Hearing Health Care: Information for the Health Professional

by Meryl Epstein , Randi Gerson , Alisa Ivanutenko , Jake Marsden

The purpose of this article is to provide all health care providers with a complete overview about hearing loss, treatment for hearing loss, and the role of the audiologist, in addition to reviewing other areas within the scope of practice of audiology. There are now over 32 million Americans with some degree of hearing impairment, many of them elderly. Common causes of hearing loss can be associated to the different parts of the ear. For example, a loss associated with the outer ear can be attributed to excessive accumulation of earwax and infections of the auditory canal such as swimmer's ear. Losses associated with the middle ear, known as conductive hearing loss, can be attributed to perforation of the eardrum, infection or fluid in the middle ear, and to otosclerosis, which is a calcifi cation around the middle ear bones limiting their ability to move. Many outer and middle ear problems can be treated with medication or surgery.

The majority of hearing impairments are a result of damage to the inner ear structures. Hearing impairments associated with the inner ear structure or further up the brainstem are referred to as sensory or sensorineural hearing losses. Typical causes are the natural aging process, excessive exposure to noise, medication that is toxic to the auditory system (such as drugs used to treat cancer aggressively), and head injuries. Damage caused to the inner ear structures can generally not be reversed or treated but can be largely overcome by the fitting of amplification devices (e.g., hearing aids).

HEARING TESTS AND DEGREE OF HEARING LOSS

A hearing test is performed using an audiometer and the results are charted on an audiogram, a graph of the patient's hearing test results. The test precisely measures the extent of the hearing loss. The "O" symbol represents the results for the right ear and the "X" for the left ear. Pitch or frequency rises from bass to treble as you move from left to right on the graph. The lower the Xs and Os are placed on the graph, the more volume is necessary to hear those tones. Each ear is measured separately using headphones or earphones. The extent of the loss may differ between ears. Both the perception of sound and the understanding of speech are measured.

Between the two extremes of hearing well and hearing nothing there are many degrees of hearing impairment. The terms mild, moderate, severe-to-profound, and mixed are used to categorize hearing loss.

A mild hearing loss is defined when results are just outside the normal range of hearing (0-25 decibels). Impacted earwax may cause a mild hearing loss. People with a mild hearing loss are unable to hear soft sounds and can have difficulty understanding speech in a noisy environment.

A moderate to moderately-severe hearing loss is identified when the auditory thresholds fall between 40 and 70 decibels. Those with a moderate to moderately-severe hearing loss have difficulty processing many sounds, especially in the presence of noise. The energy behind consonant sounds like /s/, /f/, /th/, and /sh/ is much softer than for vowels and these sounds are not audible to those with a moderate to moderately-severe impairment.

Those with a severe to profound hearing loss have difficulty hearing most sounds. In general, normal conversational level is 50-75 decibels. With this extensive loss (thresholds below 70 decibels), conversation is perceived at very low levels if at all and hearing aids are essential for speech understanding and environmental awareness such as noise alarms.

High-frequency hearing loss is common and defined as the inability to hear high-pitched sounds at normal levels due to irreversible damage to the hearing nerve. This leads to difficulty hearing in the environment of background noise and a tendency to miss certain consonant sounds in speech such as those mentioned earlier. Women's and children's speech in particular may seem to be more challenging to process. The most common symptoms of those with high-frequency hearing loss include difficulty understanding speech in the presence of noise and asking for frequent repetitions. In the past, those with this type of hearing loss had extreme difficulty being fitted with amplification devices due to the nature of the loss, and they experienced much frustration throughout the fitting and adjustment process. Fortunately, a niche product has been developed specifically for those with high-frequency hearing loss and was made available about 6 years ago. Since the release of this type of open-fit, behind-the-ear device, people with high-frequency hearing loss are having more success than before wearing and adjusting to hearing aids.

ADULT CANDIDACY FOR AMPLIFICATION

There are two aspects to consider when determining hearing aid candidacy for adults. These can be divided into audiological and motivational factors. Audiological factors, of course, are measured and can be objectively quantified; however, motivational information is of equivalent importance in order to achieve a successful hearing aid fitting (Dempsey, 1994, p. 723).

Understanding degrees/types /configurations of hearing loss is crucial when determining hearing aid candidacy. Results from pure tone audiometry and speech testing give the audiologist important information about the patient's hearing potential. Since no two audiograms are the same, each candidate has different hearing potential. It is extremely important that the audiologist thoroughly counsel patients and their family members about what expectations are realistic from wearing hearing instruments, based on their individual hearing potential and needs. (Realistic expectations will be discussed more thoroughly later in this segment). As the digital hearing aid technology has improved significantly in sophistication and fitting precision, guidelines for hearing aid candidates have changed over the past 3 years, since patients with mild high-frequency sensorineural hearing loss can now perceive benefi t from hearing aids. Candidates for hearing aids include: those with hearing sensitivity thresholds of 30dBHL+ from 3 KHz-8 KHz. Patients who present with this degree of hearing loss might report: "difficulty understanding speech in background noise, asking for frequent repetition, mistaking words, for example, 'take' for 'cake,' 'people always mumble,' and turning up the television" (Nair, 2008).

PSYCHOSOCIAL EFFECTS OF HEARING LOSS AND STAGES OF READINESS

Motivational factors to pursue aural rehabilitation with the use of hearing aids are typically influenced by the degree of hearing handicap as opposed to the actual hearing loss. One's perception of a hearing handicap is not as easily quantified, and is defined subjectively from the patient's perspective. We are concerned here with the impact of the hearing loss upon an individual's ability to communicate efficiently and effectively in order to maintain good quality of life. One of the best ways for an audiologist to obtain this information is via self-report procedures. These questionnaires have been developed to measure individual level of motivation, by those who are self-perceived as hearing handicapped. Patients are asked to answer questions about their day-to-day lifestyle and individual needs. In addition they check off how motivated they are to get help, for example, on a scale from 1-10. Often one is also asked to rate which aspects of the hearing aid are most important, such as overall sound quality, cost, and appearance. This provides the audiologist with important information about the individual's needs and expectations to allow for appropriate hearing aid selection, in addition to proper patient counseling (Dempsey, 1994, p.723).

Often patients have difficulty admitting that they have a problem and it is essential for the audiologist to counsel the patient and family members thoroughly about the benefits of amplification, and the consequences of refusing treatment. As one might imagine and might have even experienced, communicating with someone who has hearing loss can be a very frustrating experience for spouses, family members, friends, and coworkers. Often hearing loss is noticed by or affects patients' loved ones first (Kirkwood, 1999).

Asking for repetition, missing a joke, answering a question incorrectly, or even lack of interest are clear symptoms of someone with hearing loss and are often misconstrued as a lack of intelligence and attention. These conditions tend to result in loss of patience and angry responses from others. In 1999 The National Council on Aging performed a survey to assess the detrimental effects of hearing loss on quality of life and compared the magnitude of those effects among hearing aid wearers and among persons whose loss was untreated. Patients who were untreated presented with sadness and depression, worry and anxiety, paranoia, less social activity, and emotional turmoil and insecurity. For those whose hearing loss was treated, the reported benefits included: better relationships with their families, better feelings about themselves/increased confidence, improved mental health, and greater independence and security. More than half of the users noticed improvement in their family relationships and self esteem. About 40% reported that their lives had improved in general and they felt better mentally. An even higher percentage of the significant others perceived improvements in the lives of the family member or friend using hearing aids (Kirkwood, 1999).

The following segment considers crucial factors required to achieve a successful hearing aid fitting and positive result.

HEARING LOSS AND AUDITORY DEPRIVATION

Hearing loss can affect persons of any age, including infants, schoolchildren, and adults. Early intervention for hearing loss with the use of hearing aids is a key factor in the normal development of speech and language; and in adult onset of hearing loss, the ability to maintain good speech-recognition skills. When referring to the adult population, Shlomo Silman observed that those who were monaurally aided with a bilateral symmetric sensorineural hearing loss (SNHL) revealed a more rapid deterioration over the years in suprathreshold speech-recognition ability in the unaided, but not the aided ear (Silman, 1993). To the contrary, it was noted that there was a lack of rapid deterioration in suprathreshold speech recognition ability over the years in binaurally fitted adults with bilateral symmetric SNHL. The phenomenon is called "auditory deprivation."

Based on these factors, early intervention with the use of hearing aids once the patient is determined to be a hearing aid (HA) candidate results in a more successful adjustment, and more positive results with regard to speech discrimination ability. Hearing aids have been designed for the purpose of taking full advantage of a person's residual auditory system -in other words, the hearing you have left, or the hearing potential . Those hearing structures that have been lost due to a lifetime of recreational and occupational (including military) noise exposure, ototoxic chemicals (ranging from aspirin to chemotherapy), the aging process, and inherited genes are essentially lost forever. We can't bring them back. But we can optimize the use of the remaining hearing-which, in the vast majority of cases, is more than enough for a person to hear well and communicate effectively when sound is amplified appropriately (McSpaden, 2008).

BINAURAL VERSUS MONAURAL: REALISTIC EXPECTATIONS

Most adults with SNHL due to the normal aging process have a symmetric hearing loss or at least hearing loss present in both ears. In that case, two hearing aids are recommended and ideal to achieve optimal hearing results. After all, it is not by chance that nature gave us two ears. Benefits of binaural hearing aids are improved ability to hear and understand in noisy environments, richer, smoother sound quality, and more natural hearing. This is so because our sense of hearing is designed to receive sound input from both ears so that the brain can process and filter all of the information. A final benefit is improved ability to determine the direction of sound (localization of sound). Additionally, as previously noted, auditory deprivation can occur if aided monaurally when a bilateral SNHL is present (Kochkin, 2000).

Many patients who choose to be fitted monaurally when binaural amplification is recommended often have a very difficult time adjusting to their hearing aid, as the above-mentioned factors would predict. Use of HAs requires an adjustment period. We do not hear sound until the brain receives the signal and can then process the information as a system. Therefore, since in most circumstances there has been a gradual progression of hearing loss, the brain in time actually forgets how to process certain sounds in our environment, perceiving speech sounds as dull (i.e., missing the "s" in "sit"). Therefore acclimating to hearing these new sounds again and understanding speech in surrounding noise through the hearing aids can initially be quite challenging. Working with the audiologist to achieve this goal via counseling and programming can sometimes take a few months to achieve comfort, and the best overall hearing possible with hearing aids. It is crucial that this process be properly explained to the patient and their family members so that expectations are realistic (Kirkwood, 1999).

IMPORTANCE OF PATIENT COUNSELING IN ORDER TO MAINTAIN REALISTIC EXPECTATIONS

Research consistently shows counseling to be an essential factor in the acceptance of hearing loss, hearing instrument utilization, and satisfaction with hearing instruments. For example, a study by Sultana and Hockley (2007) showed that hearing-impaired individuals who received effective counseling wore the hearing instrument more often and for longer periods of time, and reported a greater perceived reduction in hearing handicap. Studies have also shown that failure to provide effective counseling can be a signifi cant contributor to patient dissatisfaction. Given the relatively high level of user dissatisfaction with hearing instruments, it is critical to focus attention on the role of counseling in the practice of the hearing care professional (Sultana & Hockley, 2007).

HEARING AID SELECTION PROCESS: STYLE, TECHNOLOGY AND HISTORY

Audiologists face a major challenge when selecting the most appropriate amplification system for their patients in a time-efficient manner. In a typical hearing aid consultation/evaluation of one hour or less, we must determine which set of hearing aid fitting options (monaural vs. binaural, device style and technologies) are appropriate for the patient. There are various styles of hearing aids, which range in size and setting, including behind the ear (BTE), in the ear (ITE), in the canal (ITC), and completely in the canal (CIC). Within this process the audiologist must determine not only the audiological needs of the patient but also the nonaudiological variables, such as vision, aging effects, physical function/dexterity ability, cognitive ability, HA expectations, level of motivation, lifestyle issues, education, and support system that may affect the fitting outcome (Kricos, 2006; Sandridge & Newman, 2006).

The level of hearing aid technology is always important to consider when counseling a patient on which HA will best meet the communication needs and expectations. The more sophisticated the circuitry, the better will be the overall performance in the presence of background noise and overall sound quality. However, high-end digital technology is not the only option and the others will certainly provide benefit for the patient. It is important for the audiologist to explain thoroughly the differences in technology levels and what to expect out of the instrument chosen, based on communication needs and degree of hearing loss.

An explanation of the components of hearing aids, how they work, and different styles will be reviewed and a historical perspective of the development of hearing aids will also be discussed.

HEARING AID COMPONENTS

All hearing aids have three main components: microphone, amplifi er, and receiver. The microphone converts acoustic sound into electricity. The amplifier increases the strength of the electrical signal. In the process of increasing the strength of the sounds, it also alters the balance of the sounds, usually giving more emphasis to weaker and high-frequency sounds than to low-frequency and stronger sounds. The receiver is a miniature loudspeaker that functions to convert the electricity back to sound. Hearing aids are powered by zinc batteries.

A major recent change in hearing aids is that they have become smaller. The constant motivation behind the technological progress of hearing aids has been to make them smaller, less conspicuous, and more cosmetically appealing. At times, performance has been sacrificed in order to achieve size reductions, but over time, performance has increased dramatically and sometimes because of the size reductions. Current hearing aids have better sound quality (fidelity, wide bandwidth, and less distortion) and greater adjustment flexibility than ever before.

From the way they function to their size and shape, hearing aids today are far different from what they were 10 years ago. The history of hearing aids is diverse and interesting. The earliest aids working without electricity and the earliest electric models were too large to be portable. Today, digital hearing aids are quite discreet, are lightweight, and can be programmed to amplify sounds without distortion for different environments. We can expect exciting improvements to hearing aid technology but it is prudent to review the history of hearing aids in order to grasp where the future of hearing aids is headed.

HISTORY OF HEARING AIDS

The history of hearing aids begins about 200 years ago, in the form of ear trumpets. This period is referred to as the acoustic era. The acoustic era began the first time someone cupped a hand behind an ear. This produces a 5-10 dB of gain at mid- and high frequencies by collecting sound from an area larger than the ear itself. By cupping the ear, one is also shielding sounds coming from behind, thus creating an effective noise reduction system. A more effective acoustic aid is formed by anything shaped like a trumpet, horn, or funnel. These types of acoustic aids have a large open end to collect as much sound as possible and transfer it to the ear via a gradual reduction in area along the length of the trumpet or funnel. The width and length of the trumpet will determine how successfully the sound reaches the ear.

Two important milestones marked significant change in the advancement of hearing aid technology: the advent of electricity and Alexander Graham Bell's invention of the telephone. This period is referred to as the carbon era, defined by the telephone, a device that could amplify sound electronically via a carbon microphone in combination with a battery. Current technology still uses the concept of a receiver, a telephone component, to describe the speaker inside the hearing aid.

The vacuum era, in the early 1920s, incorporated the use of vacuum tubes, providing a more efficient method of amplifying sounds. These aids, however, were still far too large to be portable.

After the vacuum era, increased portability was next, ushered in by the miniaturization of batteries. Previously, batteries were large and cumbersome and could not hold a charge for longer than a day, making them impractical for hearing aid use. The invention of the transistor in the late 1940s changed all of that, beginning the transistor era. A transistor is a switch with no moving parts and two settings: on or off. By putting multiple transistors together, larger combinations of on and off switches are possible, thus the basis for binary code, which is essentially a computer in its simplest form. Silicon transistors allowed hearing aids to become smaller and smaller, first into the size of the "body aid " (a large, antiquated hearing aid comprising of a box approximately the size of a pack of playing cards worn in the pocket or on a belt, and connected to an ear mold by a cord) and eventually leading to technology available in a size that we are more familiar with today, aids that can be worn behind the ear or inside the ear canal.

Digital hearing aid technology was in common use by the mid-1990s. This technology allows for more precise shaping of sound. The sounds can be attenuated or amplified as needed depending on the wearer's hearing loss and the sound environment. Programs can also be created depending on the wearer's needs. For example, a program can provide more or less amplifi cation for specific speech frequencies given the sound environment and how much noise is present. Another crucial aspect of digital technology is the idea of compression. Compression is a feature that attempts to change the amount of gain that the amplification circuits add to the incoming signal so as to fit the wearer's needs better. A smoother sound is the result and hearing aid wearers no longer have the annoying side effect of distortion of loud sounds.

We are still shaping the history of hearing aids today. Technology is constantly being updated and patients can now play an active role in the fitting of the hearing aids by responding to loudness levels during the fitting. This makes the honing of the user's setting more patient-specific than ever before, such that audiologists need rely solely on universal prescriptions. These days hearing aids are more automatic, meaning they adapt in real time depending upon the sound environment and how much noise is present. Studies show that today's hearing aids provide consistently improved speech intelligibility, both in quiet and noisy environments, more comfort for the user in the presence of loud sounds, greater audibility of soft sounds, and improved sound quality overall as compared to earlier amplification methods.

Hearing aid technology continues to evolve as transducers and circuitry become smaller. This means that miniaturized and increasingly more powerful aids will be produced. And consumers will continue to find themselves more active participants in the fitting and programming process (Smith, 2006).

Hearing aids range in price depending on the level of technology and can start at $1,500-$3,500 per ear. Most insurance companies, Medicare in particular, do not provide hearing aid benefits, although some provide partial reimbursement.

THE TRIAL PERIOD

Because the fitting process and adjustment period can be challenging, all hearing aids sold in New York state have a 45-day trial period, according to law. This allows the audiologist to work closely with the patient to find the best possible hearing aids to satisfy the patient's needs. Being able to make any kind of adjustments in style, level of technology, or even manufacturer is important and in some cases necessary in order to achieve a successful fit and to suit the person's communication needs. Additionally, should for some reason the patient be unable to adjust to the hearing aid or perceive enough benefit, after thorough counseling and several attempts in fitting the hearing aid, the instrument can be returned for credit within the trial period. Typically there is a manufacturer/ dispensing fee of up to 10% of the cost.

Once the hearing aids are selected and dispensed, there are a number of postfitting follow-up visits to practice the use of the hearing aids (i.e., insertion/removal, battery changing, cleaning/ maintenance) to ensure successful hearing aid use and maximum communication abilities. Although this process can be challenging for the patient, the family, and the audiologist, it is crucial that the patient stick with it. This support is necessary to overcome any obstacles encountered along the way and to maintain a positive attitude throughout the process. Patients will benefit the most from the hearing instruments if they follow a training program and consider all of the topics discussed earlier in this segment with the help of their audiologist. Patients should be reminded frequently that they are not alone. There are more than 500 million people with hearing loss worldwide, and more than 8 million hearing instruments fitted each year.

"When we lose our sight, we lose our contact to the things around us. When we lose our hearing, we lose contact with other people" (Helen Keller).

THE ROLE OF THE AUDIOLOGIST

In addition to the fitting of hearing aids and other aural rehabilitation devices, the role of the audiologist is significant in the diagnosis/assessment process of the following conditions: tinnitus, unsteadiness, vertigo, and sudden hearing loss.

Tinnitus

Tinnitus, from the Latin word for ringing, is in itself not a disease but rather a symptom, the perception of sound within the ear in the absence of corresponding external sound. For some, tinnitus may be present in both ears, for others only one. Some patients experience constant tinnitus, while for others it's intermittent. While usually described as ringing in the ear, tinnitus for some patients is a high-pitched whining, buzzing, hissing, ticking, roaring, or pulsing and may even sound like wind or ocean waves. For some patients, it's a minor inconvenience, but for others it's a severe debilitation.

The origins of tinnitus vary. While often there is no identifiable cause, the most common is noise-induced hearing loss. Following is a short list of varied causes:

* Ear infection

* Impacted cerumen

* Presbycusis

* Menière's disease

* Acoustic neuroma

* Aspirin damage

* Damage from antibiotics such as aminoglycosides, streptomycin, and vancomycin

* Antidepressants

* Loop diuretics

* Chemotherapy

* Head injury

* Metabolic disorders

* Psychiatric disorders

* Psychedelic drugs

With tinnitus often comes stress. Stress in turn can actually increase the perception of these phantom sounds, resulting in more disturbance and therefore more stress. People in such a vicious cycle often feel helpless. Treatments for tinnitus also vary. Everything from specific nutrients such as Ginkgo biloba to psychotherapy to surgery have been used. There really is no cure, but strategies exist to ease stress, relax the body, and thus help calm the tinnitus. Since one of the main causes of tinnitus is hearing loss, one of the most effective treatments audiologists use is a hearing aid. By compensating for the loss of hearing at the frequencies needed, we often mask the tinnitus. Hearing aids don't necessarily make the tinnitus depart, but they can diminish the symptom while enhancing hearing and speech discrimination.

One of the latest therapies for those who suffer chronic tinnitus is the Neuromonics Tinnitus Treatment (NTT). First introduced in Australia, it is now available throughout the United States. This is basically a discreet device customized to the patient's audiological profile. NTT delivers an individually designed music and neural stimulus that over time helps the brain to filter out the tinnitus. This is a 6-month process that has been successful for many patients. NTT requires extensive training on the part of the audiologist and motivation on the part of the patient. The reader is referred to the Web site for more detail: http://www.neuromonics.com/professional/index. aspx?rollover=true.

Sudden Hearing Loss

Sudden hearing loss is defined as a greater than 30 dB decrease in hearing over at least three contiguous frequencies, occurring within 72 hours or less. Sudden hearing loss is usually unilateral, is often accompanied by tinnitus and vertigo, and can range from mild to severe. Sudden hearing loss can be temporary or permanent. Many people who experience sudden hearing loss (about one third) wake up in the morning with the loss.

Viral diseases are believed to be the cause for about 60% of sudden hearing loss cases. These include measles, mumps, rubeola, and herpes. When diagnosing a sudden hearing loss, it is essential to obtain an accurate case history, to identify potential infectious causes such as otitis media, and also to ascertain exposure to ototoxic drugs. It is then essential to perform careful audiological testing to confirm a decrease in hearing and determine whether it is sensorineural or conductive. An audiologist may do special testing such as ABR and EcoG to determine a relationship of the sudden hearing loss to the brainstem, or to Menière's disease. An ABR (auditory brainstem response) is a diagnostic test that assesses the presence of an electrical signal evoked from the brainstem by the presentation of a sound. An EcoG (electrocochleogram) is a variant of brainstem audio-evoked response (BAER) where the recording electrode is placed as close as practical to the cochlea. Several reports indicate that 65%-69% of sudden hearing loss cases recover on their own.

VERTIGO

Taking a thorough case history is the first in establishing a wellthought- out treatment plan for a patient experiencing vertigo. Vertigo is a feeling of rotation that is due psychological disbalance of the right and left vestibular nuclei. True vertigo can only last no more than a few days due to vestibular compensation. The role of the audiologist is to separate between an attack due to a patient moving and changing positions or an attack that occurs spontaneously.

BENIGN PAROXYSMAL POSITIONAL VERTIGO

Benign Paroxysmal Positional Vertigo (BPPV) is the most common type of vertigo. It is associated with the inner ear, usually when the person is quickly moving the head or looking up. It is benign because it will not get worse, paroxysmal because it happens suddenly without any imminent signs, positional because head movement provokes it, and vertigo because a person experiences a sense of rotation and spinning. It predominantly occurs in women; however, age is not factor. The cause most often is unknown, but prolonged bed rest, head trauma, upper respiratory infection are associated with BPPV. The stress affects the inner ear, particularly the utricle. Small calcium carbonate particles called otoconia are released from the semicircular canals. Once in the semicircular canals they produce endolymphatic movement that stimulates the cupula and produces vertigo and nystagmus.

Dix-Hallpike test and other provocation maneuvers can reproduce the vertigo attack. The audiologist will perform this test once the patient exhibits these symptoms and the audiologist visualizes a rotary nystagmus and can determine the affected canal or cupula of the inner ear. Performing an Epley maneuver will move the otoconia back to the untricle. There are different types of maneuvers and head positions that can accomplish compensation and further stop BPPV. Regardless of the repositioning maneuver treatment is effective 70% to 90% of cases. About one third of patients have reoccurrence in the first year after the treatment and by 5 years about half of all patients have reoccurrence (Hain, Helminski, Reis, & Uddin, 2000; Nunez, Cass, & Furman, 2000; Sakaida, Takeuchi, Ishinaga, Adachi, & Majima, 2003).

Recently migraines have been associated with BPPV. Patients with migraines have a higher incidence of BPPV and higher reoccurrence after successful positioning (Isiyama, Jacobson, & Baloh, 2000; Lempert, Leopold, von Brevern, & Neuhauser, 2000).

MENIERE'S DISEASE

Spontaneous vertigo lasting an hour or more could either be Meniere's Disease (MD) or a migraine. Endolymphatic disbalance of sodium and potassium is the cause of MD. Vertiginous episodes, low frequency hearing loss, aural fullness, and low frequency tinnitus can separate MD from other types of vestibular problems. Even after several attacks, vestibular and cochlear function can recover. After many attacks, a permanent loss of auditory and vestibular function can be detected through an annual audiogram, caloric testing, and electrophysiological testing. Following a strict diet of low sodium intake can be an effective medical therapy. Some forms of MD can have such severe cases of vertigo that it can only be managed through surgery. Migraines that cause vertigo attacks are best managed by a physician.

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Once in the semicircular canals they produce endolymphatic movement that stimulates the cupula and produces vertigo and nystagmus. Dix-Hallpike test and other provocation maneuvers can reproduce the vertigo attack. The audiologist will perform this test once the patient exhibits these symptoms and the audiologist visualizes a rotary nystagmus and can determine the affected canal or cupula of the inner ear. Performing an Epley maneuver will move the otoconia back to the untricle. There are different types of maneuvers and head positions that can accomplish compensation and further stop BPPV. Regardless of the repositioning maneuver treatment is effective 70% to 90% of cases. About one third of patients have reoccurrence in the first year after the treatment and by 5 years about half of all patients have reoccurrence (Hain, Helminski, Reis, & Uddin, 2000; Nunez, Cass, & Furman, 2000; Sakaida, Takeuchi, Ishinaga, Adachi, & Majima, 2003). Recently migraines have been associated with BPPV. 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ACUTE VESTIBULAR NEURITIS

When total loss of one vestibular mechanism occurs, it can cause a severe vertiginous attack. It is often referred to as labyrinthitis, vestibular neuritis, acute unilateral peripheral vestibuolopathy, and nero labyrinthitis. During testing, a patient will exhibit unidirectional nystagmus, which is most often surpassed by visual vixation. The patient will most likely be able to stand but will feel unsteady. Fukuda test is positive for neuritis when a patient with eyes closed will march towards the affected side.

PANIC ATTACKS AND ANXIETY

Anxiety and panic attacks with hyperventilation can cause a patient to feel dizziness but not true vertigo. Phobic postural vertigo is vertigo that is also accompanied by fear and anxiety. These cases have been documented in literature and often follow similar patterns. It is best to be non-judgemental and supportive and to explain the true cause of this vertigo.

OFF BALANCE

Bilateral vestibular loss can cause ataxia and oscillopsia but not vertigo. If a patient with this problem walks or stands with eyes closed on a soft surface they will most likely be unable to perform this task. Caloric testing will show bilateral weakness or no response.

SUMMARY

In summary, the field of audiology and the role of the audiologist are vast and encompass a wide range of diagnostic testing and rehabilitative treatment plans. It is not through the sole care of the audiologist that a patient would receive treatment for the conditions mentioned above. In order to provide optimal patient care, the support and intervention of various health care providers and family members are necessary for the best possible outcome for the patient.

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