

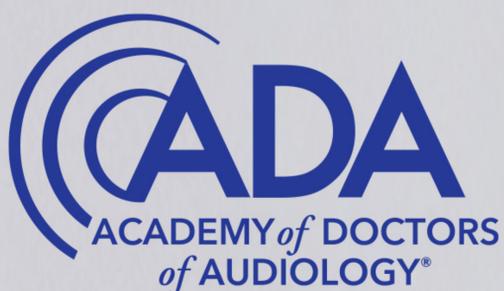
THE OFFICIAL PUBLICATION OF THE ACADEMY OF DOCTORS OF AUDIOLOGY®

Audiology PRACTICES



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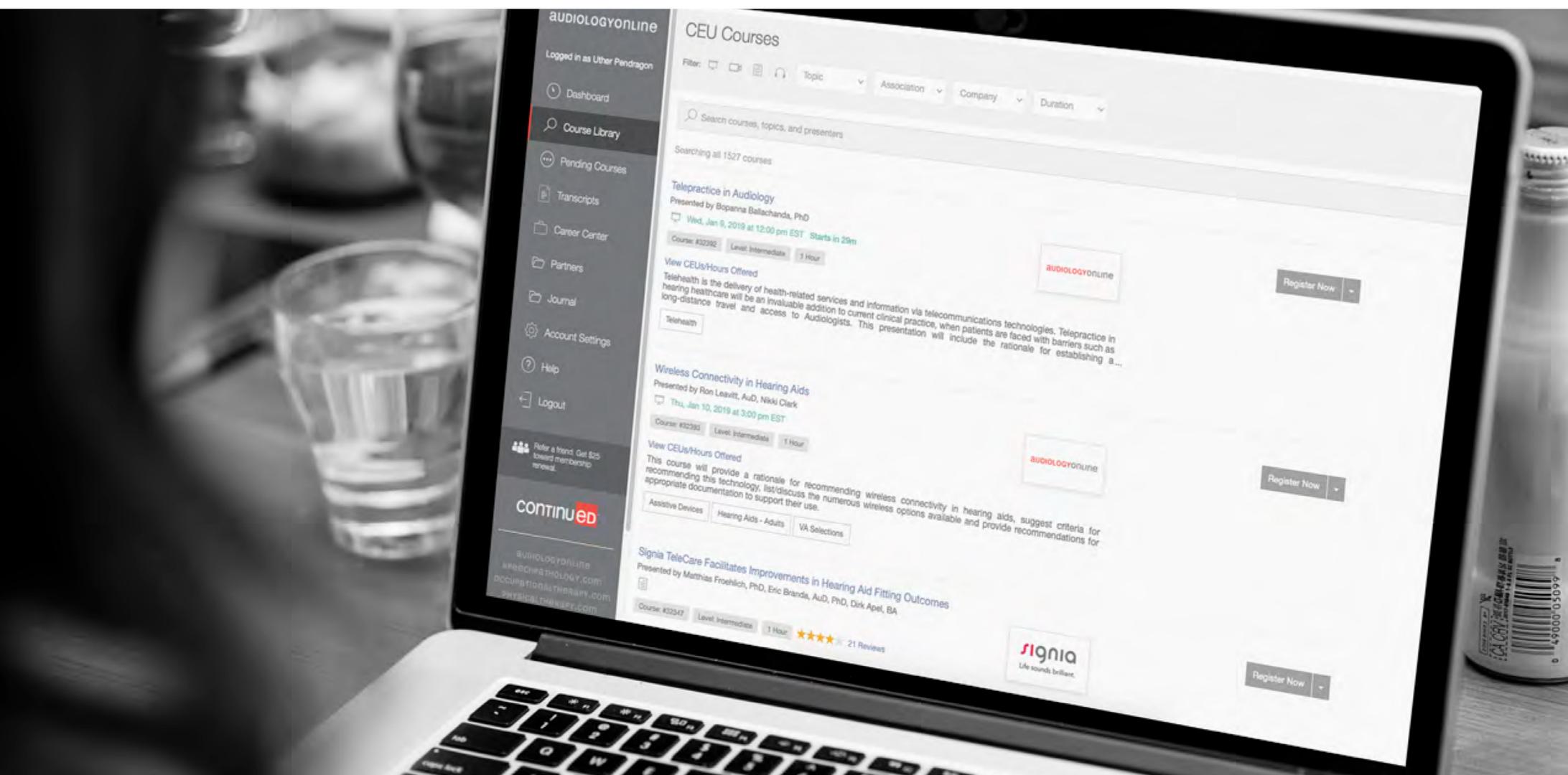


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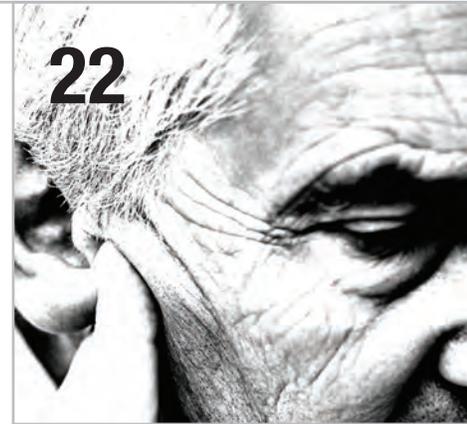
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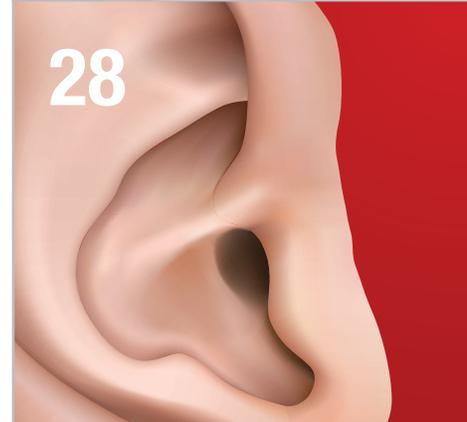
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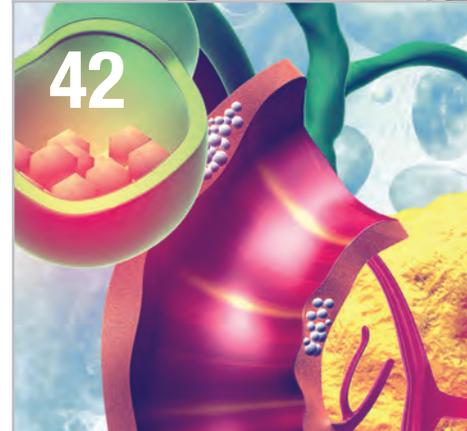
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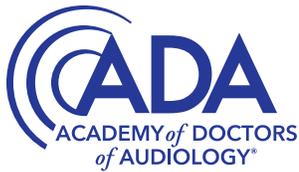
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EDITOR

Brian Taylor, Au.D.
brian.taylor.aud@gmail.com

MANAGING EDITOR

Stephanie Czuhajewski
sczuhajewski@audiologist.org

GRAPHIC DESIGNER

Julie Loboyko

ADVERTISING

Stephanie Czuhajewski
sczuhajewski@audiologist.org

HOW TO REACH US

ADA Headquarters
446 East High St., Suite 10
Lexington, KY 40507
Phone: 866.493.5544
Fax: 859.271.0607
www.audiologist.org

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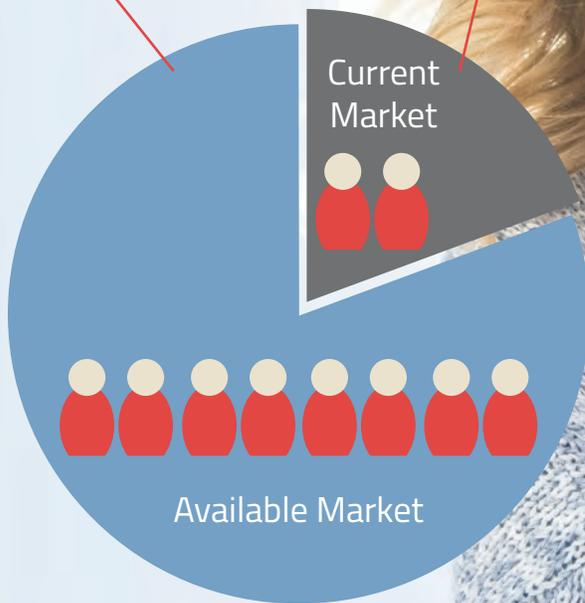
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AuDacity 2018: Worth Waking Up For

My husband is an early bird. He enjoys being the first one awake in the house and the quiet time in the morning. The lack of interruptions or daily “emergencies,” and slower pace are his ideal. On the other hand, I think mornings should begin at 10:15 a.m. and that no good work is done until 8 p.m. or later. For those who attended AuDacity in Orlando, you saw my morning enthusiasm and forced smile first-hand each day. For those who were not in attendance, whether unable to attend AuDacity or simply sleeping in, a colleague noted that I resemble Bender from Futurama.

Someone who is a great morning person, or fakes it better than me, is Dr. Victor Bray. His tireless work to advance the profession of audiology is never-ending. Dr. Bray’s passion was evident on the first day of the AuDaCity convention as he led the first AuDaCity Symposium: Co-management of Comorbid Diseases. The breadth and depth of topics from Monday’s course was a highlight for many in the audience and received significant praise at convention and online. In fact, conference surveys rated the Symposium has the best course this year. As mentioned in the last *Audiology Practices*, this issue will focus on the Symposium’s highlights and provide a summary of the information: not only why audiologists should be co-managing patients with comorbidities, but also, and perhaps more importantly, how to manage patients with information that can be put to practice tomorrow.

Another highlight from the AuDacity convention was the Town Hall to discuss the future of the Audiology Patient Choice Act (APCA). The open discussion format allowed all attendees to receive an update from Prime Policy, ADA’s lobbying group, and debate the merits for continuing with the legislation for another year, another Congressional session, until it is passed, not at all, and everything in-between. Over \$170,000 was pledged at AuDacity via the Town Hall, tuning fork auctions, and wrist bands. If you were unable to attend the meeting, a webinar in November was recorded with the important information and is available at www.audiologist.org. To add your financial support to APCA, donate at <http://18x18.org/donate>; monthly donations can also be arranged by contacting ADA headquarters.

Prior to the convention, volunteer audiologists were paired with a student attendee. Thanks to the generosity of Starkey Hearing Technologies, the student scholarship recipients were able to experience the convention and meet with their mentors each day. I doubt I’m alone in my amazement that today’s students seem to be excelling at a more rapid pace and showing professional aptitude that took many of us years to build. The student attendees were amazing at the Town Hall meeting, each pledging \$48.51—the total of the House and Senate bill numbers, to their future. As mentioned in my President’s speech, mentoring is how ADA hooked me back in 2004, and a key component of what brings me back to convention year after year.

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² Satmetrix 2018 Net Promoter Benchmark Study of U.S. Consumers.

³ Cardholder Engagement Study, Q2 2017, conducted for CareCredit by Chadwick Martin Bailey.

ADAQ42018AA



Audiologists, Working Holistically, Can be the Glue that Holds Public Health Initiatives Together

Two studies, published online by JAMA Otolaryngology on November 8th are compulsory reads for audiologists concerned about accessibility and affordability of hearing-related services. Both studies, which relied on insurance claims data from the OptumLabs Data Warehouse, a division of the for-profit UnitedHealth Group, add to the growing body of evidence demonstrating hearing loss is linked to several common, adverse conditions in older adults.

The pair of studies were conducted by researchers at John Hopkins Bloomberg School of Public Health and sponsored by AARP. In the first study, Jennifer Deal and her colleagues examined the association of age-related hearing loss with dementia, depression, accidental falls, nonvertebral fractures, heart attacks and stroke. The researchers evaluated data from adults aged 50 years and older at two, five and 10-year follow up intervals. After ensuring participants with hearing loss were carefully matched to those with no evidence of hearing loss across a wide range of possible confounding factors, they determined adults with age-related hearing loss was significantly associated with an increased 10-year risk of dementia, depression, falls and heart attack.

In the second study, Nicholas Reed and colleagues looked at the relationship between hearing loss of adult onset and overall healthcare costs per individual. In their study, they found an association between untreated hearing loss and higher healthcare costs and a higher risk for hospital readmission. Specifically, they found over a 10-year period, individuals with untreated hearing loss incurred an average of over \$22,000 in additional healthcare costs compared to similar adults with normal hearing.

Over the next few years, it will be interesting to see if the UnitedHealth Group, with its many large commercial HMO and Medicare Advantage programs, leverages these findings to provide more comprehensive hearing-related benefits for their members, including, perhaps, the coverage of hearing aids.

In the meantime, considering age-related hearing loss is more prevalent than diabetes or cancer, audiologists can play a key role in the public health mission of improving the quality of life of our aging society. This task begins with creating more effective collaborative efforts with allied health colleagues.

As the still-to-be-defined role audiology plays in public health evolves, it's important to note the professional landscape has been changing, albeit slowly, for nearly a decade. Many believe the landscape began to shift with what is now considered a landmark report in a February 2010 Ear and Hearing editorial, authored by Amy Donohue, Judy Dubno and Lucille Beck. Their editorial, titled *Accessible and Affordable Hearing Health Care for Adults with Mild to Moderate Hearing Loss*, laid much of the groundwork that led to the detailed June 2016 National Academy of Science Engineering and Medicine's

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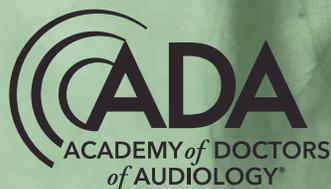
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ADA Strategic Plan— A Roadmap for 2019 and Beyond

ADA member input informed the design the ADA strategic plan, and with your help, many initiatives have been undertaken. Please find the current plan and key initiatives below.

ADA Mission: To advance practitioner excellence, high ethical standards, professional autonomy and sound business practices in the provision of quality audiologic care.

ADA Vision: Practitioner ownership of the profession of audiology through the advancement of autonomous practice models.

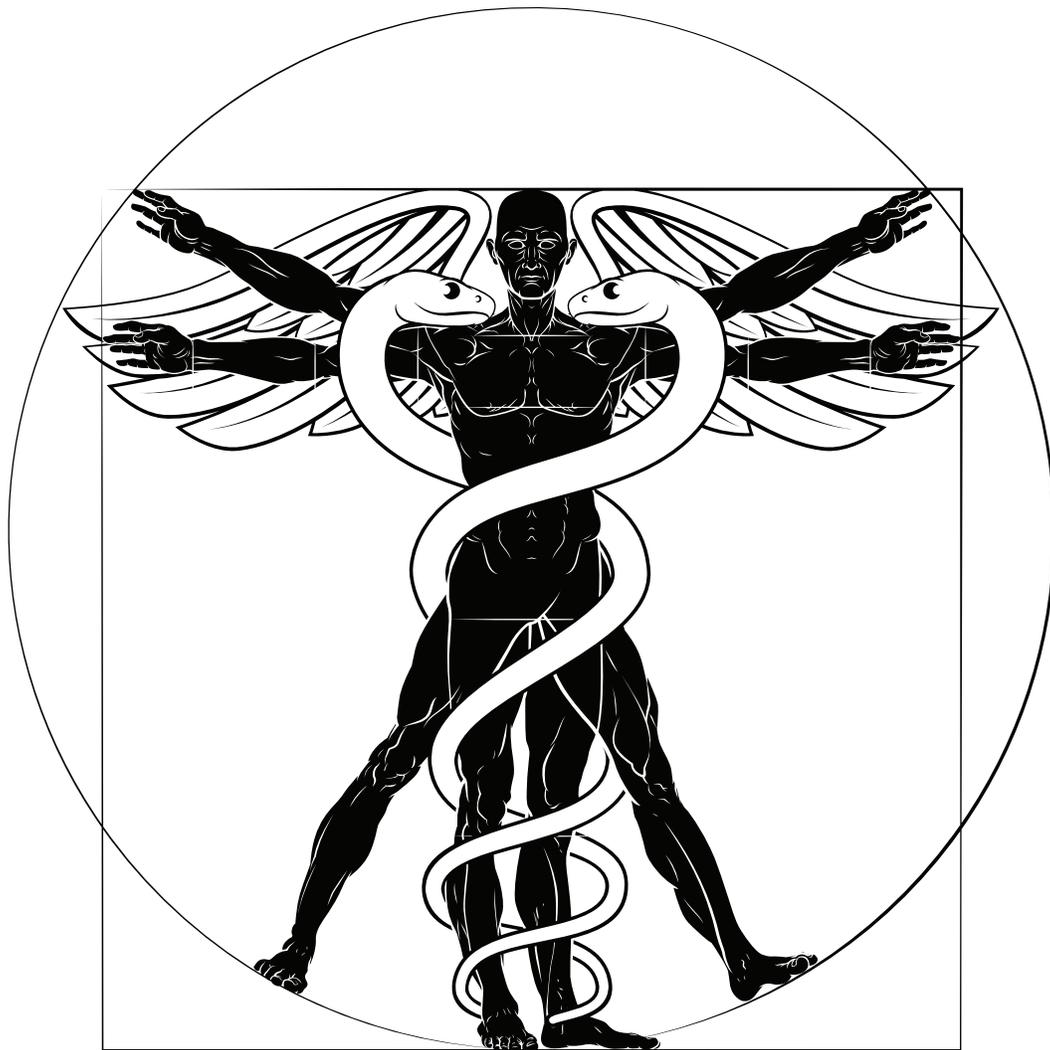
The ADA strategic plan contains three pillars and aligned goals to support the ADA mission and vision: Education – Advocacy – Resources (EAR).

EDUCATION	ADVOCACY	RESOURCES
<ul style="list-style-type: none"> • Promote evidence-based practice • Clinical and business • Public education and awareness 	<ul style="list-style-type: none"> • Ensure autonomy • Protect scope of practice • Remove barriers to patient access 	<ul style="list-style-type: none"> • Designed to foster ownership of the profession through practice ownership • Support students and early career

The ADA Board of Directors is committed to advancing initiatives that align with the strategic goals as requested and supported by ADA members. Key initiatives carried forward for 2019 include:

- Advocate for the Audiology Patient Choice Act.
- Conduct additional federal and state advocacy initiatives to protect audiology’s scope of practice.
- Petition regulators and agencies to remove regulations that pose barriers to patient access to audiologists.
- Create educational programming and resources that support the 12 recommendations contained in the 2016 NASEM report, *Hearing Health Care for Adults: Priorities for Improving Access and Affordability*.
- Provide tools, education, and resources to assist audiologists in successfully expanding their service portfolios and creating innovative, sustainable, profitable models of care.
- Implement the ADA Audiology Practice Accreditation Program.
- Expand the Student Academy of Doctors of Audiology and Early Career Professional resources.
- Explore practice financing models and resources that promote autonomous practice.

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CONSIDERATIONS ON THE CO-MANAGEMENT OF COMORBID, CHRONIC DISEASES IN THE AUDIOLOGY PATIENT

On the 22nd of October 2018, the Academy of Doctors of Audiology (ADA) conducted what may have been an unprecedented event in audiology; ADA allocated the first day of their annual meeting to explore the co-management of chronic illnesses that are comorbid with hearing and balance disorders in audiology patients. Why was this done and why is this important to audiology? The answer to the question ‘why this was done’ is there is an emerging and growing body of evidence documenting the linkage between audio-vestibular disorders, especially sensorineural hearing loss, and many chronic illnesses. In short, some ear diseases and some whole body diseases are now known to be linked through a common pathophysiology.

The answer to the question ‘why is this important’ is that the professional transition process is moving the audiologist from an allied-health position, operating behind the filter of physician screening, to a doctoring position, operating as point-of-entry for persons seeking help with hearing and balance disorders. With this transition to the point-of-entry position, comes the opportunity and responsibility to interact with the patient with regards to whole-body health, wellness, and illness. Also with this transition comes the challenge for the profession that was put forward by physicians, in the event that hearing healthcare patients are successful in gaining direct access to audiologists:

“While patients with hearing problems may seek treatment for one symptom, such as hearing loss or vertigo, such seemingly straightforward symptoms may underlie a more serious medical condition. When undetected by a nonmedically trained practitioner, the delay in medical attention may lead to health complications, adverse outcomes and increased costs for the patient.”¹

In short, physicians are making the argument, based on patient safety, that audiologists are not qualified to serve as point-of-entry in America’s healthcare system. As such, audiologists in their new role² must be ready to identify comorbid, chronic diseases and refer appropriately to other healthcare providers, so as to not delay necessary and appropriate treatment(s) for patients. Additionally, adventuresome audiologists may reach out to the healthcare providers who are providing treatment for the patient’s chronic disease(s) to explore a co-management strategy supporting integrated patient care.^{3,4} Toward that objective of assisting audiology in their holistic patient care, this issue of *Audiology Practices* is dedicated to the proceedings of the Symposium on Comorbidities.

CHRONIC DISEASES^{5,6,7,8}

What are chronic diseases? Chronic diseases are noncommunicable illnesses of long duration, are the result of a combination of genetic, physiological, environmental and behavioral factors, require ongoing medical attention, and often limit activities of daily living. In the USA, six in ten adults have a chronic disease and four in ten adults have two or more chronic diseases, meaning that patients with these diseases are, most assuredly, in every adult audiology clinic on a daily basis.

Chronic diseases are the leading causes of death and disability worldwide, responsible for about 60% of the world’s deaths and 43% of the global burden of disease. Chronic diseases are the leading drives of the nation’s \$3.3 trillion in annual health care costs, with 90% of our health care expenditures for people with chronic diseases and mental health conditions.

What are the major chronic diseases in our population? They include arthritis, asthma, brain and neurological disorders (Alzheimer’s disease, epilepsy, stroke), cancers (breast, cervical, colorectal, gynecologic, skin), cardiovascular disorders (heart disease, high blood pressure), chronic lung disease,

chronic kidney disease, diabetes (prediabetes, type 2 Diabetes), lupus, obesity, and tooth decay. While hearing loss is not generally considered a chronic disease, it is the third most prevalent chronic condition in the elderly, after the chronic diseases of arthritis and hypertension.⁹

Chronic diseases contribute to eight of the top ten causes of death in the USA, including 635,260 (635k) deaths in 2016 from heart diseases; 598k from malignant neoplasms (cancer); 154k from chronic lower respiratory diseases (largely tobacco related); 140,000 from cerebrovascular diseases (primarily stroke); 116k from Alzheimer’s disease, 80k from diabetes mellitus, 50k from nephritis, nephrotic syndrome and nephrosis (kidney / renal disease), and 45k from suicide (largely depression related). As part of the ADA Symposium on Comorbidities, presentations were made on cardiovascular disease, cancer treatment, dementia, diabetes mellitus, kidney disease, and depression. Papers from many of these presentations are included in this dedicated issue of *Audiology Practices*.

Four of the most prominent chronic diseases – cardiovascular disease, cancer, chronic obstructive pulmonary disease, and type 2 diabetes – are linked by the risk factors of high blood pressure, high blood cholesterol, and obesity. These risk factors, in turn, are lifestyle related and include poor nutrition, excessive alcohol use, lack of physical activity, tobacco use and secondhand smoke. As such, many of chronic diseases that plague our population are preventable with life-style changes. Many of these chronic diseases also exhibit comorbidity, and possible common pathophysiology, with hearing and balance disorders, and it behooves audiologists be part of an integrated healthcare team in monitoring lifestyle factors of their patients and encouraging patients to engage in health lifestyle choices regarding nutrition, exercise, tobacco, and alcohol.

COMORBID DISEASE(S)

What is comorbidity? Comorbidity is the occurrence of two or more diseases, usually chronic diseases, in a person at the same time. The presence of comorbidity implies some common linkage between (or among) the diseases. The strength of the comorbid relationship – how often one condition can occur with respect to another condition – can be expressed as an odds ratio (OR) or hazard ratio (HR). The higher the OR or HR between two conditions, the greater the risk that the two diseases will co-occur, presumably due to some common pathophysiology.

FOUR OF THE MOST PROMINENT CHRONIC DISEASES — CARDIOVASCULAR DISEASE, CANCER, CHRONIC OBSTRUCTIVE PULMONARY DISEASE, AND TYPE 2 DIABETES — ARE LINKED BY THE RISK FACTORS OF HIGH BLOOD PRESSURE, HIGH BLOOD CHOLESTEROL, AND OBESITY

Cardiovascular disease, which includes coronary heart disease, heart attack, congestive heart failure, congenital heart disease, is often a complication of atherosclerosis.¹⁰ Atherosclerosis occurs when plaque builds up in the walls of the arteries, restricting or blocking blood flow. Not only can atherosclerosis impact the heart, blood vessels that supply the brain can be blocked, resulting in an ischemic stroke. Some control of atherosclerosis, and reduction of the risk of cardiovascular disease, is associated with lifestyle decisions such as increased physical exercise, good nutrition, smoking cessation, reduction of high blood cholesterol, reduction of high blood pressure, reduction in obesity, reduction of stress, and limited alcohol consumption.

The relationship between heart disease and hearing loss has been investigated for decades. Susmano and Rosenbush (1988)¹¹ compared 103 patients with ischemic heart disease to 29 patients with organic heart disease and normal coronary arteries and included a control group of 101 patients free of heart disease. They found that hearing loss preceded the clinical manifestation of ischemic heart disease and concluded that hearing loss could be an important, early marker of a vascular or generalized arteriosclerotic process.

Freidland and colleagues (2009)¹² found that low-frequency presbycusis was significantly associated with peripheral vascular disease, coronary artery disease, history of myocardial infarction, and intracranial vascular pathology such as stroke and transient ischemic attacks. They concluded that the audiometric pattern of low-frequency hearing loss could serve as a screening test for those at risk for cerebrovascular and peripheral artery disease, with a recommendation that patients with low-frequency hearing loss be appropriately referred for risk of cardiovascular events.

Bishop (2012)¹³ wrote that cardiovascular and cardio-metabolic diseases often result from lifestyle patterns and poor nutrition, lack of exercise, stress, and smoking and that these lifestyle patterns were also linked to hearing and hearing loss in older adults. As such, he strongly urged that specialized disciplines, including otolaryngology, can no longer function in a vacuum, but must collaborate with other specialties for patient general health and wellness. Audiology can also take Bishop's advice to heart, as audiology is the profession monitoring hearing acuity, especially with regard to specific audiometric patterns that would indicate the emerging presence of a chronic disease.

Chronic kidney disease (CKD) affects the body's ability to clean (filter) blood by removing wastes, toxins, and excess fluids in the blood.¹⁴ When the kidneys are damaged, results to the body can include anemia (low number of red blood cells), unbalanced minerals in the blood supply (low calcium levels, high potassium and phosphorus levels), loss of appetite and depression. CKD usually worsens over time and, if left untreated, can progress to kidney failure, cardiovascular disease, stroke and death. As renal failure approaches, treatment options are dialysis and/or kidney transplant. Through metabolic syndrome, chronic kidney disease is often linked to the chronic diseases of diabetes, high blood pressure, and heart disease.

The association between hearing loss and chronic kidney disease was explored by Vilayur and colleagues (2010)¹⁵ using the Blue Mountains Hearing Study database from Australia. They evaluated 2,564 participants for which audiometric testing data were available, as was renal function, as determined by the estimated glomerular filtration rate (eGFR). Normal GFR rates for young adults are 120 – 130 mL / min / 1.73m² and a decrease in GFR precedes the onset of kidney failure. Moderate kidney disease was found in 513 participants, of whom 279 (54.4%) had measured hearing loss. With regards to the eGFR values, hearing loss was present at 73% of the persons who had eGFR < 45 compared to 19% with hearing loss for persons with eGFR ≥ 90. They postulated that the link between hearing loss and CKD can be explained by (a) structural and functional similarities between the inner ear and the kidney, and (b) toxins that accumulate with kidney failure and damage nerves, including those in the inner ear. They concluded that moderate hearing loss was independently associated with hearing loss, with an adjusted odds ratio of 1.40, and recommended earlier hearing assessment with appropriate interventions to preserve the hearing of persons identified with CKD.

Diabetes is a chronic disease involving the pancreas, the hormone insulin and the function to regulate the release of glucose into the blood.^{16,17} Diabetes can occur when the pancreas does not make enough insulin or the body cell stop responding to insulin, resulting in too much blood sugar in the bloodstream. Over time, diabetes can cause serious health problems¹⁸ of heart disease, vision loss (diabetic retinopathy), kidney disease, neuropathy (feet, hands), amputation (toes, feet, lower legs), oral decay (gum disease), falls risk and hearing loss.

An important investigation linking hearing loss to diabetes was from Bainbridge and colleagues (2008)¹⁹ who evaluated NHANES data on 5,140 participants, age 20 – 69, for whom audiometric testing results were available. Their finding was that hearing impairment was prevalent among adults with diabetes. For low- and mid-frequency hearing impairment, prevalence was 21% among 339 adults with diabetes compared to 9.4% among 4,741 adults without diabetes. For high-frequency hearing impairment, prevalence was 54.1% among those with diabetes compared to 32.0% for adults without diabetes. The adjusted odds ratio, for the relationship between diabetes and hearing loss, was 1.82 for low- and mid-frequency impairment and 2.16 for high-frequency impairment.

In a meta-analysis of thirteen eligible studies, Horikawa and colleagues (2013)²⁰ compared the prevalence of hearing impairment between diabetic and nondiabetic patients. Data were available on 20,194 participants, of whom 7,377 (36.5) had hearing loss. Their finding was an overall pooled odds ratio of 2.15 for hearing impairment in diabetic participants compared to nondiabetic participants. The odds ratio of 2.61 for younger participants (≤ 60 years) was stronger than 1.58 for older participants. They concluded that the meta-analysis suggests that there is higher prevalence of hearing impairment in diabetic patients, compared to nondiabetic patients, regardless of patient age.

Dementia is a syndrome of impairment in cognitive abilities, such as attention, memory, language skills, visual perception, reasoning, problem solving and self-management.²¹ Dementia is not a state of temporary confusion or forgetfulness or a normal consequence of aging, but instead a serious condition that typically worsens over time. Dementia is a result of neurons (brain cells) that stop working and die. While dementia has multiple causes, Alzheimer's disease is the most common form among older adults. Alzheimer's is an irreversible, progressive brain disorder that involves

HEARING LOSS HAS BEEN LINKED TO CHANGES THAT OCCUR IN THE BRAIN, INCLUDING IN COGNITIVE ABILITY AS A RESULT OF THE BRAIN NEEDING TO ALLOCATE INCREASED RESOURCES FOR DECODING OF THE AUDITORY MESSAGE (UNDERSTANDING) AND ENCODING OF THE MESSAGE (MEMORY).

abnormal clumps (plaques) and tangled bundles of fibers (bundles) in the brain.²² The initial neural damage occurs in the hippocampus, here memories are formed. In later stages of the disease, neural degeneration is widespread and the brain tissues have become smaller.

Hearing loss has been linked to changes that occur in the brain, including in cognitive ability as a result of the brain needing to allocate increased resources for decoding of the auditory message (understanding) and encoding of the message (memory).²³ In a direct measure of the association between hearing loss and cognition in older adults, Lin (2011)²⁴ found that greater hearing loss was associated with lower scores on a test of cognition (the DSST), with the magnitude of the reduction in cognitive performance associated with a 25 dB hearing loss being equivalent to an age difference of 7 years. In a longitudinal study of 1,984 adults, Lin and colleagues (2013)²⁵ found that individuals with hearing loss had increased risk for incident cognitive impairment and that the risk of impairment was associated with the severity of the hearing loss. They concluded that hearing loss is independently associated with accelerated cognitive decline.

In a prospective study of 639 individuals who were dementia free at baseline, Lin and colleagues (2011)²⁶ found that those individuals with mild, moderate, and severe hearing impairment, respectively, had a 2-, 3-, and 5-fold increased risk of incident all-cause dementia over >10 years of follow-up. In a study utilizing magnetic resonance brain scans of 75 normal-hearing older adults and 51 hearing-impaired older adults, Lin and colleagues (2014)²⁷ found the hearing impaired individuals had accelerated volume declines (e.g. atrophy) in the whole brain as well as the right temporal lobe.

THE IMPORTANCE OF THE AUDIOLOGIST IN CONTRIBUTING TO THE MONITORING OF CHRONIC, COMORBID DISEASES

While many chronic diseases have been shown, in multiple investigations, to have elevated OR or HR with respect to hearing and balance disorders, the common pathophysiology is often hypothesized, but not known. Part of the reason for this unknown aspect is due to the unique and inaccessible location to investigate ear disease, compared to accessible tissues, structures, and organs associated with many chronic diseases. Many chronic diseases can be studied in the laboratory utilizing blood, urine, and tissue samples; such is not the case for the cochlea. Many chronic diseases can be monitored with simple physiological measurements of pulse, respiration, temperature, blood pressure, and blood oxygen saturation; such is not the case for the cochlea. Progression and/or involvement of many chronic diseases can be investigated with noninvasive procedures (e.g. simple imaging studies), semi-invasive procedures (e.g. biopsies), or invasive procedures (e.g. surgery); such is not the case for the cochlea.

There are other aspects of the cochlea that make it unique, with regards to the need to monitor its status. The cochlea has limited arterial blood supply via the labyrinthine artery, very small capillary pathways, and no collateral circulation. As a consequence, the cochlea is very sensitive to microvascular, macrovascular, and ischemic diseases, as a brief blockage to blood supply can result in sudden hearing loss and/or deafness. With the limited vascular flow into and out of the cochlea and a slow turnover of blood supply, toxins and other harmful agents can remain in the cochlea longer than they remain in contact with other structures. As a result, sensitive and fragile cells in the cochlea can be more susceptible to temporary or permanent impairment from toxic agents (e.g. blood-borne metabolic compounds and/or medication induced, controlled poisons). The cochlea is 'always on' and has a relatively high metabolic demand and as a result can quickly display loss of function resulting from loss of oxygenation.

I, and others, urge the audiology community to begin to think of the cochlea as a canary in the coal mine. You may recall that in earlier days, miners would bring canaries (in bird cages) with them into underground mining operations. As an organism, the canaries were more sensitive than humans to airborne toxins, particularly carbon monoxide,

which can build up in mining operations. The damage to, or death of, the canary was a notice to the miners that evacuation from the mine was needed, as the respiratory conditions were degrading and human death could be imminent. From this use of the sacrificial canary to preserve human life, we speak of the canary in the coal mine as an early indicator of impending adverse events. The ear, its health, and its illness, can be an (early) indicator of emerging and/or progressive bodily damage. The audiologist, as the sole professional equipped to measure and monitor cochlear health, can serve as the person watching the canary. I am also certain that as more is learned about the physiology and pathologies of the cochlea, more and more explanations will be provided with regard to common pathophysiology explaining elevated ORs and HRs between many chronic diseases and hearing and/or balance disorders.

In summary, chronic diseases are the bane of our society and comorbid diseases are ever present in our patient population. Many chronic diseases have linkages to hearing and balance disorders. In our emerging role as doctoring professionals in the healthcare system, audiologists must be prepared to discuss chronic diseases, as well as lifestyle choices and the health and illness consequences, with patients. Audiologists can also monitor the status of the cochlea, in a manner that no other professional can do. As more knowledge is gained about the disease processes in chronic illnesses, the evaluation and monitoring process of the cochlea will add important information towards patient status of health or illness. ■

Victor Bray, Ph.D., is Associate Professor and former dean at Osborne College of Audiology. He was previously the Director of Audiology for the Austin (Texas) Ear Clinic, the Director of Clinical Research for ReSound Corporation, the VP and Chief Audiology Officer for Sonic Innovations, and VP and Chief Audiology Officer of OtoKinetics. Dr. Bray holds a bachelor's degree in Biochemistry, a master's degree in Audiology, and a doctorate in Speech and Hearing Science. He has presented nationally and internationally at numerous workshops, seminars and conferences on the clinical applications of audiology.

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Communicating with Primary Care Providers

by David A. Zapala, Ph.D.

Collaborative healthcare requires efficient and effective communication. Audiology can contribute to the management of a broad range of health conditions with co-managing physician and non-physician providers. How well such collaborations work depends in large part on how well the audiologist communicates and integrates clinical information. What information is important to share, and how it should be organized depends on the nature of the condition to be co-managed, and requires an understanding of body systems beyond the special sense of hearing. This issue of Audiology Practices will highlight some of conditions and body systems that commonly interact with vestibulocochlear system. Before focusing on these conditions, this article will focus on the basic organization of the audiological evaluation as might be collected in an adult audiological evaluation and shared with a primary care provider in the medical home. That is, we will focus on the kind of audiological evaluation often completed for individuals seeking hearing aids, with the audiologist serving as the entry point to hearing healthcare. The intent is that this type of evaluation would always be shared with the PCP in the medical home.

To complete an adult audiological evaluation, the audiologist must answer two fundamental questions. The first question is: “Is there evidence for a disease requiring medical referral or co-management?” If yes, the audiologist must have in mind where to refer the patient, and what specific audiological information the receiving provider will need to effectively initiate a care plan. The second question is: “Is there evidence for a functionally significant hearing difficulty that can be mitigated by audiological care?” If the answer is yes, the audiologist should have in mind treatment options to offer the patient. To the experienced private practitioner, these questions may seem intuitively obvious. However, it is important to report the answer to both questions to the healthcare team in a collaborative care model.

In terms of disease management, Kleindienst et al., (2016) listed a set of over 100 diseases and conditions that could conceivably be encountered during an adult audiological evaluation. The diseases and conditions¹ were categorized along several dimensions, two which are particularly relevant to this discussion. These dimensions are: 1) the likelihood that disease-related signs and symptoms would only manifest as an otologic problem, or present with signs and symptoms affecting other body systems first; and 2) the likelihood of subsequent morbidity or mortality if the disease was missed during an audiological evaluation. In diseases where the signs and symptoms develop in the otologic sphere, the audiologist has a special responsibility to screen for the condition and initiate referrals as needed. When signs and symptoms are present in other body systems, the audiologists will not likely detect the initial disease process, but will provide information that may help stage the progression of the disease. Understanding this helps to organize what information needs to be communicated in the report. Naturally, diseases that are associated with morbidity or mortality are more important to detect than trivial conditions.

For example, uterine cancer metastasis to the posterior fossa, which can present as a progressive unilateral or asymmetrical retro-cochlear hearing loss, would have a very significant risk of mortality (dimension two). The initial signs and symptoms of the disease would involve body systems other than the auditory system (dimension one), and the diagnosis will be made by other health care providers. However, finding a hearing asymmetry in a woman with a prior history of uterine cancer should raise the possibility of metastasis. The referring physician, the patient's oncologist, and otolaryngologist should receive a report that clearly notes the presence of an unexplained hearing asymmetry in the setting of prior uterine cancer. This is what is meant by co-management. Information developed by other providers is

¹In the interest of making this text more readable, we will use the word "disease" to mean both disease and non-disease conditions that should be identified and referred for medical evaluation.

integrated into the decision-making of the audiologist, and vice versa. Together, they form a system whereby disease detection and progression can be monitored effectively.

In contrast, an acoustic neuroma or vestibular schwannoma may sit quietly for many years without observable signs or symptoms beyond an insidiously progressive unilateral hearing loss. In an otherwise asymptomatic adult seeking hearing aids, it falls upon the audiologist to recognize the risk for underlying disease and refer appropriate (Zapala, et al, 2008). There is no one else positioned to perform this vital service.

Naturally, diseases that are associated with morbidity or mortality are more important to detect than trivial conditions.

The handshake between audiology and otolaryngology is well worn. Audiologists and otolaryngologists are familiar with each other's terminology. Otolaryngologists are trained to be able to evaluate audiological test data and understand our classification systems (e.g. Type "C" tympanogram, air-bone gap, mixed hearing loss). Importantly, they know how to integrate audiological test data into their evaluation process and come to their own conclusions about the nature of the underlying problem (e.g. Eustachian tube dysfunction).

The average physician will not be as capable as our otolaryngology colleagues, nor will they always have the interest to delve into the intricacies of the audiological evaluation. We will inevitably interact with physicians who have varying familiarity with our discipline. Moreover, when physicians have a complex patient to manage, they are required to digest a great deal of information from many sources to understand the patient's current state of health. Their time and effort is best directed towards the needs of the patient. Poor report writing results in ineffective information exchange. It increases reading time, comprehension effort, and, importantly, increases the risk of misunderstanding. If we are to contribute to the co-management of disease, we must present our impressions clearly and succinctly. "Clearly" means that the assessment and plan sections are easily found in the report. "Succinctly" means that the impression statements use the minimum number of words necessary to communicate. But what is necessary?

Date of birth: N/A	Ventricular rate: 56 B.P.M.	IMPRESSIONS:
Male	PR interval: 144 ms	- Sinus bradycardia
175 cm	QRS duration: 98 ms	- Suggestion of posterior inferior wall infarct
Room: PCH	QT/QTc: 404/389 ms	- J-point elevation
Location: 45	P-R-T axes 69 47 -1	- Nonspecific peaking of the T waves

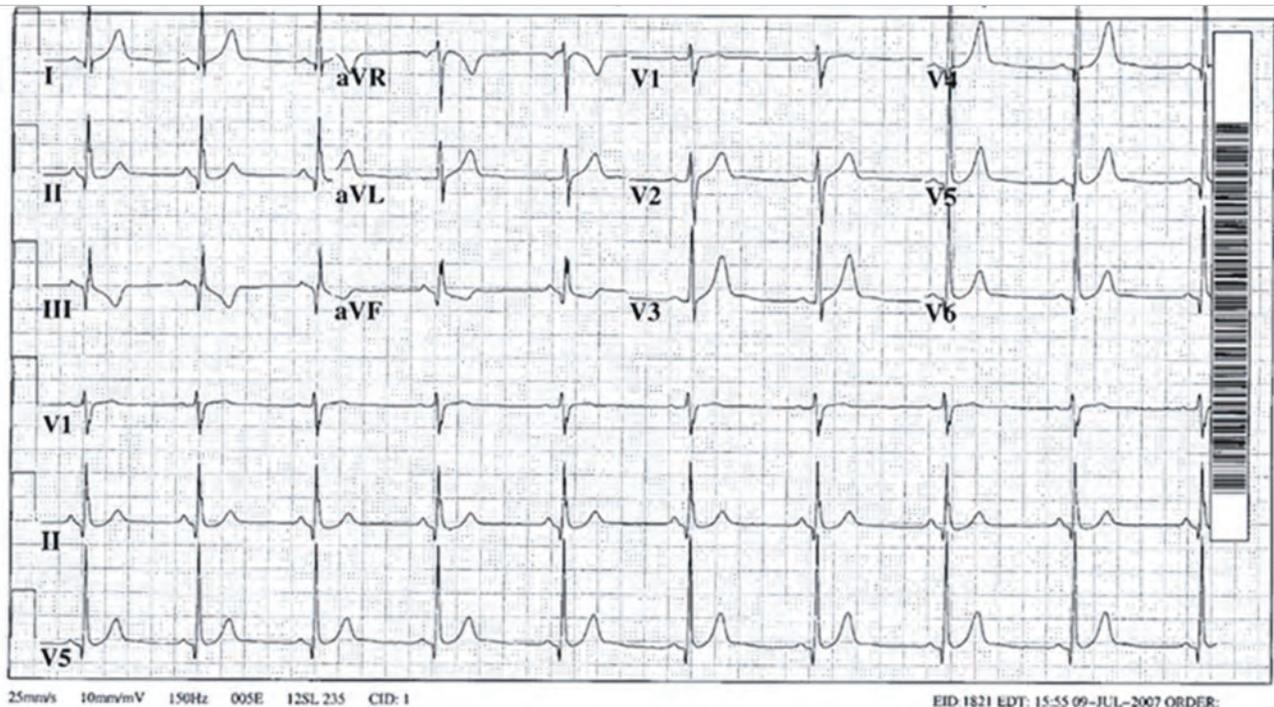


FIGURE 1. Example ECG.

Consider the electrocardiogram (ECG) in Figure #1. ECGs are relatively simple to interpret. They have a complexity about on par with an evoked potential study. There are defined waveforms that vary with electrode position. The waveforms are listed alphabetically from P through T. Heart rate, inter-wave intervals and amplitudes relate to the function of the various regions of the heart muscle and their neuro-electrical drivers. Waveshape, variations in rhythm, and dipole changes can all be interpreted in terms of normal versus abnormal, and have implications for likely site of lesion. Is this important to you, a non-cardiologist looking at this record? You can see the raw ECG waveforms (data) and a few measurements (heart rate, QR interval, etc...). You could learn to interpret these waveforms and understand the implications of those measurements if you wanted to do so. Normal values are easily obtained on the web. But if you saw this in a patient's chart, would you take the time to do this? No. You have other things to do. Your interest should be focused on the impression statement of the cardiologist – the specialist who is qualified to interpret the data and explain what they may mean. In this case, the cardiologist felt there was evidence for a myocardial infarction in the posterior wall of my heart. Yes, this is my ECG study. It looked like somewhere down the line I had suffered a silent heart attack. (Fortunately, it turned out not to be true.) Now if this were you or your patient, how important is it for you to know how to interpret the raw waveforms in this report? If you had a second study, where would you look first to get the information you seek? You would look at the impression statement.

There are several parallels between the ECG and the basic comprehensive audiological examination. Just like the ECG, the audiological evaluation contains several types of data and classification systems that require a specific technical background to understand. You might be tempted to present these test results and review the meaning of each test. Don't do this. Other healthcare providers will look to you to present your assessment succinctly in a series of easily understood impression statements. They tell everyone reading the report what you have learned that guides you to propose what should be done. That is,

each impression statement is actionable. Each one leads to a subsequent proposed action in the treatment plan. There is no time or space to review the results of specific tests. No one has time for that.

In the case of my ECG, it was the impression of myocardial infarction that triggered a cascade of tests to evaluate the truth of that clinical hypothesis. So what does the analogous statement look like on an audiological report? When answering the first question, “Is there evidence for a disease requiring medical referral or co-management?” use the following format:

<magnitude>,<type>, <likely etiology>

Where magnitude is the common severity classification (such as “mild”, “moderate”, “severe”, “profound”); type is the common site of lesion classification (“conductive”, “mixed”, “sensorineural”, etc...), and likely etiology can be “consistent with age-related hearing loss/prior noise exposure/idiopathic hearing loss etc...”) I typically do not go into great detail about audiometric configuration as this is most often used to establish etiology. Rather than force the reader to remember what is implied with various audiogram shapes, make it easy for them: explicitly tell them what is implied. When the etiology is likely age-related or noise-related, there is no need for subsequent medical evaluation. If the hearing loss is idiopathic, or from some other cause, referral would be implied, and this becomes part of the treatment plan. Non-otolaryngologists will appreciate the simplicity of this approach.

If there is an additional reason for medical referral not captured in the above impression statement format, and additional statement can be added. For example:

1. Right Ear: mild sensorineural hearing loss, likely age related.
2. Left Ear: moderate sensorineural hearing loss, idiopathic.
3. Unexplained hearing asymmetry.

These impression statements lead to the first item on the audiological treatment plan:

1. Recommend otologic evaluation of idiopathic left sensorineural hearing loss.

From the primary care providers perspective, this statement has the effect of saying “referring provider, you have more work to do to arrange for an otologic evaluation.”

In contrast, if the first impression statement addressing the need for medical referral were: “bilaterally symmetrical, mild to moderate sensorineural hearing loss, in keeping with age-related hearing changes”, it would follow that there was no identified need for additional medical evaluation and no such plan would be proposed. The <magnitude>,<type>, <likely etiology> format is an unambiguous way to communicate to primary care providers the medical implications of audiological evaluation results. There is no need to be overly specific with the etiology statement. If it looks like mastoid disease, let the specialist make that diagnosis. It is sufficient to simply state: “idiopathic conductive hearing loss.” This is enough to establish the need for further evaluation on the part of the referring provider.

The second question to be answered by the audiologist is: “Is there evidence for functionally significant hearing difficulties that can be mitigated by audiological care?” I strongly propose that this question be answered in a separate impression statement from the <magnitude>,<type>, <likely etiology> statement. It is unfortunate that the current classification system for describing hearing loss magnitude (i.e., “mild,” “moderate” etc...) has been conceptually anchored to a decibel range, communication difficult descriptors, and average overall hearing loss severity (Clark, 1981, Manchaiah & Freeman, 2011). This co-mingling of constructs can leave the mistaken impression that the audiogram links all of these constructs together. Do all people with mild to severe steeply sloping sensorineural hearing loss have communication difficulties? No.

Separating impression statements of hearing loss magnitude (<magnitude>,<type>, <likely etiology>) from impression statements about hearing difficulty and subsequent need for audiological intervention avoids the ambiguities inherent in using a confounded classification system. It also clearly states to the referring provider that the audiologist will take over care of the patient’s communicative needs. In most cases, this is welcomed news for the referring provider – one less problem on the problem list.

As we have moved to interoperable electronic health records (EHRs), the industry has adapted SOAP structured to document clinical encounters. Reports generated from audiology encounters should follow the structure as well. The alternative structure, APSO (assessment, plan, subjective, objective) may also be acceptable so long as the assessment and plan portions of the report are clearly and succinctly presented (Zapala, 2007).

The treatment plan, at minimum, should address the need for further medical evaluation if such a need is established in the <magnitude>,<type>, <likely etiology> statements. It should also explicitly state that the audiologist will take over care for any hearing difficulties or communication impairments. Additionally, if there is a risk or question about hearing loss progression, a follow-up evaluation at an appropriate time interval should be recommended.

Audiology is rapidly evolving. Not only is hearing aid technology becoming more sophisticated, but our role in co-managing patients with otologic as well as systemic disease is likely to broaden. Against that backdrop, it is vitally important that audiological reports be digestible to specialists and generalists in other healthcare disciplines. Using the <magnitude>,<type>, <likely etiology> structure to describe the pathophysiology, and separating this from the patient's need for audiological management will greatly facilitate information transfer across disciplines. ■

David Zapala earned his BA from California State University at Fullerton, MS from Utah State University, and PhD from the University of Memphis. Early in his career he developed the Infant Hearing Center and Hearing and Balance Center at Methodist Healthcare in Memphis and served as a clinical professor in Otolaryngology at the University of Tennessee. He is currently a Senior Consultant and Chair of the Audiology Section at the Mayo Clinic in Florida and an Associate Professor of Audiology in the Mayo School of Medicine. Dr. Zapala has published and taught in the areas of vestibular assessment and diagnostic audiology. He has served on the American Board of Audiology, the Board of the American Academy of Audiology, the American Balance Society and the Institute of Medicine's Committee on the Accessibility and Affordability of Hearing Healthcare. He is currently an NIH funded clinical researcher, investigating how well consumers and audiologists assess ear disease risk.

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DEPRESSION HAPPENS

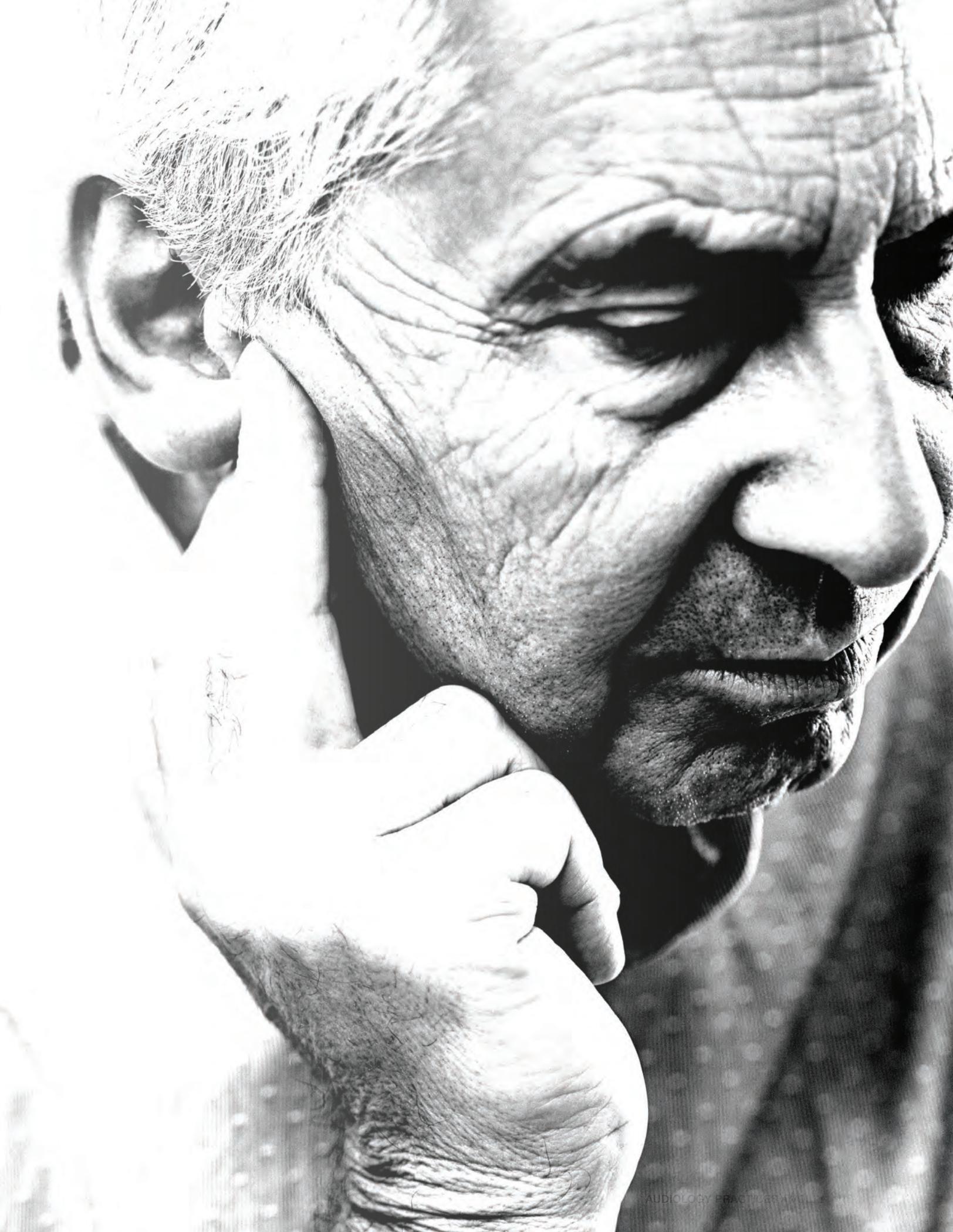
By Victor Bray, Ph.D..

A Story. He was in his mid-60's and he was struggling. His personal interactions and quality of life, at both home and work, had been significantly impacted by his progressive, bilateral, moderate, sensorineural hearing loss. We had been working together for about six weeks, through an initial diagnosis, hearing aid selection and fitting, check-ups and troubleshooting adjustments, and we were successfully closing out his hearing aid trial period. But while his auditory capabilities and speech understanding ability had been restored to improve daily function, he was still unhappy with life.

As we wrapped up this phase of his treatment plan and I reflected on the next steps, I decided on two actions. One, the routine action, was to recommend to him to return to see me in six months for follow-up, or sooner if problems developed. The second, and nontraditional action, was to consult with the otologist in the clinic to make the request that we refer our patient to a psychiatrist for evaluation for depression.

This was not an easy referral for me to make, as it was the first time I had ever taken a step to interject myself into a patient's personal life with a recommendation for mental health evaluation. But, I was highly motivated to do so because I had seen a similar situation develop earlier in the year; a man of similar age, similar life situation, the same frustrations, the same unhappiness as the hearing aids were not the panacea to solve his life problems, who committed suicide. I did not want to see that happen again.

It was now six months later and he had returned for his check-up appointment. As we started our dialogue, he looked me straight in the eye, and with a bit of anger, stated 'it was you who referred me to the psychiatrist, wasn't it?' I replied, 'yes, it was me' taking action through the otologist. He said to me 'well, I didn't appreciate it, but I did go see the psychiatrist and, looking back, it was the right thing for you to do and for me to get some help.' He went on to say 'I now recognize that I had some significant depression, which was brought to crisis in dealing with my hearing loss. I'm still in treatment with the psychiatrist, but much better now. So, thank you for making the referral. But, I still hate having to wear these damn hearing aids.' Thus was my first encounter in holistic health care that went beyond the evaluation and treatment for hearing loss.



An Overview of Depression^{1,2,3}

Depression happens and is all around us. It is a common, serious mental health disorder affecting more than 300 million persons worldwide and 1 in 6, or 16 million Americans. In the USA, the prevalence of major depressive episodes is 6.7% in the general population, higher among females (8.5%) than males (4.8%), and more common in younger persons 18-25 (10.9%) than persons in the age ranges 26-49 (7.4%) and 50+ (4.8%). But, in the older population the prevalence of depression increases, with estimates of 10 – 11% for persons in their 70's and 12 – 13% for those 80 and older.⁴

Depression negatively affects feelings, thoughts, and actions and can lead to emotional and physical problems and a decrease in a person's ability to function at work and at home. Depression is characterized by persistent sadness and a loss of interest in activities that are normally enjoyed, accompanied by an inability to carry out daily activities for at least two weeks. People with depression may have anxiety, reduced concentration ability, feelings of worthlessness, guilt, or hopelessness, and thoughts of self-harm or suicide.

Depression is the leading cause of disability worldwide and is a major contributor to the overall burden of disease and health care. In the USA, a little over 10% of physician visits have depression indicated in the medical record. Depression-related suicides occur at a rate of about 14 per 100,000 persons, or 45,000 per year, and suicides are the tenth leading cause of death in the USA, following heart disease, cancer, accidents, chronic lower respiratory diseases, stroke, Alzheimer's disease, diabetes, influenza and pneumonia, and kidney disease.

Some general risk factors for depression include a personal or family history of depression; major life changes, trauma, or stress; and/or certain physical illnesses and medications. More specifically, risk factors include lifestyle and addiction behaviors of alcohol dependence and substance abuse; biological factors of chronic pain, unexplained somatic symptoms, and being nonresponsive to normally effective treatments for medical conditions; gender associations of female sex, obstetric conditions, and recent childbirth; psychological association with anxiety, hypomania, or psychosis; and life factors of recent stressful events and comorbid chronic conditions. While hearing loss is not specifically listed as a risk factor of depression, hearing loss can be considered as a chronic condition that can introduce significant stress on the individual.

Depression, itself, is a chronic disease that should be monitored, but it cannot be identified by laboratory tests or clinically useful biological markers and its pathophysiological

cause is unknown. Fortunately, when identified through behavioral observations, depression is treatable with talking therapies or antidepressant medication or a combination of these. Of those persons with depression, about 44% receive both therapy and medication, 13% participate in therapy alone, 6% utilize medications, and 37% are not in treatment.

Increased Depression Associated with Hearing Loss

There have been numerous epidemiological studies examining population statistics to document depression and hearing loss in the population. Where increased rates of depression were found to be associated with hearing loss, the most frequent explanations include a sequence of events whereby hearing loss reduces speech recognition and ability to communicate, especially in difficult listening environments, which negatively impacts the person and their interpersonal relationships, leading to a declined quality of life, related to isolation, reduced social activity, a feeling of being excluded, and increased symptoms of depression.⁵

Strawbridge and colleagues (2000)⁶ examined data on almost 2,500 persons tracked in the Alameda, California database, looking for effects associated with untreated hearing loss. They found multiple, negative outcomes and negative functional status associated with hearing loss, including depression, loneliness, and altered self-esteem. They calculated adjusted odds ratios (OR) associated with moderate or greater hearing loss, of 1.39 for fair or poor physical health, 1.90 for fair or poor mental health, 1.85 for Activities in Daily Living, 1.98 for physical performance disability, and 2.05 for depression.

Gaynes and colleagues (2002)⁷ evaluated depression and its impact on health-related quality of life (HRQOL) across almost 10,000 persons using the USA National Health and Nutritional Examination Survey (NHANES). They found that that depression can be an independent source of suffering and disability, similar to that of arthritis, diabetes, and hypertension, that the effect of depression on HRQOL was comparable to the chronic illnesses, and that depression could interact with the chronic illnesses to amplify the negative effects of the illnesses.

Li and colleagues (2014)⁸ examined a sample size of over 18,000 adults using NHANES data. They found that hearing loss was one of many factors associated with depression, along with age, body mass index, cardiovascular disease, diabetes mellitus, educational level, general health status, hypertension, living alone, poverty income ratio, sex, sleep disorder, smoking, and trouble seeing (even with visual aids). They

found the prevalence of moderate-to-severe depression to be 4.9% in persons with excellent hearing, 7.1% in persons with good hearing, and 11.4% in persons with hearing loss. They reported the odds ratio for depression were 1.4 for persons with good hearing, 1.7 for little trouble hearing, 2.4 for moderate trouble hearing, 1.5 for a lot of trouble hearing, and 0.6 for deafness.

Hsu and colleagues (2016)⁹ examined the Taiwan National Health Insurance Database (TNHID) for the presence of depression associated with hearing loss. Their analysis of over 5,000 patients with sensorineural hearing loss and 20,000 patients without hearing loss yielded a dozen comorbidities associated with hearing loss, including alcohol-related illness, anxiety, asthma, chronic artery disease, chronic kidney disease, chronic obstructive pulmonary disease, cirrhosis, diabetes mellitus, hearing loss, hyperlipidemia, hypertension, steroids, and stroke. Of particular interest to us, four of the conditions associated with depression were also associated with hearing loss: alcohol-related illness, anxiety, chronic artery disease, and stroke. Comparing the incidence of depression and hearing loss, the adjusted hazard ratio (aHR) was 1.73 and the aHR increased with patient age and was higher in women than men.

The epidemiological studies described above are not the only ones that show statistically significant correlations between hearing loss and depression. However, these studies are characteristic of many findings that come from analyses of the population data bases. In general, many of the studies report an odds ratio of around 2 when linking hearing loss and depression, indicating that the presence of hearing loss is associated with a doubling of the occurrence of depression, compared to not having hearing loss. In practical terms, if your patients are in the older age groups, where depression occurs at a rate of 10 – 15%, this may be consistent with older onset depression, occurring at twice the 5% rate of the adults over age 50.

In consideration of the general findings of these epidemiological studies, please take into account two cautions. First, while these linkages between depression and hearing loss are statistically significant, it is not necessarily because of a strong linkage between hearing loss and depression, but instead because of the very large sample sizes used, which can pick up the weak link between untreated hearing loss and depression. Second, these studies utilize correlational analysis tools and cannot be used to imply causation. As previously stated, the increased odds ratio implies a comorbidity between hearing loss and depression, where the depressive symptoms are believed by many audiologists to be a result of impaired communication and socialization. But, the increased odds ratio

can also imply a comorbidity between depression and hearing loss, which could be caused by other factors, such as brain-centered, neurological degradation having a negative impact on both emotion health (e.g. depression) and sensory processing (e.g. hearing loss).

Reduced Depression Associated with Treatment for Hearing Loss

There have been epidemiological studies examining population statistics to understand depression, hearing loss, and treatment with hearing aids. With regard to the finding that use of hearing aids was correlated with reduced depression, compared to individuals with untreated hearing loss, an explanation is that treatment for hearing loss reduces depressive symptoms through improved social engagement, or another explanation is that individuals without depression may be more likely to seek treatment with hearing aids.

Mener and colleagues (2013)¹⁰ evaluated over 1,000 subjects, age in their 70's, using the NHANES database. They found that 58.5% had hearing loss, 7.1% met the criteria for depressive disorder, and 3.9% met criteria for major depressive disorder (MDD). In examining the use of hearing aids, they reported reduced odds ratio of 0.33 for those with any depressive symptoms and 0.35 for those with symptoms of MDD. These findings were similar to those of Gopinath and colleagues (2009)¹¹ who evaluated over 1,000 persons, age 60 and older, using the Blue Mountains (Australia) database and found hearing aid use was associated with lower odds ratio of 0.32 for depressive symptoms.

While these correlational studies are significant in their findings of hearing aid use being associated with significantly reduced rates of depression, more powerful evidence on the reduction of depression associated with treatment for hearing loss can be found in clinical trials.

Mulrow and colleagues (1990)¹², with USA military veterans, fit hearing aids to almost 100 patients who were matched to a similar group of patients placed on a waiting list for treatment. At the beginning of the study, 82% of the combined treatment group and waiting group reported adverse effects of quality of life due to hearing impairment and 24% were depressed. At four months after treatment, compared to the waiting list, there were significant improvements for social and emotional function, communication function, cognitive function, and depression. In a follow-up report, Mulrow and colleagues (1992)¹³ reported that many of the quality of life changes, including from depression, were sustained at eight and twelve months. They concluded that several adverse

effects of hearing loss on the quality of life for elderly persons, including depression, are reversible with use of hearing aids.

More recently, Choi and colleagues (2016)¹⁴, in the Johns Hopkins Medicine Studying Multiple Outcomes after Aural Rehabilitation Treatment (SMART) study, evaluated 112 participants, aged 50 or older, for effects on depression following aural rehabilitation. For the 63 participants who received hearing aids, Geriatric Depression Scale (GDS) scores were improved by 28% (a significant effect) at six months and 16% (a nonsignificant effect) at twelve months. For the 50 participants who received cochlear implants, GDS scores were improved by 31% at six months and 38% at twelve months (both significant effects). In terms of individual effects, at baseline, only five of the hearing aid recipients (8%) and eight of the cochlear implant recipients (16%) had GDS scores suggestive of depression. At twelve months post-treatment, three of the hearing aid recipients (5%) and six of the cochlear implant recipients (12%) still had GDS scores suggestive of depression.

This study highlights two important considerations when clinically applying the general conclusion that amplification may relieve depressive symptoms in patients. First, while there were statistically significant effects on depression scores for the group, the vast majority of each group (92% of the hearing aid recipients and 84% of the cochlear implant recipients) did not have GDS scores indicative of depression at baseline. Second, the individuals who demonstrated the most substantial improvement in depression scores were individuals who had the highest depression scores at baseline. Thus not all persons with untreated hearing loss had GDS scores indicating depression, but for the minority who had the highest depression scores, large reductions in scores did occur for post-treatment depression.

Related to depression, Weinstein and colleagues (2016)¹⁵ evaluated 40 adults for the effect of hearing aid use for emotional loneliness and social loneliness. They found, with hearing aid usage, there was a significant change for overall loneliness and perceived emotional loneliness, particularly for those with moderate-to-severe hearing loss. Their findings urge us to remember that treatment with hearing aids is more than just restoring audibility, but should be considered as a method to improve verbal communication, restoring the possibility for social networking, thereby improving the quality of life and quality of social interactions.

Another important aspect of their findings is that hearing loss alone is not the cause of all forms of loneliness, and hearing aid use is not an all-purpose remedy for loneliness. For the group, 28% of the participants were lonely after treatment,

compared to 45% of the participants pre-treatment. In terms of the number of participants, the 17% change would correspond to 7 participants, with 22 of the participants not reporting loneliness before treatment and 11 still reporting loneliness after treatment. Clinically we must remember that not all of our patients will have negative psychosocial consequences as a result of hearing loss, not all of our patients will obtain relief from psychosocial problems following treatment with amplification, but for some of our patients, hearing loss will have psychosocial consequences and the treatment we provide can have a dramatic, and positive, effect.

Depression Associated with Dual Sensory Loss

As audiologists, while we may concentrate on the auditory aspects of verbal communication and the psychosocial consequences resulting from hearing loss, we must also be aware of vision, vision impairment, and visual communication. Many of our patients with hearing impairment also have vision impairment, known as dual sensory loss (DSL). While hearing impairment is associated with increased rates of depression, vision impairment has higher rates and DSL has even higher rates (see details below). Heine and Browning (2002)¹⁶ point out that decreased vision and/or decreased hearing both can interfere with reception of speech, resulting in communication breakdown, which can result in poor psychosocial functioning, including deeper depression. Many visual factors, which audiologists normally rely on to facilitate communication, may no longer be available to the DSL patient. These factors include the inability to perform lip-reading (to pick up cues for those hard-to-hear high-frequency fricatives, which are also hard to amplify to audibility) and even the inability to see the person, resulting in the loss of non-verbal cues such as facial expressions, body posture, and gestures.

Huang and colleagues (2010)¹⁷ conducted a meta-analysis of 31 publications concerning nine chronic conditions and depression. They concluded from their investigation that there were definite risk factors, including elevated odds ratios, for increased depression in old age for five conditions: cardiac disease (OR: 1.67), hearing loss (OR: 1.71), stroke (OR: 1.87), vision loss (OR: 1.94), and chronic lung disease (OR: 2.13). It is extremely important that we recognize that hearing loss and vision loss were two of the five factors that emerged from the meta-analysis and that the odds ratio for depression and vision impairment (1.94) was stronger than for hearing impairment (1.71).

In additional investigations of DSL and depression, Armstrong and colleagues (2016)¹⁸ reported the prevalence of

depression at 11.6% in their older adult population, at 17% for persons with hearing impairment, at 25% for vision impairment, and at 31% for dual sensory loss. Turunen-Tahari and colleagues (2017)¹⁹ reported rates of depression of 34% for the DSL group vs. 19% for the hearing impairment group. Cosh and colleagues (2017)²⁰ also found that DSP posed a more significant risk for depression and loneliness than vision loss or hearing loss alone.

Some Thoughts on Clinical Guidelines for the Audiology Patient with Depression¹

Many patient encounters begin with the case history and intake discussions. At this point, the clinician may choose to start collecting information on depression and comorbid conditions. Several important items to consider incorporation into the case history form are those that have been found to be comorbid with depression: alcohol-related illness, anxiety, asthma, cardiovascular disease, chronic kidney disease, chronic obstructive pulmonary disease, cirrhosis, diabetes mellitus, hyperlipidemia, hypertension, sleep disorder, smoking, steroids, stroke, and trouble seeing (even with visual aids). The presence of these items, as identified through the case history, may place your patient at increased risk of a depressive disorder, separate from the hearing loss you are treating.

As for the presence of depression, the audiologist may utilize the Patient Health Questionnaire with two questions (PHQ-2): “Over the past 2 weeks, have you felt down, depressed, hopeless?” and “Over the past 2 weeks, have you felt little interest or pleasure in doing things?” Patients who have a positive response to one or both questions can have a more complete assessment, which can be in the form of the nine question PHQ-9, as follows:

Over the past two weeks, how often have you been bothered by any of the following problems? (0 = not at all; 1 = several days; 2 = more than one half the days; 3 = nearly every day)

1. Little interest or pleasure in doing things
2. Feeling down, depressed or hopeless
3. Trouble falling or staying asleep or sleeping too much
4. Feeling tired or having little energy
5. Poor appetite or overeating
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down
7. Trouble concentrating on things, such as reading the newspaper or watching television
8. Moving or speaking so slowly that other people have noticed, or the opposite (i.e. being so fidgety or restless that you have been moving around a lot more than usual)
9. Thoughts that you would be better off dead or hurting yourself in some way

Scoring: Items 1 through 9 are added to yield a score ranging from 0 to 27. On this scale, 0 – 4 is considered nondepressed, 5 to 9 is considered minor depression, 10 – 14 is considered mild depression, 15 – 19 is considered moderately severe depression, and 20 – 27 is considered severe depression.^{21, 22, 23}

If you, as the clinician, detect that your patient may have depressive symptoms that are (a) not resolved through your course of auditory rehabilitation, and (b) negatively impacting the quality of life of your patient, please consider referral of your patients to an appropriate mental health care provider. Remember that depression is all around us and most likely will be occurring at an elevated rate, in your patients, through many factors associated with aging. While auditory rehabilitation is an excellent course of treatment for some of your patients who have depression associated with untreated hearing loss, the amplification and therapy treatments we offer can have very limited effect on depression associated with many other life factors in our patients' lives. ■

Victor Bray, Ph.D., is Associate Professor and former dean at Osborne College of Audiology. He was previously the Director of Audiology for the Austin (Texas) Ear Clinic, the Director of Clinical Research for ReSound Corporation, the VP and Chief Audiology Officer for Sonic Innovations, and VP and Chief Audiology Officer of OtoKinetics. Dr. Bray holds a bachelor's degree in Biochemistry, a master's degree in Audiology, and a doctorate in Speech and Hearing Science. He has presented nationally and internationally at numerous workshops, seminars and conferences on the clinical applications of audiology.

¹The comments in this section are not medical advice, but 'food for thought' for the audiology clinician concerning a significant issue coming through our offices on a regular, and frequent, basis. You are urged to develop awareness of depression in your patients; be alert for improvement, or lack of improvement, in the patient's depressive symptoms during the course of auditory rehabilitation; and refer, when appropriate, to appropriate health care providers. In the development of a protocol for your clinical setting, it is highly recommended that you consult with, and seek advice from, the health care providers who will be your referral point for patients showing depressive symptoms. Also, in consultation with these professionals, the audiologist should take the opportunity and time to sensitize the mental health professionals of the relationship between hearing loss and depression, thus alerting them to the need to refer appropriate patients to you for hearing health care. For more information, see "Hearing Loss: The Silent Risk for Psychiatric Disorders in Late Life" by Blazer (2018).

Continued on page 64

GETTING TO THE **HEART** OF THE MATTER

Hearing Loss and Cardiovascular Disease

By Carol Knightly, Au.D.





According to the Centers for Disease Control and Prevention, 11.5% of adults in the US have cardiovascular disease (CVD), the most common cause of death worldwide (CDC, 2016). Likewise, congenital heart malformations in children are the most common birth defect, affecting some 40,000 newborns in the United States each year (CDC, 2018). Thirty percent of those newborns will require some sort of intervention during the first year of life; very often, that intervention is surgical. It is likely, therefore, that the caseload of an audiologist will include individuals with some type of cardiovascular disorder.

We have long been aware of genetic abnormalities and syndromes that include both hearing loss and heart defects, such as Down syndrome, Goldenhar syndrome, CHARGE syndrome, Velocardiofacial syndrome and Jervell Lange-Nielsen syndrome. There also appears to be a relationship between CVD and hearing loss. Perhaps most importantly, however, there is evidence for a predictive relationship between hearing loss and sub-clinical CVD, before other, better-known, symptoms appear. Finally, just recently, we have begun to examine the relationship between congenital heart defects requiring surgery in infancy and permanent childhood hearing loss.

Myocardial infarction (heart attack) and stroke are common causes of death resulting from CVD, and those two events are generally caused by atherosclerosis, thromboses, hypertension, valve malformations or atrial fibrillation. Atherosclerosis, commonly referred to as “hardening of the arteries” is a build-up of a substance called plaque on the interior walls of the blood vessels, of which cholesterol is a key component. Plaque build-up can severely restrict blood flow, resulting in the formation of blood clots called thrombi, or obstruct the flow of blood through a vessel entirely. If a thrombus breaks off and begins to travel through the body, it is referred to as an embolism. An embolism can travel unimpeded through the body until it comes to narrower blood vessels, where it can lodge resulting in ischemia, or insufficient blood flow beyond that point to provide adequate oxygenation, and localized death of cells and tissue.

Hypertension, or high blood pressure, damages the interior walls of the blood vessels, making them more susceptible to the build-up of plaque. Hypertension can also result in “leaky” blood vessels.

There are four valves in the heart, which are responsible for ensuring that the blood flows in only one direction. If the valves do not function properly as a result congenital malformation or scarring from an infection, they can restrict blood flow, as in stenosis, or allow some amount of regurgitation, resulting in embolism.

Finally, atrial fibrillation is an irregular heartbeat, or arrhythmia. In cases of arrhythmia, the blood does not empty from the heart completely with each contraction, leading to the formation of blood clots in the heart, which can then travel to lodge in smaller blood vessels, resulting in ischemia. Significant restriction of blood flow to the heart itself will result in myocardial infarction.

The relationship between CVD and hearing loss is straightforward. The inner ear is a large consumer of energy, relying on metabolism of both glucose and oxygen supplied by the blood to fuel the stria vascularis. The stria vascularis maintains the overall health of the cochlea, important to the organ of Corti and, in turn, endocochlear potentials.

Damage to the cochlea from CVD can occur for a number of reasons. First, the blood supply to the cochlea is delivered via extremely small vessels, or capillaries. Capillaries are very susceptible to damage from high blood pressure and embolism, or even microembolism (Gyo, 2013). An embolism that passes through other arteries unimpeded because of their relatively larger size can become lodged in the supply vessels to the cochlea. In addition, few arteries feed the cochlea. If they become damaged or blocked from hypertension or embolism, there is no collateral blood supply. Finally, the blood supply to the cochlea is relatively sparse at the apex, compared to that of the base.

Given the likely insults to the cochlea from CVD, there are somewhat predictable patterns of associated sensorineural hearing loss (SNHL). There are a number of different types of presbycusis affecting older adults: sensory, neural, metabolic and mechanical (Lee, 2013). Of particular interest here is metabolic, or stria, presbycusis. Any degeneration in health of the stria vascularis from embolism or micro-bleeds will impact the quality of endolymph. And, since endolymph flows throughout the cochlea, the resulting SNHL is often of flat configuration.

Sudden-onset unilateral SNHL has been associated with embolism in the arteries supplying the cochlea, and there here have been cases reported of sudden onset unilateral hearing loss followed by stroke (Gur, 2006). High frequency SNHL has been associated with micro-bleeds of the capillaries supplying specific regions of the cochlea. Finally, as mentioned, the blood supply to the apical portion of the cochlea is relatively sparse in comparison to that of the basal section. Degradation of the blood supply to the cochlea, therefore, has been implicated in low frequency SNHL.

Because the blood supply to the cochlea is so susceptible to the CVD process, it is possible that hearing loss would appear in advance of other symptoms of CVD. In fact, hearing loss has been shown to be predictive of larger, more serious, CV events. In 1993, Gates, et al. showed that the odds ratio (OR) of having any CV event and low frequency PTA presbycusis of 40 db HL was 3.06 for women. For men, the OR for coronary artery disease and low frequency PTA presbycusis of 40 db HL was 1.68. However, the OR increased to 3.46

Treatment for CVD includes lifestyle changes and sometimes medication and surgery

for stroke in men. A 2009 study by Friedland, et al. showed that approximately 85% of individuals suffering a stroke had low-frequency or flat hearing loss. Consequently, Friedland has suggested that individuals with low frequency SNHL be regarded as at-risk for CVD, and that consideration be given to referral for appropriate follow-up.

Treatment for CVD includes lifestyle changes and sometimes medication and surgery. Many cases of CVD are preventable though lifestyle changes. Smoking cessation or adhering to specific diets may, in fact, reverse CVD. In addition, it has been suggested that increasing aerobic activity for a period of as little as 6 months results in faster recovery from temporary threshold shift, evidence of a protective effect for the ear.

Surgical intervention theoretically introduces an entirely new set of potential risks for hearing loss. While extended high-frequency audiometry and TEOAEs have shown evidence of sub-clinical hearing loss, there is somewhat conflicting evidence in the literature that techniques used during cardiac surgery, including cardiac bypass and deep hypothermic circulatory arrest, have any significant measurable or self-reported impact on hearing sensitivity (Aytacoglu, 2005; Munjal, 2013) except in the pediatric population.

Neurodevelopmental disabilities are the most common sequelae in children following infant cardiac surgery (International Cardiac Collaborative on Neurodevelopment Investigators, 2016), but the impact is highly variable and may lessen over time. There are comparatively few studies examining hearing loss following cardiac surgery in children.

The prevalence of permanent childhood hearing loss (PCHL) is 1-3 per 1000 in the general population, and 2-4 per 1000 in NICU survivors (Delaney, 2018). Recent studies (Bork, 2018; Grasty, 2018) have suggested that the prevalence of PCHL in children following infant cardiac surgery ranges from 59 to 69 per 1000, an almost twentyfold increase. The risk factors,

as well as the degree and configuration of hearing loss, vary. In addition, not all study participants had reviewable newborn hearing screening results, but for those that did, the results were a pass. Regardless of the cause of hearing loss in these cases, infant cardiac surgery should be considered a risk factor for hearing loss. ■

Carol Knightly, Au.D., CCC-A, is director of clinical operations in the Center for Childhood Communication and the Center for Rehabilitation at CHOP. She received her Bachelor of Arts degree in Speech & Hearing Science & Psychology from Thiel College, her Master of Arts degree from The Ohio State University and her Doctor of Audiology degree from the University of Florida.

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HEARING LOSS AND DEMENTIA

WHY AUDIOLOGISTS NEED TO BE PAYING ATTENTION



by Nicholas S. Reed, Au.D.

Hearing loss impacts 38 million Americans¹ and increases with age such that two-thirds of adults over the age of 70 years have a clinically meaningful hearing loss². In the eyes of an audiologist, these numbers are meaningful because audiologists witness the consequences of hearing loss on a daily basis in clinics across the United States. However, to the public, including other healthcare practitioners and policy makers, these numbers don't stir as much of a reaction. This may be because hearing loss is often viewed as a benign inconsequential aspect of aging.

This perception stems, in part, from a historical focus on hearing loss as the outcome of interest in auditory research and, in part, from hearing loss getting lost in the relatively high number of comorbid chronic conditions experienced by older adults – many of which are more costly with higher mortality rates than hearing loss. Therefore, studying the causes of hearing loss (noise, toxins, cardiovascular risk factors, etc.), which is often the focus of epidemiologic auditory research, generates little attention in the greater healthcare community. However, if we consider how hearing loss affects other areas of healthcare, it offers a more meaningful role of hearing loss to the general medical community.

To that extent, the association between hearing loss and dementia has received much press in recent years. Interestingly, the hypothetical relationship is not completely new. As far back as the mid-1980s, Barbara Weinstein described this relationship in a small cohort while Uhlmann and colleagues leveraged epidemiologic methods to produce a 1989 JAMA published case-control study revealing dementia patients had 2-times the odds of having hearing loss compared to those without dementia^{3,4}. In the past decade, a significant number of studies leveraging epidemiologic methodology have begun to further describe this relationship.

5.4 million Americans have dementia, a number that is projected to increase to 13.8 million over the next ~30 years given the aging demographics of the United States population. Importantly, dementia has substantial negative outcomes including declines in functionality, increased healthcare resource utilization and cost, and high caregiver burden. The Alzheimer's Association reports the estimated lifetime cost of care for persons with dementia is as high as \$341,840.

In media, terms such as cognition and dementia are often used synonymously; however each has a specific meaning. Cognition is characterized as a singular or collection of mental process (working memory, processing speed, language, attention, etc.). Dementia is considered impairment in two or more cognitive domains with significant interference in daily functioning⁵. Dementia has numerous causes including, but not limited to, vascular disorders, degenerative neurological diseases such as Alzheimer's, and traumatic brain injury.

Hearing loss may also have a causal association with dementia. Biologic plausibility and appropriate measurement are needed to consider a causal relationship. The mechanistic pathways through which hearing loss may contribute to poorer outcomes includes increased cognitive load due to degraded auditory



signal processing in the cochlea, changes to brain structure and function, social isolation due to communication difficulties, and loss of environmental sound cues⁶. Moreover, it is important to a priori identify cognitive tasks that do not require hearing to access the task. For example, a task such as the Mini-Mental State Exam⁷ requires conversation to complete the tasks that could be impacted by hearing loss while a measure such as the digit symbol substitution test does not require auditory input to complete the task.

Early research from Lin and colleagues established a cross-sectional association between hearing loss and individual cognitive measures among 605 adults aged 60-69 years in the National Health and Nutrition Examination Survey (NHANES)⁸ and 347 adults over 60 years of age in the Baltimore Longitudinal Study on Aging (BLSA)⁹. This research revealed that adults with hearing loss performed significantly poorer on cognitive tasks than individuals without hearing loss and this difference exacerbated as degree of hearing loss increased.

While cross sectional relationships are important methods to explore associations, longitudinal exploration is needed to establish temporal relationships. In a follow up longitudinal study of 1966 adults in the HealthABC study, Lin and colleagues revealed that adults with hearing loss experienced a 32 percent faster rate of decline on digit symbol substitution scores over a six-year period compared to individuals without hearing loss¹⁰.

While the studies noted above used measured performance on an individual task, two studies from Johns Hopkins measured incidence of dementia among persons with hearing loss. In a study of 639 adults without dementia at baseline in the BLAS, incidence of dementia was recorded over a 10-16 year period¹¹. Survival analyses revealed, that over time, adults with hearing loss were at higher risk for developing dementia and risk increased with degree of hearing loss. Compared to normal hearing adults persons with mild, moderate, and severe hearing loss had 1.89-times (Hazard Ratio [HR] = 1.89, Confidence Interval [CI] = 1.00-3.58, P=0.05), 3.00-times (HR=3.00, CI=1.43-6.30, P=0.004), and 4.94-times (HR=4.94, CI=1.09-22.4, P=0.04) the risk of developing

dementia, respectively. Similarly, in a study of 1889 adults in the HealthABC study, hearing loss was associated with higher risk for developing dementia and risk increased with higher PTA¹².

In 2017, the Lancet commission on dementia prevention and care published their findings which featured multiple significant focus of the relationship between hearing loss and dementia. Firstly, authors reported hearing loss had greatest attributable risk among modifiable risk factors for dementia. Specifically, the commission concluded that 35% of risk factors for dementia is potentially modifiable (e.g. social isolation, physical activities, education, etc.) and largest attributable risk for dementia among those modifiable risk factors was hearing loss (9%). Secondly, the commission conducted a meta-analysis of the two aforementioned studies and one other, hearing loss was associated with 1.94 times the risk (Risk Ratio [RR]=1.94, CI=1.10-219) of incidence dementia¹⁴.

Importantly, hearing aid use may modify this relationship as the pathways outlined above are theoretically amendable to hearing care. Impact on cognitive load could be reduced by a clearer amplified signal and improved communication could decrease social isolation. Secondary analyses in the literature have noted that hearing aid use may be a protective of cognitive decline¹⁵. However, several of the of factors associated with hearing aid use (i.e. higher socioeconomic status) are known protective factors of cognitive decline. It is difficult to statistically tease these confounding factors apart. To that extent, methodologically rigorous randomized control trials are required to offer a definitive answer as to whether treating hearing loss could delay cognitive decline and/or prevent dementia.

At the moment, such a randomized control trial is taking place¹⁶. The Aging and Cognitive Health Evaluation in Elders (ACHIEVE) trial is a large randomized control trial nested within the ARIC study that will examine the influence of best practice hearing care compared to a healthy aging control on cognitive decline. However, results will not be available from another 3 to 5 years. Until that time, definitive claims that hearing aid use prevents dementia should be avoided as they are not scientifically factual. Understanding limitations to the literature is an important aspect of being an evidenced-based clinician.

In conclusion, recent epidemiologic literature has coalesced around the conclusion that hearing loss is an independent risk factor for dementia that may be modifiable. This relationship has catapulted hearing loss into the public eye as evidenced by recent national media coverage, attention

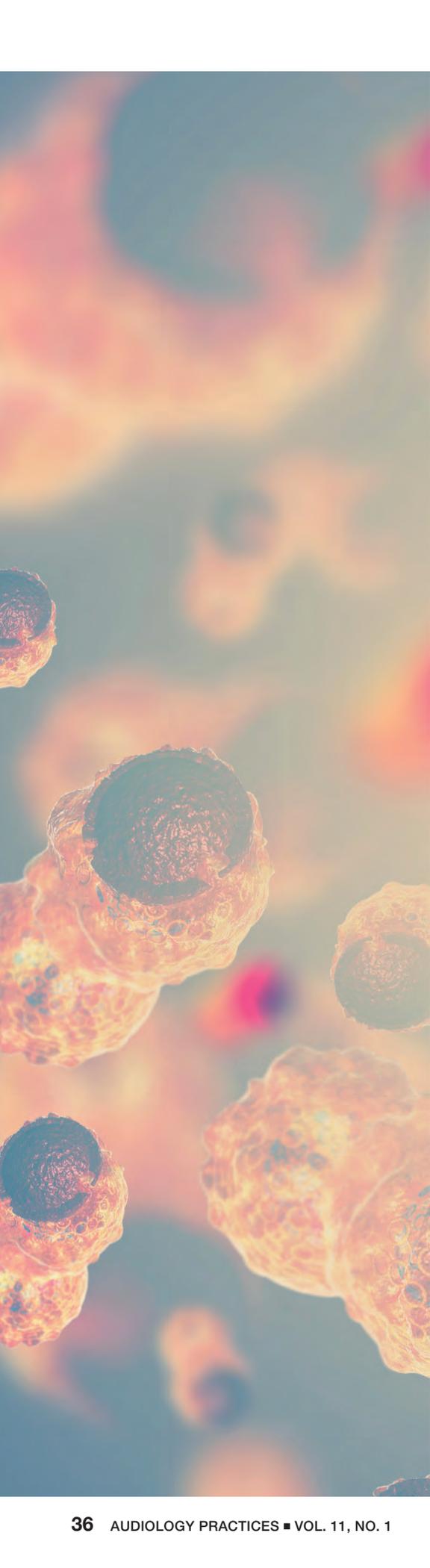


from multidisciplinary academic bodies, and government legislation. Research is underway to better understand whether this relationship is amendable to treatment. This relationship is another aspect supporting hearing loss as a public health concern – a cause audiologists should continue to champion. ■

Nicholas Reed, AuD, CCC-A is an Instructor of Audiology in the Department of Otolaryngology-Head and Neck Surgery at the Johns Hopkins School of Medicine. He received his clinical doctorate in audiology (AuD) from Towson University and completed his clinical fellowship at Georgetown University Hospital. He holds a Certificate of Clinical Competence in Audiology (CCC-A) from the American Speech Language Hearing Association. He has clinical experience with diagnostic audiology and amplification management across the lifespan (pediatric to older adults).

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A vertical strip on the left side of the page shows a microscopic view of cells. The cells are rendered in a vibrant, glowing style with colors ranging from deep blue and purple to bright orange and yellow. Some cells are in sharp focus, showing their complex, textured surfaces, while others are blurred in the background, creating a sense of depth and movement.

CANCER, CANCER TREATMENTS & OTOTOXICITY

by Michelle McElhannon, Pharm.D.

INTRODUCTION

One in three Americans will be diagnosed with cancer at some point in their lifetimes (National Cancer Institute, 2018). The good news is that deaths from cancer have decreased by 25% since 1990. By 2026, there will be an estimated 20.3 million cancer survivors in the United States (National Cancer Institute, 2018). As patients present with cancer, or having survived cancer, health care professionals are called upon to integrate, communicate and educate on how cancer and cancer treatments affect audiologic health.

WHAT IS CANCER?

The body consists of trillions of cells. Cells are DNA encoded to specialize, replicate and die when no longer functioning as needed. Cancer cells have genetically mutated, and can ignore signals for apoptosis, or cell death. Cancer cells begin to divide without stopping and can spread into the surrounding tissues. Cancer cells are less specialized than healthy cells, and damaged or old cells survive or new cells form when not needed. Since cancer cells are a mutated form of the host's own cells, the immune system may not recognize cancer cells as foreign. Cancer cells can influence healthy cells, molecules and blood vessels. By releasing angiogenic factors, a cancerous tumor can promote capillary development to supply nutrients and remove waste. Cancer cells can also access blood supply to metastasize, or spread to other organs. (NIH, 2015)

Neoplastic treatments such as surgery, radiation and chemotherapy may cause or worsen ototoxicity.

SURGERY

Tumors may place pressure on or infiltrate the auditory organs. Surgery may further damage the ear or auditory nerve. (Simon, 2011) Central nervous tumors may cause rapid changes in intracranial pressure. Other procedures affecting intracranial pressure include lumbar puncture, tumor resection, ventriculostomy and cerebral spinal shunts (Guillaume DJ, 2012).

RADIATION

Radiation therapy uses high energy particles or waves, such as x-rays, gamma rays, electron beams or protons to destroy or damage cancer cells. Radiation causes small breaks in the DNA inside cells, stopping growth and replication

to cause cell death. Radiation can be external, using high energy rays, or internal. Internal radiation, or brachytherapy, is the placement of a radioactive source in or near the tumor, such as in prostate cancer radioactive seed implants. Radiation can also be given systemically, via mouth or IV.

The risk of radiation induced ototoxicity is increased with increased dosing, at greater than 30 grays (Hua C, 2008). Risks are also increased if given with other ototoxic therapies, such as ototoxic chemotherapy (Warrer R, 2012). Radiation of the posterior nasopharynx and mastoid can cause serious otitis media and conductive hearing loss. External auditory canal radiation can lead to soft tissue infections as well as increased/dry cerumen production (JA, 1984). Cochlear radiation is associated with sensorineural hearing loss, which is generally permanent and progressive.

Sensorineural hearing loss affects a third of patients, typically having a late onset of 3-5 years post-treatment. Hearing loss is generally more severe in the high frequencies, and poor word discrimination is common (Mujica-Mota M, 2013).

CHEMOTHERAPY

The cell cycle goes through the resting phase, active growing phases, and then mitosis (division). The efficacy of chemotherapy depends on its ability to stop cell division. Cancer drugs usually work by damaging the RNA or DNA that instructs the cell how to replicate and divide.

Chemotherapy-induced side effects occur when the chemotherapy also damages healthy cells. Rapidly dividing cells are generally affected, accounting for the side effects of hair loss and mucosal irritation, for example.

Drug-induced ototoxicity is increased based on several factors: susceptibility of the tissue to the drug, accumulation of the drug within the organ, inhibition of normal physiologic functions, direct toxic effects on the sensory end organs, central effects, and ototoxic synergism.

Patient factors also increase ototoxic risk from chemotherapy and adjunct therapies. Age, co-morbid conditions, cumulative dose, concurrent ototoxic medications and radiation treatment can all contribute to chemotherapy-associated ototoxicity.

AGE

Children are at greater risk for developing cisplatin-induced ototoxicity than adults. Children less than five are 21 times more likely to develop ototoxicity from cisplatin than at 15 years old, with an odds ratio of 21.17. The incidence of cisplatin-induced hearing loss in children ranges from 22-77%. (Knight et al. 2005; Kushner et al., 2006; Coradini et al., 2007)

CO-MORBID CONDITIONS

Renal failure decreases clearance of the ototoxic medication, increasing organ exposure. Individuals presenting with high serum creatinine are at greater risk. (Bokemeyer, 1998) Chemotherapy may also induce nephrotoxicity in patients with previously normal renal function.

Hypertension was significantly associated with impaired overall hearing in analyses adjusted for age and cisplatin dose (Frisna RD, 2016).

DOSE, INCREASING NUMBER OF CYCLES

The degree of hearing loss is often related to the dose. The larger the dose, the more significant the hearing loss. Cumulative cisplatin doses exceeding 400 mg/m² (Bokemeyer, 1998) and carboplatin administered in high, myeloablative doses have been shown to increase the risk of irreversible hearing loss.

Co-administration of ototoxic agents can create a synergistic or additive effect. Aminoglycosides, loop diuretics, quinine, nonsteroidal anti-inflammatory drugs and antiretroviral therapy have ototoxic potential and can increase risk of hearing loss when given concurrently with platinum compounds. (Verdel BM, 2008)

CONCURRENT OR PAST CRANIAL IRRADIATION

Hearing loss associated with concurrent cisplatin and radiation treatment may be progressive beyond the conclusion of chemotherapy. Audiologic monitoring may be appropriate for as long as 10 years following the completion of treatment. (Bass JK, 2016) (Sweetow, 1983)

Ototoxic chemotherapies include: Platinum compounds, nitrogen mustard, methotrexate, vincristine, dactinomycin and bleomycin.

PLATINUM COMPOUNDS

Platinum compounds are highly ototoxic, with cisplatin being one of the most ototoxic drugs in clinical use. Carboplatin and Oxaloplatin are less ototoxic, but still have ototoxic potential. Cisplatin is used in the treatment of solid tumors of head, neck, lung, ovary, testicle and bladder cancer in adults. In children, cisplatin is used to treat neuroblastoma, osteosarcoma, hepatoblastoma, germ cell and CNS tumors. Cisplatin ototoxicity is variable in adults and children, but has been reported to occur in up to 50 % of adults and up to 77% of children (Bokemeyer, 1998).

MOA

Cisplatin is a planar complex of a bivalent platinum cation with two cis-standing chloride and two cis-standing ammonia ligands. A highly reactive aquo complex is formed when the chloride anions of the cisplatin complex are exchanged by water molecules intracellularly. This complex then binds to nucleophiles in DNA, RNA, proteins, and peptides. The DNA is the main target of cisplatin in proliferating tumor cells (Wang, 2005). Cisplatin can enter cells by passive diffusion or via active transporters. Copper transporter 1 (CTPR1) and organic cation transporter 2 (OCT2) have been shown to mediate the cellular uptake of cisplatin (Howell SB, 2010) (Cianfrone G, 2011). Cisplatin blocks DNA replication and transcription and induces DNA repair. Cisplatin exposure in the mitochondrial DNA and proteins affect cell respiration and induces reactive oxygen species (ROS) formation, causing additional harm to cells. Irreversible damage causes cell death (apoptosis) in the affected cells. (Wang, 2005)

In most organs, cisplatin is eliminated in days to weeks. The half-life of cisplatin is prolonged in the ear, and may take months to years to be eliminated. Cisplatin is also dosed in cycles, resulting in a larger cumulative dose. Research shows that for every 100 mg per m² increase in cumulative dose results in a 3.2 decibel hearing impairment. Cumulative doses >400 mg/m² increase irreversible ototoxic risk. (Frisna R, 2016)

Cisplatin ototoxicity is characterized by the production of reactive oxygen species (ROS) in the cochlea, resulting in destruction of cochlear hair cells, stria vascularis damage, and spiral ganglion cell destruction. (Ding D, 2012)

Outer hair cells have both copper transporter 1(CTPR1) and organic cation transporter 2 (OCT2) molecules and therefore cisplatin can enter the cells via active transport, causing initial hearing impairment at the higher frequencies. Inner hair cells contain only OCT2. Over time and with increased exposure, cisplatin will also enter the inner hair cells via OCT2, causing hearing impairment at the lower frequencies. (Lanvers-Kaminsky C, 2017)

PRESENTATION

Cisplatin-induced hearing loss usually presents as progressive and bilateral high-frequency sensorineural hearing loss with tinnitus. (Sakamoto, 2000) Hearing loss can occur rapidly or gradually, from multiple or singular doses. Most cisplatin-induced hearing loss is permanent, but some cases have demonstrated a partial recovery when the patient has received lower cumulative doses (<400 mg/m²) (Bokemeyer, 1998). The associated hearing loss may not be symmetrical. Women receiving cisplatin chemotherapy for breast cancer displayed an asymmetry of hearing thresholds of at least 10 dB between ears posttreatment. (Jenkins, 2009) Tinnitus may occur with or without hearing loss. Tinnitus may be permanent or temporary, alleviating a few hours after treatment or persisting after treatment.

ADJUNCT OTOTOXIC THERAPIES

Other drug classes that are known to induce hearing loss include aminoglycosides, loop diuretics, quinine, non-steroidal anti-inflammatory drugs, and antiretroviral therapy (Cianfrone G, 2011). Supportive treatment with aminoglycosides and loop diuretics in patients with cancer is well documented to increase risk of ototoxicity from cisplatin significantly.

AMINOGLYCOSIDES

Chemotherapy can result in decreased immune functions, and patients may need to be treated for serious infections. Aminoglycosides are used to treat Gram-negative infections by *Pseudomonas*, *Salmonella*, and *Enterobacter* species.

(Forge and Schact, 2000) Aminoglycoside ototoxicity is usually irreversible. Of all ototoxic drugs, the aminoglycosides are the most vestibulotoxic, although they vary within the class in the effects on the vestibular and cochlear systems. Kanamycin, amikacin, neomycin, and dihydrostreptomycin are preferentially cochleotoxic. Gentamicin affects both cochlear and vestibular systems, although most authors include gentamicin as primarily vestibulotoxic. Streptomycin, tobramycin, and netilmicin are also primarily vestibulotoxic. (Monsell EM, 1993) Aminoglycosides show a decreased clearance from inner ear fluids. The half-life is 10-13 days from a single dose and up to 30 days from multiple doses. Damage occurs to cochlear hair cells, stria vascularis, marginal cells, and the spiral ganglion. Aminoglycosides mechanism of toxicity involves the creation of reactive oxygen species (ROS) leading to cell death. Increased risk of aminoglycoside-associated ototoxicity has been seen in patients with a genetic A1555G mutation. A1555G codes for mitochondrial 12SrRNA. Mutated 12SrRNA resembles bacterial 16SrRNA, and can be targeted by aminoglycosides. (Prezant TR, 1993)

Increased risks of aminoglycoside ototoxicity include: increased serum concentrations, decreased renal function (Lerner SA, 1986), multiple daily doses (Wu WJ, 2001), noise exposure, and concurrent ototoxic medications. Patients' serum aminoglycoside levels and serum creatinine should be monitored for safety. Once daily dosing is preferable over multiple daily dosing. Optimally, patients should have hearing evaluations before, during, and after therapy. Patient counseling should include the avoidance of noisy environments for at least 6 months following aminoglycoside therapy and the avoidance of other ototoxic medications.

LOOP DIURETICS

Loop diuretics are given to reduce edema and blood pressure. Furosemide, bumetanide, ethacrynic acid, and torsemide have been indicated in causing reversible, self-limiting ototoxicity, although irreversible effects have been reported in neonates. Loop diuretic-induced ototoxicity can occur when changes in the ionic gradients between the perilymph and endolymph cause edema of the epithelium of the stria vascularis. Blood flow reduction also can impair the barrier function of the endothelium, allowing entry of other ototoxic medications. Minimization of the ototoxic risk includes using the lowest possible dose, avoiding rapid infusion rates, avoiding co-administration of other ototoxic agents, and using caution in patients with renal failure.

MONITORING/CO-MANAGEMENT

Many patients are unable to relay the name or dose of their chemotherapy. Cisplatin is known by different names such as Platinol®, Platinol- AQ®, CDDP, DDP. Cisplatin may be combined with another medications: CT (cisplatin/topotecan), Herceptin® (cisplatin/capecitabine/trastuzumab), Gemzar® (cisplatin/gemcitabine), Taxotere® (cisplatin/docetaxel), for example. Interdisciplinary communication with the patient's oncologist, pharmacist, and family physician is important to identify a patient's comprehensive risk profile.

CLINICAL PEARLS

- High blood pressure can worsen cisplatin-induced ototoxicity
- Dehydration can increase ototoxic risk
- Renal failure, increased serum creatinine, can increase ototoxic risk.
- Cisplatin is also nephrotoxic. Nephrotoxicity increases risks of ototoxicity. Serum creatinine should be monitored before, during and after therapy
- Irreversible ototoxicity risk is higher at cisplatin doses $>400 \text{ mg/m}^2$
- Children <5 are 21 times more likely to experience hearing loss
- Radiation can worsen the risk of ototoxicity, and may be progressive in nature even up to 10 years post radiation
- A comprehensive list of patient medications is necessary to screen for additive ototoxic and nephrotoxic potential

PATIENT COUNSELING

As chemotherapy induced ototoxicity can be progressive, extending past the date of initial exposure, patients require self-monitoring and protective counseling. More than a third of adults are in the basic (47 million) and below basic (30 million) health literacy groups (U.S. Department of Education, 2003), so educational material should be literacy appropriate and provided in both verbal and written forms.

Patient counseling points to include:

- Signs and symptoms of cochlear damage and potential effects on communication ability
- Symptoms such as tinnitus, fullness, loss of balance, or changes in hearing sensitivity
- How and how often to assess for hearing loss
- Potentiating effects such as exposure to noise during or following treatment
- If the patient lives or works in an environment with high noise levels, the possible synergistic effect of noise and cochleotoxic damage must be considered, and both the patient and family should be made aware of this increased risk.
- Audiological follow-up may be required long term

Per the “Guidelines for the Audiological Management of Individuals Receiving Cochleotoxic Drug Therapy” developed by the American Speech-Language-Hearing Association, prospective audiological evaluations remain the only reliable method for detecting ototoxicity before the patient becomes symptomatic. (American Speech-Language-Hearing Association, 1994) An interdisciplinary ototoxicity health care team ideally would involve oncologists, nurses, audiologists, and a pharmacist. Early referral to the audiologist can allow for early identification of ototoxic hearing loss, patient counseling, and prescription for amplification devices, and/or hearing loss strategies. Pharmacists can identify drug and disease state interactions and alert the oncologists and audiologists of other ototoxic medications that may worsen cisplatin-induced ototoxicity, as well as provide patient counseling. Early identification of an ototoxic hearing loss or drug interaction provides oncologists with an opportunity to adjust the chemotherapy/medication regimen and/or increase patient monitoring. (American Academy of Audiology, 2009) Applying a team-based approach to clinical, audiological and pharmacological identification of ototoxic risks in the oncology patient can serve to improve patients’ hearing outcomes and quality of life. ■

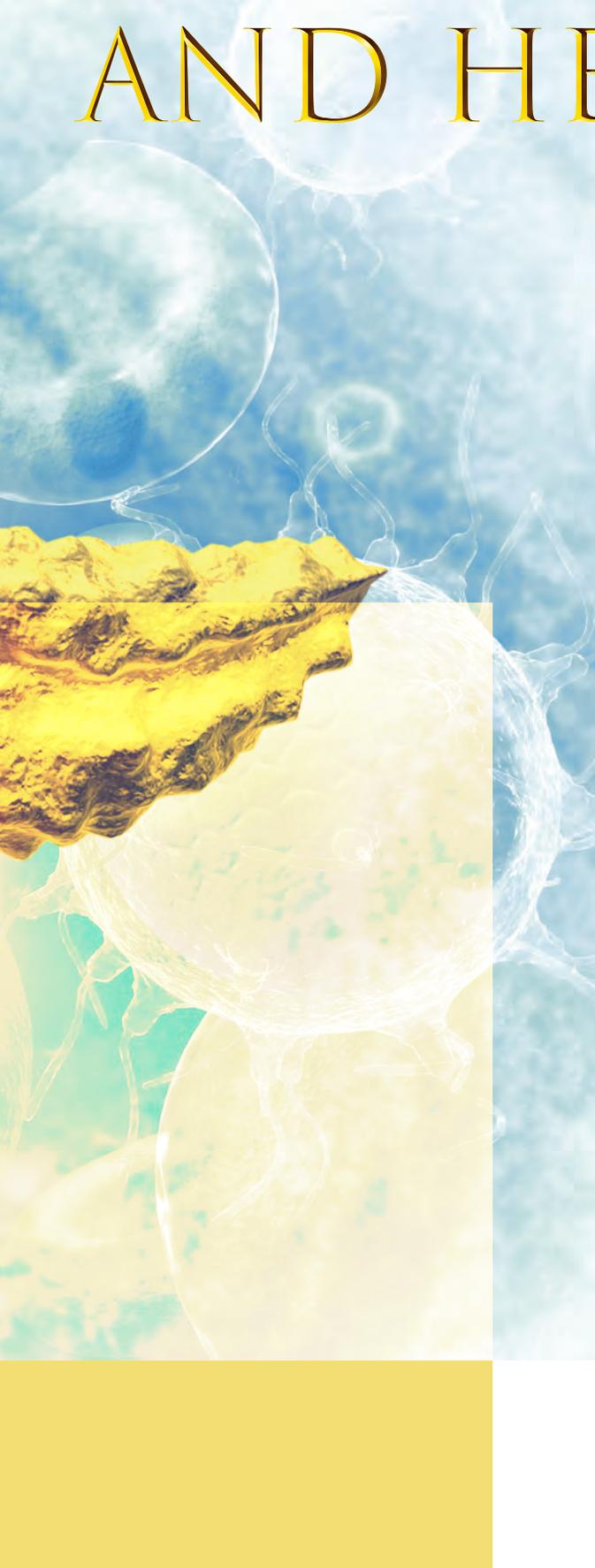
Michelle McElhannon received her B.S. and Doctor of Pharmacy from the University of Georgia. She completed a residency in pharmacy practice at The Ohio State University Medical Center and has specialized in ambulatory care pharmacy for over 20 years. Currently, Michelle is a Public Servant Assistant in the Division of Experience Programs at the University of Georgia College of Pharmacy. At her practice site she provides diabetes education and medication management to patients at a Federally Qualified Health Center while simultaneously providing introductory pharmacy practice experiences to second year UGA pharmacy students. At her home site, she is a wife, and a mother to three children, 11 dogs (3 dogs plus 8 puppies), 5 chickens, 3 birds, 5 fish, 1 turtle and 1 very ferocious black cat.

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PANCREAS





AND HEARING

by Christopher Spankovich, Au.D., Ph.D., M.P.H.

The pancreas is a composite organ, with exocrine and endocrine functions. As an exocrine gland, it secretes pancreatic fluids into the duodenum to aid in digestion. As an endocrine gland, it secretes important hormones for regulation of glucose. Nearly 98% of the pancreas consists of acinar cells that secrete digestive enzymes for exocrine function¹. Interspersed within the acinar parenchyma are the islets of Langerhans, hormone producing endocrine cells, which play a critical role in glucose homeostasis.

There is limited support for a relationship between exocrine functions of the pancreas and hearing loss; this makes sense as the inner ear is not involved in digestion of food. Disorders/disease of the exocrine tissue tends to be related to inflammation (pancreatitis) or tumors (most common pancreatic adenocarcinoma). The relationship to hearing loss is limited to a handful of case studies^{2,3,4}. It is worth noting that cisplatin, a highly ototoxic chemotherapeutic is not the primary treatment of pancreatic cancers⁵.

The primary disorder of pancreatic function related to hearing loss is diabetes mellitus. Diabetes mellitus (DM) is a chronic condition characterized by high blood and urine glucose levels due to inadequate insulin production or utilization. DM is highly prevalent in the United States, with an estimated 21 million diagnosed cases of persons with diabetes (PWD) and an additional ~8 million undiagnosed cases⁶. The past few decades have seen an unprecedented increase in DM throughout the world. There are two primary types of DM: type 1 DM (T1DM) results from insulin deficiency as a result of β -cell destruction and accounts for less than 10% of the DM population. Although it may occur at any age, T1DM is usually diagnosed before 40 years of age and is the third most common chronic disease in childhood. Type 2 DM (T2DM) results from progressive loss of β -cell insulin secretion and is often diagnosed later in life relative to T1DM. It accounts for the vast majority (~90%) of the DM population⁶.



DM, or more specifically hyperglycemia, initiates a complex cascade of biochemical consequences. Three main effects are non-enzymatic glycation, activation of the polyol pathway, and generation of reactive oxygen/nitrogen species. Metabolic processes disrupted include: energy production, abnormal accumulation of metabolic byproducts, nitric-oxide and glutathione dysregulation, glycation (advanced glycation end products), lipid balance abnormalities, and protein synthesis dysfunction. Tissue damage associated with DM includes: endothelial, neural, extracellular, and collagen compromise⁷. The cumulative effects of these biochemical changes contribute to damage of blood vessels and compromised metabolic function. The high-energy demands of the cochlea can be compromised by these changes, particularly with additional challenges (e.g. noise exposure).

In general, studies from animal and humans support the independent relationship between DM and hearing loss^{7,8,9,10,11,12,13,14,15}. Studies that have not supported this relationship have commonly been performed in older adults or did not adequately control for confounding variables^{16,17,18}. Human and animal evidence suggest potential for damage along the cochlea length from basal to apical regions. For example, Austin et al¹⁰ reported early indices of hearing loss presenting in extended high frequency ranges (>8000 Hz) of young adults. On the contrary, older adults showed greater difference in lower frequency hearing sensitivity (< 2000 Hz). The distribution of changes along the cochlea may be related to the relative contributions of the array of mechanisms implicated in diabetes related hearing loss. Microangiopathy may result in direct compromise of vascular supply to the inner ear; the apical region representing the most distal region of this supply may show pathology⁷. On the other hand, elevated risk for noise induced damage may underlie early changes observed in basal regions of the cochlea¹⁴.

Potential for onset of hearing loss earlier in life and increased risk for other determinants of hearing loss (e.g. noise and ototoxic drugs) support need for improved preventative and early identification approaches for PWD. It is important for audiologist to be cognizant of increased risk of PWD for hearing loss and potential early onset. Establishing baseline hearing status, education on preventative strategies: including reducing noise exposure, avoiding ototoxic drugs, eating a healthy diet, being physically active, and maintaining proper blood glucose levels is important to the PWD and their hearing health.

The Audiology Project (TAP) led by Kathy Dowd, Au.D. seeks to promote early diagnosis, treatment, and management of hearing and balance disorders with chronic disease. The first initiative of TAP has been focused on diabetes and hearing/balance. The aim is to develop evidence-based guidelines for screening, evaluation, and management of PWD and hearing/balance health. Also, to foster relationships with other health providers for PWD and the insertion of Audiology into the PPOD toolkit (Pharmacy, Podiatry, Optometry, and Dentistry) for management of diabetes. Further, to seek inclusion of hearing and balance assessment as part of CDC based recommendations for PWD. For more information on the TAP please visit this link <https://www.theaudiologyproject.com>. ■

Christopher Spankovich is an Associate Professor and Vice Chair of Research for the Department of Otolaryngology and Communicative Sciences at the University of Mississippi Medical Center. He obtained his Master of Public Health from Emory University (Atlanta, GA), Au.D. from Rush University (Chicago, IL), and Ph.D. from Vanderbilt University (Nashville, TN). Dr. Spankovich is a clinician-scientist with a translational research program focused on prevention and treatment of acquired forms of hearing loss, tinnitus, and sound sensitivity. His research includes clinical trials of otoprotectant agents, epidemiological studies of determinants (e.g. dietary quality) of hearing loss and tinnitus, basic research in thermal stress for prevention of ototoxicity, and translational research on the effects of noise on auditory physiology and perception. Dr. Spankovich's clinical interests include tinnitus, sound sensitivity, ototoxicity, hearing conservation, and auditory evoked potentials.

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Christina Cooper, Au.D.
Collin Cordery, Au.D., CCC-A
Dana Coveney, Au.D., CCC-A, FAAA
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Tara Crane, Au.D., FAAA
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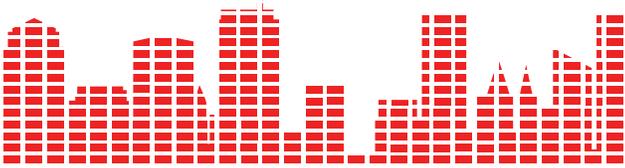
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Merit Based Incentive Payment System (MIPS)

BY KIM CAVITT, Au.D.

Merit Based Incentive Payment System (MIPS) Implementation for Audiologists (2019)

If you missed the ADA MIPS webinar, please visit www.audiologist.org to view it.

STEP #1: DETERMINE IF YOU ARE REQUIRED TO PARTICIPATE IN THE MIPS PROGRAM.

- Go to <https://qpp.cms.gov/participation-lookup>.
- Insert your National Provider Identifier in the box provided.
- **Only the Performance Year (PY) 2018 Participation Status is CURRENTLY available.** The Centers for Medicare and Medicaid Services (CMS) plan to have the site updated by early December 2018 and make a PY2019 Participation Status Tool Available.
 - The PY2018 Participation Status summary, for your NPI, will give you a snapshot of your Medicare claims data for determination periods between September 1, 2016 – August 31, 2017 or September 1, 2017 – August 31, 2018.
 - While this snapshot will provide you with information on your status for 2018 Participation ONLY, it does give you some interim information on your enrollment date, the number of Medicare patients you have seen in the review period, and the amount of Medicare allowed charges you have billed during the review period.
 - If, when you check your MIPS eligibility status on the PY2019 tool (which is not yet available), it indicates that you are eligible to report because of participation in an Alternative Payment Model (APM), please immediately reach out to the practice manager of your facility to determine your specific reporting requirements and mechanisms (as the claims-based reporting option might not be available to you).
 - Typically, APMs only exist in large hospitals, medical centers, and multi-disciplinary clinics.

Audiologists are MIPS EXEMPT for participating in the MIPS program if, individually, they:

1. **Have \$90,000 or less in Medicare Part B allowed charges for covered professional services; OR**

2. Provide care to 200 or fewer Medicare beneficiaries; OR

3. Provide 200 or fewer covered professional services under the Medicare Physician Fee Schedule (PFS).

These exemptions are collectively called the *low volume threshold*.

99% of individual audiologists in the United States, whose practice is not enrolled in an Alternative Payment Model (APM), will be exempt from MIPS reporting in 2019.

STEP #2: DETERMINE IF YOU WANT TO VOLUNTARILY REPORT MIPS MEASURES OR OPT IN TO THE MIPS REPORTING SYSTEM.

- Exempt audiologists (audiologists who do not meet the low volume threshold) may decide to voluntarily participate in the MIPS program. This can be accomplished by two means:
 - Voluntary Participation:
 - Audiologists will not formally sign up/enroll in this type of reporting.
 - Audiologists can participate via the same mechanism they reported Physician Quality Reporting Systems (PQRS) Measures.
 - Reporting G-Codes via Medicare Part B claims.
 - Audiologists will also “attest” to the Improvement Activities (IA).
 - Opt-In Participation:
 - Audiologists will officially and formally “opt in” (the form or process is not yet available).
 - Audiologists can participate via the same mechanism they reported Physician Quality Reporting Systems (PQRS) Measures.
 - Reporting G-Codes via Medicare Part B claims.
 - Audiologists will also “attest” to the Improvement Activities (IA).
 - **Audiologists would be eligible for payment incentives and payment reductions, based upon their overall MIPS score and performance.**

The Academy of Doctors of Audiology is not recommending that its members “opt in” to the MIPS program in 2019. Instead, we are advocating that our members voluntarily participate in the MIPS program in 2019. For more information on voluntary participation, please review the Voluntary MIPS Participation Guide attached.

Resources

<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/MIPS-Scoring-Methodology-slide-deck.pdf>

<https://qpp.cms.gov/>

<https://www.cms.gov/Medicare/Quality-Payment-Program/Resource-Library/2019-QPP-proposed-rule-fact-sheet.pdf>

Additional guidance will be provided as more information becomes available from the Centers for Medicare and Medicaid Services (CMS). Please watch your email for more information in early 2019.

For questions, please contact Kim Cavitt at kim.cavitt@audiologyresources.com or 773-960-6625.

Merit Based Incentive Payment System (MIPS) Voluntary Reporting for 2019

STEP # 1: REGISTER FOR AN ENTERPRISE IDENTITY MANAGEMENT (EIDM) ACCOUNT

- This account will allow you to track your Quality Payment Program (QPP) performance and score.
- You can register (or login to an existing account) at <https://portal.cms.gov/wps/portal/unauthportal/home/>.

DO NOT INADVERTENTLY OPT IN TO THE MIPS PROGRAM AS PART OF EIDM REGISTRATION PROCESS.

STEP # 2: COMPLETE AND REPORT MIPS QUALITY MEASURES

- MIPS Quality Measures are reported *EXACTLY* the same way by which your practice reported for the Physician Quality Reporting System (PQRS) from 2012-2016.
 - The six quality measures are the *EXACT* same six quality measures that audiologists reported for PQRS is 2016. They are:
 - Documentation and verification of current medications in the medical record.
 - Screening for clinical depression and follow-up plan.
 - Falls Risk Assessment
 - Falls Risk Plan of Care
 - Screening for Tobacco Use/Cessation
 - Referral for otologic evaluation for patients with acute or chronic dizziness.
- Audiologists must complete quality measures and report on their outcomes for at least 50% of all eligible patients.
- Audiologists can get a refresher on “what” and “how” to report these measures at:
 - <https://audiologyquality.org/measures/>
 - <https://audiologyquality.org/reporting-pqrs-measures/>
 - <https://qpp.cms.gov/mips/quality-measures>
- Audiologists who are voluntarily reporting MIPS Measures will report via their CMS 1500 claim form or 857 formatted electronic claims using the PQRS Measure codes (just as they did PQRS).

STEP #3: COMPLETE AND ATTEST TO IMPROVEMENT ACTIVITIES

- MIPS also has a category known as Improvement Activities.
- Improvement activities are activities designed to improve clinical practice.
- Some improvement activity options that are applicable to an audiology practice include:
 - Collection and follow-up on patient experience and satisfaction data on beneficiary engagement.
 - Collection and use of patient experience and satisfaction data on access.
 - Completion of an Accredited Safety or Quality Improvement Program.
 - Completion of the AMA STEPS Forward program.
 - Depression screening.
 - Engage Patients and Families to Guide Improvement in the System of Care.
 - Engagement of New Medicaid Patients and Follow-up.

- Evidenced-based techniques to promote self-management into usual care.
- Implementation of condition-specific chronic disease self-management support programs.
- Implementation of documentation improvements for practice/process improvements.
- Implementation of episodic care management practice improvements.
- Implementation of fall screening and assessment programs.
- Implementation of formal quality improvement methods, practice changes, or other practice improvement processes.
- Implementation of improvements that contribute to more timely communication of test results.
- Implementation of practices/processes for developing regular individual care plans.
- Implementation of Use of Specialist Reports Back to Referring Clinician or Group to Close Referral Loop.
- Improved Practices that Disseminate Appropriate Self-Management Materials.
- Improved Practices that Engage Patients Pre-Visit.
- Integration of patient coaching practices between visits.
- Leadership engagement in regular guidance and demonstrated commitment for implementing practice improvement changes.
- Participation in a 60-day or greater effort to support domestic or international humanitarian needs.
- Participation in Joint Commission Evaluation Initiative.
- Participation in Population Health Research.
- Participation in private payer clinical improvement activities.
- Participation in User Testing of the Quality Payment Program Website (<https://qpp.cms.gov/>).
- Practice Improvements that Engage Community Resources to Support Patient Health Goals.
- Promote Use of Patient-Reported Outcome Tools.
- Provide Clinical-Community Linkages.
- Provide Education Opportunities for New Clinicians.
- Provide peer-led support for self-management.
- Regular training in care coordination.
- Regularly assess the patient experience of care through surveys, advisory councils and/or other mechanisms.
- Tobacco use.
- Unhealthy alcohol use.
- Use evidence-based decision aids to support shared decision-making.
- Use of telehealth services that expand practice access.
- Each audiologist must complete at least four of these activities listed above and each activity must be performed for 90 days or more during 2019.
- Audiologists will attest to their performance of these improvement activities at the EIDM site (<https://qpp.cms.gov/login>).
- Audiologists can learn more about improvement activities at:
 - <https://qpp.cms.gov/mips/improvement-activities>
 - <https://www.cms.gov/Medicare/Quality-Payment-Program/Resource-Library/Improvement-Activities-Performance-Category-fact-sheet.pdf>.

For questions, please contact Kim Cavitt at kim.cavitt@audiologyresources.com or 773-960-6625.



HAVE YOU HEARD?



Ring in the 2019 New Year with a New Congress and New Momentum for APCA

The Audiology Patient Choice Act already has momentum in the 116th Congress with commitments from lawmakers in both parties to help enact it so that Medicare patients can have direct access to the audiology services that they need, and so that audiologists can be appropriately recognized within the Medicare system.

We hope and expect an early re-introduction in both the House of Representatives and the Senate and we need your help. There are more than 100 new members of Congress entering the 116th Congress, which began on January 3, 2019.

These freshmen legislators will all need to be educated on the Audiology Patient Choice Act (APCA) and its merits as soon as possible—and we will also need to reconnect with incumbent lawmakers as well. To that end, ADA is creating collateral packets and other resources including patient information brochures and legislative support postcards to send to Congress during the first quarter of 2019. Please contact Adam Haley at ahaley@audiologist.org to order yours today.

Also, please contact Adam Haley at ahaley@audiologist.org to sign up for the **ADA Advocacy Listserv** where we will be able to broadcast and share specific information about plans and initiatives to advance APCA in the 116th Congress (members only, please).

► **Please contact Stephanie Czuhajewski at sczuhajewski@audiologist.org for more information about ADA, ADA membership, and opportunities for advancing your audiology career through involvement with ADA.**

Volunteers Sought for ADA Committees

We need you! If you are looking for a great way to give back, while meeting some great people, ADA committee service is the way to go. Positions are now open for the following committees:

Early Career Professionals Committee (members practicing 10 years or fewer): The committee is charged with identifying opportunities to engage and inform early career professionals through education, advocacy, and networking initiatives.

Practice Accreditation Committee: Committee is charged with developing tools and resources to assist audiology practices with achieving ADA Practice Accreditation Standards.

Education Committee: Committee is charged with planning programming for the 2019 AuDacity Conference to be held November 14-16, 2019 at Gaylord National Harbor, in National Harbor, MD.

Advocacy Committee: Committee is charged with developing public policy initiatives and strategies designed to achieve professional autonomy for audiologists and access to high quality audiology services for patients.

Please contact Carrie Puyear at cpuyear@audiologist.org to volunteer. All ADA members in good standing are eligible and encouraged to volunteer for ADA committee service.

CROS/BICROS Updated Guidance as of November 29, 2018

The Centers for Medicare and Medicaid Services (CMS) has created a new code set related to CROS/BICROS technologies. These codes will go into effect on January 1, 2019.

A CROS system is where a patient wears a “hearing aid,” functioning as a receiver, on the normal hearing ear and a “hearing aid,” functioning as a transmitter, on the “unaidable” ear. A BICROS system is where a patient wears a hearing aid/receiver on the better hearing ear and a “hearing aid,” functioning as a transmitter, on the “unaidable” ear. The hearing aid and “hearing aid” receivers and “hearing aid” transmitters can be in-the-ear (ITE), in-the-canal (ITC), and/or behind-the-ear (BTE) types/styles and the patient can be fit with different types/styles in each ear. The new codes will now reflect these options.

PLEASE NOTE: Before utilizing this new code set, please consult your payer fee schedules, agreements, and websites. Some payers, especially State and Managed Medicaid programs, may not recognize the new code set. THE EXISTENCE OF A CODE IS NOT A GUARANTEE OF THIRD-PARTY COVERAGE OR PAYMENT NOR IT IS A GUARANTEE OF AN INCREASED ALLOWABLE RATE.

Below please find select tables that outline the new, revised, or remaining existing codes, their official 2019 descriptions, their official 2018 descriptions, when applicable, and how these codes are applied to clinical situations.

NEW CODES

HCPCS CODE	OFFICIAL 2019 HCPCS DESCRIPTION	CLINICAL UTILIZATION OF THE CODE
V5171	Hearing aid, contralateral routing device, monaural, in the ear (ITE)	The patient has an existing hearing aid or CROS receiver that was dispensed on a previous date of service; this code represents a new or replacement ITE transmitter for the “unaidable” ear.
V5172	Hearing aid, contralateral routing device, monaural, in the canal (ITC)	The patient has an existing hearing aid or CROS receiver that was dispensed on a previous date of service; this code represents a new or replacement ITC transmitter for the “unaidable” ear.
V5181	Hearing aid, contralateral routing device, monaural, behind the ear (BTE)	The patient has an existing hearing aid or CROS receiver that was dispensed on a previous date of service; this code represents a new or replacement BTE transmitter for the “unaidable” ear.
V5211	Hearing aid, contralateral routing system, binaural, ITE/ITE	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where both ears have an ITE device.
V5212	Hearing aid, contralateral routing system, binaural, ITE/ITC	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where one ear has an ITE device and one ear has an ITC device.
V5213	Hearing aid, contralateral routing system, binaural, ITE/BTE	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where one ear has an ITE device and one ear has a BTE device.

V5214	Hearing aid, contralateral routing system, binaural, ITC/ITC	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where both ears have an ITC device.
V5215	Hearing aid, contralateral routing system, binaural, ITC/BTE	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where one ear has an ITC device and one ear has a BTE device.
V5221	Hearing aid, contralateral routing system, binaural, BTE/BTE	The patient is receiving a new CROS/BICROS system (both the transmitter and hearing aid/receiver) on the same date of service; this code represents a system where both ears have a BTE device.

REVISED CODES

HCPSC CODE	OFFICIAL 2019 HCPSC DESCRIPTION	2018 HCPSC DESCRIPTION	CLINICAL UTILIZATION OF THE CODE
V5190	Hearing aid, contralateral routing, monaural, glasses	Hearing aid, CROS, glasses	The patient is receiving a new CROS device housed in eyeglasses; this code represents the eyeglass CROS device in the monaural configuration.
V5200	Dispensing fee, contralateral, monaural	Dispensing fee, CROS	The patient is receiving a new CROS device; this code represents the dispensing fee surrounding the fitting of this device.
V5230	Hearing aid, contralateral routing system, binaural, glasses	Hearing aid, BICROS, glasses	The patient is receiving a new BICROS device housed in eyeglasses; this code represents the eyeglass device in the binaural configuration.
V5240	Dispensing fee, contralateral routing system, binaural	Dispensing fee, BICROS	The patient is receiving a new BICROS device; this code represents the dispensing fee surrounding the fitting of this device.

Please note: The dispensing fee is the facility fee surrounding the evaluation, selection, ordering, programming, and fitting of a CROS/BICROS device that is not represented by another CPT or HCPSC code. Some payers, specifically State and Managed Medicaid programs, consider the dispensing fee code to represent the fitting and orientation of the device (V5011).

DELETED CODES

HCPSC CODE	OFFICIAL 2018 AND 2019 CODE DESCRIPTION
V5170	Hearing aid, CROS, in the ear
V5180	Hearing aid, CROS, behind the ear
V5210	Hearing aid, BICROS, in the ear
V5220	Hearing aid, BICROS, behind the ear

Please note: Some payers, specifically State and Managed Medicaid programs, may have difficulty transitioning to the new code set. Practices may need to file appeals, especially at the outset of 2019, detailing the replacement codes.

If you have specific questions, please contact Kim Cavitt, AuD at kim.cavitt@audiologyresources.com or 773-960-6625. This one-on-one professional guidance is a value-added benefit of ADA membership.

ADA Now Accepting Participants for 4th and 5th Mastermind Groups

Due to unprecedented demand, ADA is now taking applications for the 4th and 5th Mastermind Groups, including one group, by request, that will meet during workday hours.

The term “Mastermind Group” is a long-recognized peer-to-peer mentoring concept used to facilitate problem solving using small groups of peers dedicated to helping each other succeed. The Mastermind Group concept was originally introduced by author Napoleon Hill in the early 20th Century.

ADA is pleased to facilitate Audiology Mastermind Groups for its members through its GotoMeeting web platform. Group leaders will be provided access to set up and use the virtual meeting space and each Mastermind group will have complete autonomy. The meetings will be exclusive to the audiologist participants. ADA staff will be available to contact for technical troubleshooting if needed but will not participate in the meetings.

Meeting discussions will be private and confidential to each group. Each Mastermind group will independently determine topics for discussion and the structure and frequency of the meetings. Each group will consist of 8 – 12 non-competing audiologists. ADA members only.

Please contact Carrie Puyear at cpuyear@audiologist.org for more information or questions.

ADA's Practice Resource Catalog: The Tools You Need for Your Practice



ADA's Practice Resource Catalog offers a comprehensive library of off-the-shelf forms, office forms, bills of sale, HIPAA compliance documents, and guidance materials. These materials can assist audiologists and their staffs with practice operations, compliance, and patient management.

Visit audiologist.org/prc for more information!



INSIGHTS FROM THE OUTSIDE

Critical Patient Conversations

Insights from the Outside is a group of practicing clinician practice owners. This is a diverse group from many medical specialties, including dentistry, veterinary medicine, cosmetic surgery, ophthalmology, audiology and optometry. This group was uniquely created by CareCredit for the purpose of capturing and sharing “best practices” to some of the common challenges all healthcare business owners face, such as attracting new patients, the patient experience, patient retention, social media, team training and empowerment and much more.

In this article, dentist Dr. Howard Ong, owner of Seal Beach Dentistry and Nola Aronson, owner of Advanced Audiology, discuss how they handle critical patient conversations.



Why are the team’s communication skills so important to the success of the practice?

DR. ONG The way your team communicates is a direct reflection of your culture and brand. Often patients interact more with your team than they do you, the clinician. So your team is your “voice” to patients. And what patients want to know is that they are welcome, that they will be expertly cared for clinically and relationally, and they have chosen the right practice.

NOLA People often come in our practice door with elevated emotions. They are stressed, concerned and anxious. First and foremost, they want to feel welcomed and comfortable. When people are emotional, it’s harder for them to make great decisions regarding their hearing health. The team is responsible for communicating empathy and expertise to patients, so they can relax and be confident they have chosen the right practice for their hearing health needs.



Which conversations are the most critical?

NOLA Every conversation the team has with patients is an opportunity to build relationships, resulting in treatment acceptance, patient satisfaction, retention and referrals. But there are three critical conversations that directly impact the health of the practice and patients, which are 1) the new patient call, 2) the clinical results and recommendations discussion and 3) the financial conversation.

DR. ONG I agree with Nola. Those are the three top conversations and the most important thing to communicate in all three of those conversations is value. When it comes to any type of product or service, people invest in things they value – their smile, their hearing, their relationships.



Can you give me some key strategies for a successful new patient call?

DR. ONG The new patient call is the first opportunity to share with patients how we can provide them with excellent care. We want to communicate that they are important to us, so first, never put a new patient on hold. There should be a plan in place that enables the person handling the call to let everyone else on the administrative team know they cannot be interrupted and will need back-up for other incoming phone calls or other patient care needs for the duration of the call. Second, don't assume you know what the new patient wants or needs. Ask the appropriate questions and let them share their story. Validate their concerns. Capture as much information as possible, which means writing detailed notes about the conversation. Third, be empathetic, not a "know-it-all" and include your patient on the healthy journey. And finally, don't promise the world. Set appropriate expectations and never over promise. People are happy when you exceed expectations and are, conversely, upset when you don't meet them.

NOLA We do many of those same strategies. It's important to remember that we are communicating by phone, so it's important what we say and how we say it. My team is trained to smile every time they answer the phone. Smiles can be heard and felt by the person on the other end of the line. We believe that healthcare is personal, so we always introduce ourselves by name and we ask them how we can help them HEAR today. We want to let people know we are there to listen and to help. Before you can solve a problem, you have to listen and respond with empathy. Everyone has different needs, different situations and, therefore, needs to be treated like unique individuals. In terms of best practices, don't interrupt and speak clearly and slowly, without talking down to people. We have found one of the best ways to improve our team's phone skills is by having them professionally recorded, so we can listen and celebrate what's working and retrain where needed. We also have success metrics where we evaluate the effectiveness of our phone skills by measuring how many patients schedule, schedule appropriately and keep their appointment.

DR. ONG That's a great point. We also track the conversion of new patient calls to scheduled and completed appointment. We don't record calls, but we do ask for patient feedback to identify opportunities for improvement.



What are some communication techniques for the clinical treatment recommendation conversation?

NOLA The success of the treatment conversation starts before the examination. When the patient is escorted to the back, we take a thorough health history that includes capturing how the patient's hearing health is affecting their daily lives, what specific situations they find most frustrating and what they think the change will be with better hearing. We then do testing and share with the patient and their spouse the results of the audiogram, relating it to the frustrations and situations they have shared with us. "Mrs. Jones, no wonder you are frustrated that your husband doesn't seem to be paying attention to you. As you can see with the audiogram, Mr. Jones is missing those sounds." The next step is to provide personalized solutions and pricing. We use a chart that clearly explains the benefits they will enjoy at each technology and price level and let them know we have solutions for all budgets. Then we let patients know that because we want to help them change their lives, we can make it possible for them to try the lowest and highest-end technology so they can compare the results and benefits and make a more informed decision. It is a no-obligation trial period. Be a real person, an advocate for the patient and let them know it's their decision to make, and your role is to provide information and guidance.

DR. ONG That is exactly it. This is a critical conversation because the way you talk with – not to – the patient will tell them if you have listened and if you are trustworthy. One thing to note is this conversation should happen in the treatment room or chair side because anywhere else the patient loses focus. Patients are more accountable to the clinical setting than an administrative one. We believe that we are there to educate, not lecture and we want patients to know they are not alone so we share similar patient stories and experiences. People like and respond to stories more than facts. Visual aids can be extremely helpful because

often patients believe what they see, not what they hear. Like Nola, a big part of the conversation is understanding the goals of the patient and showing them how treatment will help them achieve their goals. Show and tell them their clinical needs and how that can impact their health and lives. Then show and tell them solutions. We know the treatment conversation is going well when patients ask questions. They are engaged and curious. We know it's not going well when the only question they have is about cost.

NOLA That's insightful. We have found that when people ask about cost or say, "that's very expensive," our role is to agree that it is an investment in their health, not to offer cheaper solutions or discounts. Just because people believe it's expensive doesn't mean that they are not willing to pay for it, especially if you can find a comfortable way to fit the cost into their family finances.



Which brings up the final critical conversation, the financial conversation. How do you make the money talk a win-win for your practice and patients?

NOLA Although there is a focused discussion on cost and payment options, we are happy to talk about it any time the patient is. The financial conversation is about communicating value and enabling patients to say yes. We add a lot of value into our high-end hearing health solutions – free batteries, a free Bluetooth device, free quarterly cleanings and adjustments, a 3-year warranty and trade-in value of \$500 – because we know the better the technology, the better the result. To enable patients to choose the higher-end technology, we accept the CareCredit healthcare credit card. If the patients hear and understand the value, can experience the benefits through the no-obligation trial, then it's just about fitting the cost comfortably into their lives.

DR. ONG The only time to have a financial conversation is after the patient has agreed that they value the benefits of the care you are recommending. One of the most important things to do is be prepared to answer questions about the clinical care, insurance contributions and payment solutions. One thing you don't want to do is assume the patient's ability to pay. Similar to what Nola said, just because the patient says, "That's expensive," doesn't mean they don't have the means to pay for it. A great financial conversation reinforces what the clinical team has recommended, offers fees that coincide with care, and provides solutions such as sharing how insurance contributes to care or how CareCredit can help alleviate any stress to their budget by enabling them to pay monthly. Patients are often more interested in knowing what a monthly payment might be, rather than the total cost of care. Ultimately, the patient is the decision maker and is in control. We are there to, again, advocate and guide them through the process, helping them achieve their health goals. ■

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PRESIDENT'S MESSAGE

Continued from page 5

As a night owl, I personally believe that the best education comes after the exhibit hall closes. The breadth and depth of information obtained from sitting with a group of professionals, and often students, and sharing successes and failures cannot be taught in a classroom. This same type of networking is happening on a regular basis with the ADA MasterMind groups. These MasterMind groups bring the best part of convention to each member involved and help each one of us succeed as an autonomous, independent professional.

Finally, as the year comes to a close, I'd like to take a moment to say a quick thank you ("Thank you!") to all ADA members, the Agentis staff, and the companies that support our organization. I wish Dr. Ram Nileswhar the best as he takes the reigns as your ADA President in 2019.

Have a Happy and Healthy New Year! ■

HQ REPORT

Continued from page 9

- Identify evidence-based practices in product sourcing and purchasing for audiologists.
- Create resources to assist audiologists in using audiologists' assistants in their practices.
- Participate as a partner in the Audiology Project to promote the audiology-based medical management of chronic diseases.
- Establish and foster relationships with agencies and organizations that can assist in raising awareness about hearing health issues and the importance of audiology.
- Create presentations and resources for audiologists to use to raise awareness within their communities.
- Implement the ADA Mastermind Program.
- Create presentations for audiologists to use to raise awareness about audiologic health and audiology within their communities.

Please consider joining an ADA committee to help advance one or more of these initiatives (see page 56 for details). ADA needs you! In the meantime, please contact me at sczuhajewski@audiologist.org if you have any questions, or if I can assist you in any way. Happy New Year! ■

EDITOR'S MESSAGE

Continued from page 7

(NASEM) *Hearing Health Care for Adults: Priorities for Improving Access and Affordability*, and ultimately the 2017 OTC Hearing Aid Act.

At a time when smartphone-based hearing screening apps and automated audiometry are readily available to the general public, what role is there for the audiologist? Depending on whom you speak to, some audiologists see the implementation of automated hearing testing and the availability of OTC devices as posing a risk to the patient and a threat to our profession. This perspective is understandable given our commitment to patient safety and our gold standards of practice. It also rings true if we solely think of the hearing test and the amplification device as being synonymous with hearing "health." However, hearing health involves more than just technology and when viewed through a public health lens, Audiologists can choose to be the glue that holds these tools together.

As Professor Kelly Tremblay at the University of Washington recently shared with me, "When thinking about older adults, hearing tests and amplification devices are key ingredients to identifying and managing age-related hearing loss. But on their own, they are likely insufficient to improve someone's quality of life. Audiologists are involved in advising governing bodies and they have the opportunity to shape their practice in a manner that fills the gaps that technology leaves behind. They can draw upon the many support skills they learned in graduate school; skills like counseling and advocacy. It gives audiologists an opportunity to draw on the evidence-based research showing the benefits of person-centered care and it serves as a call to action to improve billing practices so that auditory rehabilitation practices can be reimbursed. It also challenges us to get creative so that alternative but professional approaches to rehabilitation can be found." This requires an all-hands-on-deck approach that includes moving beyond the traditional four walls of the clinic and getting directly involved in dispensing high quality non-custom amplification devices in places where improved communication with a medical professional or caretaker is imperative. It also includes taking a holistic approach to managing hearing loss by deepening on knowledge of comorbidities associated with hearing loss and collaborating in more meaningful ways with other healthcare specialties.

Professor Victor Bray at Salus University is the guest editor of this issue of Audiology Practices. The articles come from a featured session at the recently concluded annual ADA meeting in Orlando, Florida. Their authors reflect much of the current thinking surrounding a more holistic approach that audiologists can implement in their clinics to improve the standing of the profession with other healthcare specialties, and more importantly, to contribute to earlier identification and treatment of hearing loss in adults. Services that are valued and thus reimbursed by third party payers. ■

DEPRESSION

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