitor classroom amplification systems in a school. For auditoriums and other public areas, it may even be required by law in some states. An audiologist knows how to help you comply and address students' needs in these situations.

Tinnitus affects so many people. But dispensaries and ENTs are not the best choice for diagnosis and treatment. Audiologists are the best qualified to evaluate and manage ringing in the ears.

Audiologists are doctors and can recommend medicine. But if prescribed medication is required, you will be referred to an ENT or general practitioner.

However, they do counsel patients and their families. They can also teach you how to best care for and protect your ears to prevent further hearing loss. An audiologist is knowledgeable of the latest technologies and developments in the field of hearing loss and is best equipped to help those dealing with the issue.

So, in short, audiologists are the health care specialists focused on diagnosing and treating hearing loss. You will find some audiologists who run their own practices. But you may also find them working in schools, ENT offices, or other related practices where the specialized knowledge of diagnosing and treating of hearing loss is needed.

Dispensing a Hearing Aid

No matter where you choose to get your hearing aids, they must “dispensed” to you. What does that mean? Well it is more than just selling you a particular hearing aid(s).

You need to be tested for a number of things. The data has to be analyzed and used to select and fit the hearing aids to work with your condition. Then, over the months, or even years, the equipment must be fine-tuned over time to dial in the settings to function at full potential as your condition changes over time. It is common practice to pay for all this up front, and it is often referred to as dispensing the hearing aid, or aids if you need them in both ears.

Successfully dispensing a hearing aid comes down to three key components that are critical to ensure the benefits of amplification are maximized. They are:

- The patient,
- The instruments, and
- The provider.

1. The Patient

The patient needs realistic expectations and must realize hearing rehab is a process that takes time. They hold much of the power over the successful use of the hearing aids and they are a vital link in the process.

The patient must acknowledge that they have a hearing loss and be motivated to put in a consistent rehabilitation effort. For example, they must wear the hearing instruments and provide routine care and maintenance as directed by their hearing specialist.

Also, they must schedule and attend routine servicing, maintenance and testing of the devices and hearing levels. Without the patient's commitment, it is very difficult to achieve maximum results with their hearing aids.

2. The Instruments

It may seem obvious, but hearing aids vary in quality and features. And just like any major purchase, you should buy a good set of hearing instruments from a reputable manufacturer. There are many brands on the market, but many are made by the same manufacturer.

Research the features and quality of a particular hearing aid and the manufacturer you might be considering. It helps you to make sure you get the quality and features you need for your hearing loss.

The audiologist can also help you with evaluating different hearing instruments. They are expert in this area, so consult with them and ask questions. You will be relying on these instruments to help you interact and socialize. These hearing instruments are important to you and worth the time it takes to research them and ask some questions.

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Finally, a patient should keep the current technology and features at an appropriate level for their hearing loss and goals. Do not skimp. But also avoid going overboard. It is possible to pay for features you do not need or will not use. So, scrutinize and select your hearing aids wisely. And always buy quality instruments from a reputable manufacturer.

3. The Provider

Just as a physical therapist would help someone with a severe injury learn to use certain muscles again, a hearing specialist provides products, services, and recommendations to help “rehabilitate” your hearing.

This involves hearing tests and data analysis. Based on the findings, they then must match the best available hearing aid to your needs. This is done to maximize the chances for proper amplification based on your aural condition.

Once you have the hearing aids, then the provider must verify that the instruments are working properly and make adjustments to provide the correct amplification. This adjustment process is actually an ongoing procedure and you will need to make follow up visits over time to get this fine-tuning done. As noted earlier, this is why it is important for those with new hearing aids to follow the provider’s advice about when and how long to wear the instruments. You need to get used to using them, and they will likely require further adjustment as you acclimate to them, then as your health changes as you get older.

As you can see, the provider has much to do working directly with their patients. But they must also be up-to-date on the latest testing methods and technology. Staying current requires significant time and effort behind the scenes. They also keep up with the industry procedures and

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regulations and follow best practices. Again, this happens out of the patient's view, but is a vital part of what a good provider must do for their practice to be one of the best.

Of course, you want a great provider to help you address your hearing loss. But there are many things that go into being a good provider. The best providers are adept at evaluating, fitting, customizing, educating, adjusting and servicing their customers. So, do your homework and use a reputable audiologist or hearing specialist. They are a key part of the aural rehabilitation process.

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If any of these three core components are missing or compromised, it will significantly affect the performance of your hearing aids. In other words, you want to be sure all three of these factors are properly accounted for to maximize the success with your hearing aids.

The Hearing Journey: The Hearing Aid Fitting Process

Too many people wait too long to get help when dealing with hearing loss. Early detection and treatment provide many benefits. So, yes, see a specialist if you suspect you are suffering symptoms of hearing loss.

But that is just the first step in a process. You will be tested and evaluated to determine your precise condition. What frequencies do you hear well, and which ones do you hear poorly? How well do you comprehend speech? We reviewed this testing in detail earlier in the book.

But then there is the selection of the hearing aid(s), discussed in the last chapter. They vary greatly in features and price. So, it is an important step.

However, one of the critical steps in your journey to better hearing is the fitting of your hearing aids to work with *your* condition. Everyone is unique and the hearing aid must be fine-tuned to work its best for you.

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Yes, that means it has to fit your ear and be comfortable. The provider will make refinements as needed to provide a snug, comfortable fit in your ear.

But “fitting” also requires the audiologist to take all the data acquired about your aural condition and setup the hearing aids to provide the best possible amplification for you to hear well.

With eyeglasses, you just put them on go. Not so with hearing aids. You may have to make a few visits to get the settings just right so you can hear as well as possible, in all situations. It requires your commitment to working with your hearing specialist.

The audiologist will rely on your input for many of the smaller adjustments and many of these can be quite difficult to get just right. Often, this takes time, possibly months, to get it perfect. Your commitment and patience are a vital part to obtaining the best fit and hearing results from your hearing aids.

Also, ask questions during this period. You are learning a new skill, how to use and care for hearing aids. It is complicated and your hearing specialist appreciates this fact. They are a valuable resource that can help you understand and use your hearing aids to their full potential. So, ask any question you may have during the fitting process.

Another aspect that might seem a bit unusual is the adjustment process. You may be given a schedule for when to wear your new hearing aids. This is to let you get used to the hearing and processing new sounds. Over time, the brain stops devoting resources to understand certain sounds since it no longer is receiving them. But when you reintroduce them, it can take some time for your auditory system to recover and deal with the new sounds again.

So, a rehabilitation schedule allows you to exercise your aural system. It allows your brain to get used to hearing these sounds again and ease back into things. But you must be

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faithful to the schedule. As with any workout; you have to consistently stick with it to get the desired results. The same is true with your auditory system. You need to follow the recommended schedule, or any other recommendations given to you, for the faster and better results with your hearing aids.

Some tips as you travel your hearing aid fitting journey:

- Don't get discouraged or give up.
- Expect one or two visits to fine tune your hearing aids the 1st month.
- Tinniness sounds are normal at first. Give your brain time to reacquaint to the new sounds.
- It is normal for your voice to sound funny, but give it time, it will get better.
- Background noise is normal, even for those without hearing loss. It is part of the sounds we take in every day.

Some other things you can do to ease into using your new hearing aids. Choose a quiet environment to begin using your hearing aids. You might not want to wear your new hearing aids in crowded or noisy environments until you have adjusted to them in your own home.

Listen carefully to the many forgotten sounds in your home, like the refrigerator, furnace, or the sound of turning the pages of a book or magazine. You will get used to hearing them again.

Practice having a conversation with your spouse or loved one. Make sure your television and radio are turned off. Facing each other, sit no more than seven feet apart. Practice looking at the speaker's mouth. Remember, much of communication is visual. Practice reading out loud. You will slowly adjust to the loudness of your speech while wearing your hearing aids. It is normal at first for your voice to sound different. Don't worry; soon it will sound familiar again.

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Play “Hear Coach: Repeater” on nuear.com/care. Hear Coach is a series of fun, interactive listening games designed to improve your ability to listen in noise. If you become fatigued, remove your hearing aids and take a break. After a couple of hours, put them back in.

Even with all these items checked off, you may still need small adjustments as you become used to your new hearing aids. Do not get discouraged. Yes, it may take months to get it all just right, but to hear well again in all situations is worth it. That bring us to...

Follow-up and Maintenance

The need for follow-up visits cannot be overstated and should occur regularly. As already mentioned, your audiologist can fine-tune your hearing aid settings during these visits. But there a number of other things that occur during these visits.

They may retest your hearing to check if anything has changed. It is not different than eye care. The ability to see or hear can change over time, so it must be retested every now and then.

During your follow-up visits, the provider will check the fit. Anything causing pain or soreness will be refined.

Follow-up visits also help a provider to get your input. You may still have trouble hearing

Troubleshooting Tips

If your hearing aids aren't working like they should, try these tips before bringing them in for servicing.

HEARING AID IS “DEAD”

POSSIBLE CAUSE	SOLUTION
Depleted battery or “dead” battery	Replace the battery
Wax or debris in microphone, receiver, earmold or dome	Clean the microphone and receiver with a brush Change the wax prevention system

HEARING AID ISN'T LOUD ENOUGH

POSSIBLE CAUSE	SOLUTION
	Clean the microphone and receiver with a brush

in certain situations, like hearing speech in a noisy environment. With your input about what you are experiencing, they are better informed to make adjustments.

They also have tools, like auditory therapy computer games and counseling to help you learn how to hear and understand better. So, follow-up visits bring a slew of benefits, which is why they are so important.

Then there is maintenance. Of course, providing good care for your hearing aids will help them perform as expected and last longer. The maintenance is something your provider can teach you, and you should follow whatever they recommend. But hearing aids are equipment, and we all know equipment can break or fail.

Fear not. Your hearing aids will likely come with some sort of warranty. But your provider can often help you with some repairs when necessary. They can also often help or guide you through the manufacturer's warranty to get replacement hearing aids or repairs, if your equipment is still under warranty.

FAQs

Do I need hearing aids for both ears?

While you might assume you only need a hearing aid in one ear, ask your hearing specialist. Everyone's needs are different and you may need hearing aids in both ears. If you do, an audiologist can explain why your brain can better interpret sound with amplification in both ears. You are not alone if you do need two hearings aids. According to the Better Hearing Institute, about 90 percent of patients need hearing aids for both ears.

Which hearing aid is best for my particular type of hearing loss and lifestyle?

Hearing aids are designed to fit specific types of hearing loss as well as different lifestyles. The more information you give your hearing specialists about your daily activities, listening environments, and lifestyle, the more likely they will be to recommend the best hearing device for you. Take a few minutes before your appointment to list the things you do regularly. Include recreational activities as well as social interactions and your work environment. This will help

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you provide your audiologist the needed information when the issue of selecting a hearing aid arises.

When I purchase hearing aids, are there additional costs?

In many audiologist's offices, follow-up hearing care is included in the price of your hearing aids. Some hearing centers include the price of adjustments, repairs, batteries and check-ups while others do not. Some dispensaries and big box stores do not include the follow-up visits, repairs, or batteries. Make sure you understand what is included so you can budget for the additional costs, if necessary.

How often do hearing aids need to checked or adjusted?

It may take a few adjustments in order to help you hear well, and that may require a visit to your aural care provider. Each audiologist will have a different philosophy on what kind of follow-up schedule is best for their patients. But it is not uncommon to have two or three follow-up visits each year.

What is the expected useful life of hearing aids?

Hearing aids are fairly durable, but they will eventually wear out. Your hearing specialist cannot tell you exactly how long a particular product will last for you, but they should be able to give you an expected or typical lifespan. Asking this question also leads into the importance of caring for your hearing devices to maximize their performance and lifespan.

What does the warranty cover and for how long?

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Different manufacturers have different warranties. So, you do need to ask and research this question a bit. But knowing the warranty basics for devices you are considering helps you decide whether you need to purchase additional insurance coverage. You should also make sure the hearing aids are protected against loss and theft under your homeowners' policy.

What happens if I am not satisfied with the hearing aid performance?

Many practices offer a trial period once you are fit with your hearing aids. This is done specifically to so you can live with them for a while. You can see if you are satisfied before you pay the bill. If you have concerns, a trial period is a good way to try the devices and assess them ahead of time.

Do I Need to See a Doctor?

Whether or not you must see a doctor depends on your age. **If you are under 18 years old, yes, you must see a doctor prior to obtaining hearing aids.** However, legal adults can buy hearing aids over-the-counter or online without seeing a doctor first.

Skipping the doctor visit is not wise or recommended, though. Hearing loss is caused by many things. For example, you may have wax build up in your ears that makes it hard to hear and assume you have “normal” hearing loss. Should you just buy off-the-shelf hearing aids without seeing a doctor, they will not work. But a doctor could spot earwax build up and prevent a mistake like that from happening.

Think about it, buying hearing aids without an examination and proper hearing tests is like going to the airport and getting on the first plane to depart. Some might do just that and accept wherever it is they end up, but most would not.

When buying hearing aids, you need to know the best route for you to travel. To do that, you need the details about your aural health upfront to make sure the hearing aids will work for you. If you do not see a doctor and get an examination, you do not have all the information to make a good decision. You may have an underlying health problem you are unaware of that needs treatment.

People who skip the doctor visit are buying equipment without knowing what issues they need to address. They are simply hoping it can amplify sound in a way they can hear it. It is not an exaggeration to say it is a roll of the dice.

One last note about seeing a doctor. If you have Medicare, your doctor can refer you to an audiologist for a complete hearing test at no cost to you. So, there are many, many benefits to seeing your doctor, and it may be more cost effective than you think.

Hearing Aid vs Personal Sound Amplifiers

If things were not complicated enough when buying and acclimating to hearing aids, you may run into something called personal sound amplifiers (“PSAs”). A hearing aid and PSA both take in sound, amplify it, and send it to your ear canal. So, what’s the difference?

Well, the difference is significant. A hearing aid is designed to compensate for hearing loss. A PSA is not; it is intended to amplify sound for people without hearing loss to cope in certain environments, such as keeping an ear on a baby in another room. PSAs have also been marketed to bird watchers and theater goers to help them hear in these difficult situations.

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As such, PSAs are normally of lesser quality than a hearing aid and cheaper. They come with fewer features and most PSAs are not focused on helping people with hearing loss.

But there are some products sold as PSAs that are marketed for people with hearing loss. The use of these to treat and rehab hearing loss is controversial. Chances are, they will not fit as well as a hearing aid; this is not a good start. Plus, if not used properly, they can damage your ears. Even worse, it may delay a patient from seeking proper medical care and cause deleterious health consequences by putting off a proper diagnosis.

However, if you do some homework, it is possible to use a PSA to address hearing loss issues. But only if you have mild hearing loss. A PSA will not help those with more advanced hearing loss. You should get proper care and have hearing aids properly fitted to address your needs if you have moderate to advanced hearing loss.

If you do consider a PSA, make sure you get a good quality one. You should look for:

- Printed technical specifications. If a product has none, skip it.
- High gain in the 1000 to 2000Hz range. Avoid those with high gains in the lower frequencies.
- Noise input level less than 30dB.
- Volume control, it is critical.
- Maximum saturation sound pressure level (“SSPL”) under 135dB. A SSPL of 140dB or over will cause pain in the ears.

A hearing aid is a better choice. But the reality is, it is more expensive. So, PSAs do make amplification available for those on tight budgets as they cope with hearing loss. But whether you opt for a PSA device or hearing aids, you should consider seeing a doctor first. The

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input you receive from an examination, and hearing tests, is critical prior to using either choice to help to make the right choice and avoid damaging your ears further.

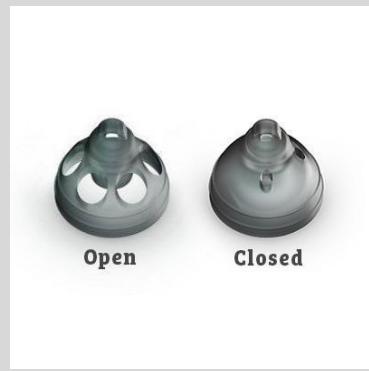
Closed vs. Open Domes

With certain hearing aids (e.g. RIC and RITE devices), the earpiece inserted in your ear may use a dome to help direct the amplified sound from the hearing aid into the ear. But the configuration of this dome is important. It can have openings in it, sometimes called vents, or it can be closed.

Why have different styles? Good question and the answer is important.



Open domes, those with openings or vents, allow air and some external sound to enter directly into the ear. Closed domes do not have vents and the only sound delivered to your ear is the amplified sound from the device.



Closed domes work well for those with severe hearing loss. With a closed dome, all the sound you hear comes through the amplified output of the hearing aid. It allows the user to isolate and focus on the sound from the hearing aid without any outside noise getting in. For some forms of hearing loss, this is helpful. However, it can

create an issue for some users. Audiologists call this problem occlusion. It is a feeling that your ears are blocked and sounds seem hollow. For example, your own voice may be too loud and booming.

Open domes are usually best for those with mild to moderately-severe hearing loss and they do eliminate occlusion. This is because the “vents” allow air and sound from outside the ear to enter the ear canal, which prevents the occlusion. However, because some sound can get in, at

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high gains you may get some feedback and the noise reduction is not as good as it is with closed domes.

So, whether you should use open or closed domes depends on the degree and nature of your hearing loss, and whether or not occlusion is an issue for you.

Costs

Hearing aids are expensive. But they are an investment in not just your aural health, but your overall health. As we discussed earlier, hearing loss impacts your balance, mental condition, social interactions, and more.

But the question of how much you should expect to spend is usually a concern. As with most things you can buy, the price ranges from a few hundred dollars to thousands of dollars. A range often quoted is \$500 to \$6,000. It is unlikely you will pay less than this for a pair. But it is possible to pay even more. It all depends on the reason for your hearing loss and what features you need/want.

We are starting to see the big box stores and retailers offer hearing aids. A pair can be found for under \$1,000 fairly easily. Some pairs are even around or under \$500. But remember, you must fit and adjust them on your own. And that is after you make your selection hoping to match the device with your degree and type of hearing loss.

If you buy an over-the-counter hearing aid at a pharmacy, or online direct from a manufacturer or dispenser, you may save some money. These hearing aids are in the range of \$500 to \$2,000 per hearing aid (\$1,000 to \$4,000 per pair). But you can spend more.

A pair of hearing aids, bought through an audiologist's practice, averages a cost of just under \$4,000 according to Consumer Reports⁴. But you probably guessed it, you can spend more

⁴ <https://www.consumerreports.org/hearing-aids/ways-to-spend-less-on-a-hearing-aid/>

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than this depending on what conditions you need to address with your hearing loss and the features you need or want. But this price will often include follow-up visits and other items and services not found when buying hearing aids through other venues.

What is the Best Hearing Aid?

We saved the one of the most asked questions for last. It seems basic. But when you ask, what is the best hearing aid? You are really asking, what is the best choice for my specific condition that includes all the features I want? Patients' conditions and desired features vary and the answer to the question, therefore, also varies.

So, the answer then comes down to having a reliable diagnosis in hand to identify which hearing aids are designed to help with your particular hearing loss condition. Add the features you want or need, and that will zero in on what the best hearing aid(s) is *for you*. The best choice is the one that "matches" your aural health needs and your life style.

You are not alone in finding the best hearing aid, though. If you do work with an audiologist, they can counsel you on what hearing aids will provide the best performance for you. They will also listen to concerns, such as whether or not you want the hearing aids completely out of sight, and factor that in as well. Features like being small and out of sight and advanced features like language translation can impact the choice of which hearing aid will satisfy you in daily use. The audiologist is trained and experienced with all the hearing aids they sell and can help you decide which is best.

CHAPTER 9

Resources

Future Development

Hearing loss is sometimes treated as “minor” disability. But fortunately, the researchers and innovators understand the importance of good hearing. They are hard at work to improve the technologies and products available to those with hearing loss.

The methods of testing and analyzing hearing loss are continuing to evolve and incorporate things like the building the articulation index right into the hearing aids and/or your electronic assistant. This helps to cut down on background noise and make speech more prominent. In other words, expect the ability to hear speech in noisy environments, and discriminate words, for those with hearing aids will continue to improve.

Research has revealed a protein in the hair cells in our inner ear. The decline in this protein levels in the hair cells has been linked to hearing loss. So, research is being done hoping to find a way to reestablish this the protein levels in an attempt to “heal” age related hearing loss.

Technology is bringing us marvels like electronic assistants that communicate to you right in your hearing aids. Or, you can answer your phone and get things like your music, TV, or public speeches directly on your hearing aids. These sorts of innovations are expected to improve, and you will likely see more devices and methods that send sound directly to your hearing aids over time.

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Falls are a major problem for the elderly, and hearing aids with built-in fall protection provide the best fall protection for a number of reasons. So, hearing aids with fall protection will likely become more prominent in the market. With the advantage of having the fall protection device on the head (i.e. in the ears), false alarms are far less likely and your loved one will have immediate attention if they do fall.

Obviously, getting help when a loved one falls is important. But another feature expected to be found on hearing aids in the future, monitoring your gait. This can actually find an increased likelihood to fall and let you know *before* a fall. Stopping a fall from happening might sound like it is something from a movie, but it is something that you might see in hearing aids in the future.

The translation feature is expected to become more popular and improve. Our world continues to shrink and that means cultures with different languages are coming together more frequently. Being able to use your hearing aids to translate and communicate with someone who speaks a different language is a powerful tool. This feature is expected to improve and become more popular in hearing aids in the future.

We mentioned remote microphones earlier. These are a separate accessory that you clip on someone to “isolate” them by having a mic close to the source. But you can expect that your phone will be able to act as a remote microphone that brings the speech direct to your hearing aids. This is just another way that your phone and hearing aids, working together, will become more powerful.

Your hearing aids may even become devices measuring your blood composition. There is work in fine ways to let them read your blood gases right through the hearing aid.

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If that is not enough, working with your phone, hearing aids may be able tell how hard you are working by evaluating your pupil dilation. With this information, it may be possible for your hearing aids to adjust and fine-tune themselves, based on how the level of stress you are experiencing.

They may even have a fitness tracker built right into the hearing aid to collect data about your workout. Plus, these are expected to be more accurate than wrist worn devices.

Hearing aids may even be able to track your cognitive load in the future. So, it is expected that your hearing aids will be used in a number of ways help monitor your health.

Not to be forgotten, battery technology is evolving and research is under way to make batteries smaller. This technology is expected to find its way into hearing aids. Making hearing aids smaller and more discrete is a primary goal of many researchers.

And there is more. But hopefully we have touched on enough examples to demonstrate to you the exciting the future for hearing aids. Significant advances are expected and they all will improve hearing for the hearing impaired, as well as improve the overall quality of life. The future is bright and full of hope for those dealing with hearing loss.

Resources

For more information, the following list of resources compiled by the Centers for Disease Control on hearing loss contains numerous resources you may find valuable.

Intervention and Family Support Services

[The Alexander Graham Bell Association for the Deaf and Hard of Hearing \(AG Bell\)external icon](#)

International nonprofit membership organization, support network, and resource center on pediatric hearing loss and spoken language approaches and related issues.

[American Society for Deaf Children](#)

A national organization of families and professionals that helps create opportunities for children who are deaf and hard of hearing to gain full communication access, particularly through the use of sign language.

[Better Hearing Institute](#)

Provides comprehensive information on hearing loss, tinnitus, and hearing aids, as well as a directory of hearing care providers (audiologists, hearing instrument specialists, and otolaryngologists).

[Bright Futures at Georgetown University](#)

The mission of Bright Futures is to promote and improve the health, education, and well-being of infants, children, adolescents, families, and communities.

[Council on Education of the Deaf](#)

This site facilitates informational sharing and collaborative activities within the field of deaf education.

[Early Childhood Technical Assistance Center \(ECTA Center\)](#)

The Early Childhood Technical Assistance Center is funded by the Office of Special Education Programs to improve state early intervention and early childhood special education service systems, increase the implementation of effective practices, and enhance the outcomes of these programs for young children and their families.

[Family Voices](#)

A national, grassroots organization that is a clearinghouse for information and education concerning the health care of children with special health needs.

[Hands & Voices National](#)

Nonprofit, parent driven organization that provides support to families with children who are deaf or hard of hearing. Includes links to individual state chapters.

[Hereditary Hearing Loss](#)

Aims to give an up-to-date overview of the genetics of hereditary hearing impairment for researchers and clinicians working in the field. This site lists data and links for all known gene localizations and identifications for nonsyndromic hearing impairment.

[Laurent Clerc National Deaf Education Center](#)

Provides information on various topics related to deafness, including topics of interest to parents of children with hearing loss and multicultural issues.

[My Baby's Hearing](#)

Babyhearing.org was created to answers parents' questions about:

- Infant hearing screening and follow up testing
- Steps to take after diagnosis of hearing loss
- Hearing loss & hearing aids, language & speech
- Parenting issues

[National Association of the Deaf \(NAD\)](#)

Provides information on programs and activities including grassroots advocacy and empowerment, public awareness, deafness-related information, legal assistance, and policy development.

[Center for Parent Information & Resources](#)

Provides information on:

- Disabilities in children and youth
- Programs and services for infants, children, and youth with disabilities
- IDEA, the nation's special education law
- No Child Left Behind, the nation's general education law
- Research-based information on effective practices for children with disabilities

[National Center for Hearing Assessment and Management](#)

Provides information on newborn hearing screening programs, legislation, equipment, and other related issues.

[The SKI-HI Instituteexternal icon](#)

Offers training and service programs for family-centered, home based service programs for children with special needs, including children with hearing loss. The institute offers outreach programs to Utah citizens, and to families and professionals in nearly all 50 states and Canada.

Government Agencies

[U.S. Preventive Services Task Forceexternal icon](#)

An independent panel of experts in primary care and prevention that systematically reviews the evidence of effectiveness and develops recommendations for clinical preventive services.

[Health Resource Services Administration \(HRSA\)external icon](#)

Provides information about children with hearing loss and Universal Newborn Hearing Screening programs.

[National Institute on Deafness and Other Communication Disordersexternal icon](#)

Federal government's focal point for biomedical and behavioral research in human communication. Website provides information about hearing, ear infections, and deafness.

[National Library of Medicine \(NLM\) Newborn Screening Coding and Terminology Guideexternal icon](#)

Includes standard codes and terminology for newborn tests and the conditions for which they screen, and links to other related sites.

[The Office of Special Education and Rehabilitative Servicesexternal icon](#)

OSERS supports programs that help educate children and youth with disabilities, provides for the rehabilitation of youth and adults with disabilities and supports research to improve the lives of individuals with disabilities.

Professional Associations

[American Academy of Audiologyexternal icon](#)

Provides consumer and professional resources related to hearing care.

[American Academy of Family Physiciansexternal icon](#)

A national medical organization of more than 93,000 members (family physicians, family practice residents, and medical students).

[American Academy of Otolaryngology-Head and Neck Surgeryexternal icon](#)

Organization of physicians dedicated to the care of ear, nose, and throat disorders. This site provides health tips and information related to hearing disorders. It also provides a tool to find otolaryngologists throughout the United States and Canada.

[The American Academy of Pediatrics Newborn and Infant Hearing Screeningexternal icon](#)

Provides information and resources on newborn hearing screening and hearing loss in infants and young children including articles, videos, fact sheets and training materials.

[American Speech-Language-Hearing Association \(ASHA\) Newborn & Infant Hearing Screening Action Centerexternal icon](#)

Provides information for the public, professionals, and students about communication and communication disorders.

[Joint Committee on Infant Hearingexternal icon](#)

Made up of representatives from national organizations dedicated to ensuring early identification, intervention and follow-up care of infants and young children with hearing loss. Since its establishment in 1969, JCIH has issued position statements with guidelines for early hearing detection and intervention. The JCIH website provides copies of these position statements as well as other information on the Early Hearing Detection and Intervention (EHDI) initiative.

[National Business Group on Healthexternal icon](#)

Provides practical solutions, including identifying and promoting best practices among large employers.

[National Center for Cultural Competence \(NCCC\)external icon](#)

Mission is to increase the capacity of health care and mental health care programs to design, implement, and evaluate culturally and linguistically

competent service delivery systems to address growing diversity, persistent disparities, and to promote health and mental health equity.

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Denis Murnane, BC-HIS

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Denis Murnane is a board certified hearing instrument specialist, and owner of Community hearing services. He is a well known industry professional and lecturer. This book is full of information learned over a 35 year career helping thousands of individuals hear better.

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