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Hearing Loss and Whole-Body Health: Understanding the Connection

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Hello everyone, My name is Dr. RachelBarrett and I am one of the education and Training audiologists with Starkey. Before we get started, I'd like to cover a couple of housekeeping notes. If you would like to ask a question during the presentation today, please click on the Q and A area, type in your question and click Send. I'll address all questions at the end of the session, but please feel free to enter your questions as they come to mind. There is a PDF handout of this presentation available to you through your pending courses on Audiology Online or by clicking on the link in the Resources tab within the classroom.

Today one CEU Hour is available for this session. If you participate in the CEU program offered by Audiology Online. After completing the course, just go to your pending courses on Audiology Online and and pass the short multiple choice exam. Keep in mind that you have seven days to complete the quiz when viewing live courses and 30 days when viewing recorded courses. And finally, if you need any technical assistance, please stay logged in and request help by using the Q and A window or by calling or emailing Audiology Online.

Here are the risks and benefits associated with today's course. All of this information can be found in the course handout. If you would like to review these in more detail, however, I will leave these on the screen for a few moments here.

All of the materials in the CEU courses are based on evidence based information. Again, all of this content is available to you in your handout. If you would like to review this particular material more closely, the next few slides that I'll show provide the references to research studies that will be discussed in today's class. I'll leave this up for a few moments here and then I'll advance to the next.

Once again, please feel free to refer back to these as they will be found in the class handout for today.

The learning outcomes for today's course will be that you'll be able to identify three comorbid conditions that are associated with hearing loss, list three risk factors for the prevention of dementia according to the Lancet Commission, and List 2 Fall Risk Factors that are modifiable with that. I would like to give a warm welcome to everyone who is joining today. My name is again Dr. Rachel Barrett and I'm a member of the Education and Training Department here at Starkey. I want to start by saying how much I appreciate you giving me an hour of your time to attend today's course on hearing loss and whole Body Understanding the Connection as the title suggests, the focus of this talk will be on discussing the current research showing the connection between hearing loss and whole body health. As we go through, I encourage you all to think about how you can talk about these connections with your patients.

A publication from the Duke center for Personalized Healthcare included the following the provider patient relationship is a foundation of clinical care. It has been shown to positively influence health outcomes by increasing patient satisfaction, leading to greater patient understanding of health problems and treatments available, and contributing to better adherence to treatment plans. In the context of hearing healthcare with us being hearing professionals this really makes sense. But in other contexts we are sometimes the patient, right? Think about those times when you have had a really great relationship with a provider, whether that's your general practitioner or even a specialist that you may see.

Do you think more positively about those interactions? Are you maybe more likely to listen to their recommendations and follow their treatment plan? Most likely the answer is yes, even if we narrow the scope to hearing aid satisfaction Moving Market TRAC data tells us the effectiveness of the hearing care professional comes right after hearing aid performance and sound quality healthcare accounts for 10% of global GDP and longer lifespans are increasing the need for longer term care. This is leading to consumers being more proactive about their health care. I know that in talking with my parents they are

constantly looking for ways to improve their overall health and wellness.

With that in mind, it's important to be your patient's hearing health advisor. We all know that people want to be helped, not sold. There's a difference between patient driven care and patient centered care. So it's important to inform your patient, but let them guide and drive the decision making process. Utilizing a patient driven care model, your patients will see you as a partner who's helping them optimize their health rather than telling them exactly what to do.

We know that our patients tend to be more proactive about their health and research their options heavily. So they want you as their provider to help guide them not just in their hearing healthcare but in their overall health as well. Patient driven care is care that is being driven by the patient's wants and need. Patient centered care is care that follows what the clinician is wanting. We have seen over the last few years that patients are looking for care that is centered around and driven by them.

As hearing care professionals, our role extends beyond treating hearing loss alone. Educating patients about the connection between hearing health and other medical conditions allows us to provide more comprehensive care, guidance and support. With growing research linking hearing loss to a range of other health conditions, patient education is more important than ever. Let's explore how we can communicate these risks effectively and support patients through informed guidance and care.

We know that hearing loss is the third most prevalent chronic health condition in the world. As of 2020, over 5% of the world's population, including 430 million adults, require rehabilitation to address their disabling hearing loss. And it's estimated that by 2050, over 700 million people, or 1 in every 10 people, will have disabling hearing loss. Disabling hearing loss refers to hearing loss greater than 35 decibels in the better hearing ear. And as you can see, age remains the strongest predictor of hearing loss.

The total number of Americans aged 65 and older is projected to continue growing rapidly. We are in a period of history with more people 65 and older than ever before. According to the U.S. census Bureau, by the year 2030, all baby boomers will be older than age 65, and one in every five residents will be of retirement age. By 2034, 77 million people in the U.S. will be 65 and older. And this, of course, is a sweet spot as it pertains to the primary group seeking audiological care and services.

In addition, the mindset of senior citizens has changed in recent years. As we transition from a senior population that lived through the Depression and the World War II eras to one that is rapidly made up of baby boomers. That mindset has shifted to one of more optimism about the whole aging process and a focus on doing whatever they can to remain healthy for as long as possible. They're highly focused on prevention of health concerns and invested in looking after themselves and often remaining in the workforce much later in life, which may be a necessity due to the cost of living or a conscious choice to remain active and relevant. We know from our professional or family experiences that there's no typical older person.

I'm sure You've encountered an 80 year old with the mental capacity more typical of a 30 year old. And a 70 year old who's declined physically and cognitively seems more advanced than their age.

This definition of healthy aging comes from the World Health Organization, a continuous process of optimizing opportunities to maintain and improve physical and mental health independence. This could be wherever that senior citizen may be, whether that's their longtime home, living with a child, or in assisted living.

The UN has declared the current decade in which we're living as the Decade of Healthy Aging. We can see that globally, countries are embracing the growth of senior population and incorporating legislation and programs designed to support the needs of this growing group. A survey across 136 countries documented a 20% increase in legislation against ageism, legislation to support senior access to

assistive products, assessment of health and social needs of the aging population, and national programs for age friendly cities and communities.

What is aging in place? It's the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level, According to the U.S. centers for Disease Control and Prevention. As hearing professionals, we are increasingly working with patients who are interested in both healthy aging and aging in place, and we can play an integral part in that.

Now that we've talked about why it's so important to educate patients on the broader impact of hearing loss, let's shift into what the research is actually showing us. We're going to start looking at the connections between hearing loss and overall brain and body health, but not just in theory. These are associations that are being actively studied and in many cases consistently demonstrated across the literature. I'm going to walk through several health connections, starting with the ones that you're most likely to encounter in clinical practice. Those are the ones that are going to be the most relevant to us as hearing care providers.

As we go through each one, think about how this information might change the way that you counsel patients, the way you frame hearing care, and position your role as part of the broader health care team. The first topic that we're going to discuss is safety and balance in the nature of our profession. We know that often by the time patients make it into your office, many of those patients with hearing loss have likely already begun to adjust their lifestyles in ways that put them at a heightened risk for falls. We know that patients with hearing difficulty tend to withdraw from social activities that they once enjoyed. So what happens then?

Our patients stay in their home more. They spend less time walking on their feet, they get less exercise, they lose muscle tone, which in turn leads to an increased risk for falling.

And there's plenty of data to back this up, too. In 2021, Frank Lin's group published the results of a study that found people with hearing impairment do indeed have significantly lower levels of physical activity. In fact, their results showed that for every 10dB increase in hearing loss, people spend eight and a half more minutes per day being sedentary. So again, even a patient with a mild degree of hearing impairment may have on average 30 to 40 minutes less physical activity each day than someone with no hearing loss at all.

These are alarming numbers because we already expect older adults to spend 80% of their waking hours sedentary. And I say this finding is alarming because there was a study published in Age and Aging that had looked at the rate of falls in different groups of older adults. That study found that by achieving 30 plus minutes of moderately intense physical activity each day at age 65, that that had resulted in 35 to 40% fewer falls for the rest of those individuals lives. So if someone has a moderate or severe hearing loss, the data tells us that they are likely achieving much lower levels of exercise and even during their younger years, which can have a downstream effect on their fall risk later in their lives.

For our older patients, sustaining a serious fall can be a major inflection point in their lives. And it's usually not for the better. About 50% of individuals who are hospitalized for a fall will die within the next 12 calendar months. And one of the major reasons for that is because of the precedent that sets while they or their peers are being hospitalized. Even though it's well intentioned, patients become conditioned to limit their exposure to falls by remaining in bed and not moving without assistance.

As a result, the average patient will experience about 10 years worth of natural muscle tone loss after just a week of being in the hospital. They may also engage in fewer social and physical activities. And their world may become smaller and smaller as their physical strength, flexibility and endurance decline. As they perform fewer and fewer activities of daily living for themselves, they may have poor

nutrition, receive less exercise, leading to even more muscle and bone density loss. Because they're on their feet less, they can become less practical at walking and less capable of recovering from a balanced disturbance.

So they fall again. Only this next time they have less muscle mass to protect their bones and their health outcomes only get worse from there. So a fall can quickly become a downward spiral, which is why it's so important for these individuals to get early attention and care so that this vicious cycle never sets in for them.

Unfortunately, falls are very common. The CDC estimates that every second of every day every older adult falls in the U.S. this adds up to approximately 36 million falls every year. Of those who fall, more than 8 million are older adults who are injured. Those injuries lead to about 3 million emergency department visits and nearly 1 million admissions into the hospital. Even worse, more than 32,000 individuals die each year from complications of a fall.

Now, it might surprise you that although falls are common and the risks are very real, older patients might not openly share accounts of their own falls for several reasons. The first and most obvious reason is that they simply might not think to share it with us, especially if we aren't broadening the topic with them. We shouldn't be offended by that. Many of them aren't even going to their primary care physicians with this information either. They might think that falls are a normal part of aging and therefore there's nothing that can be done about it.

They may also fear that talking about their falls might result in them being placed in a nursing home, which threatens their sense of identity and desire for independence. Whatever the case, we often find that older patients are unaware of many of the common risk factors that could be putting them at risk for falling. For example, more than two thirds of older adults do not know that as they age, their bodies will metabolize medications differently, which can lead to side effects that increase their chances of falling.

Not knowing that they might not prioritize regular visits with their physicians or conversations with their pharmacists.

As we've been discussing, falls are common, they're costly, and they can result in serious consequences. The good news is that falls are preventable. Take a look at the list of modifiable risk factors for falling and you can already begin to understand how falls can be prevented. As you can see here, most risk factors for falls are modifiable, meaning that there is something tangible that we can do to help mitigate the risk. These include difficulties with gait and balance, lower extremity weakness, use of medications with fall related side effects, home hazards, orthostatic hypotension, poor vision problems, problems with their feet and improper footwear and vitamin D deficiency.

The presence of conditions such as depression, incontinence and dementia can also increase fall risk. Non modifiable risk factors include age, sex, race or ethnicity and history of falls. Fall rates increase as we age. Women are more likely to fall and incur fall injuries compared to men, but men tend to die as a result of a fall. In looking at differences among race and ethnicity, there are more first nations people and Alaskan Natives who fall compared to members of other groups.

Previous falls also increase the chances of falling again. In fact, the number one predictor of a future fall is a history of having suffered falls. As you might imagine, the risk of falling also increases with the number of compounding risk factors that any one individual has. Being able to identify the modifiable risk factors and intervening with appropriate evidence based strategies can really help to prevent falls. Now, Fall risk screening begins the moment that you look out into your waiting room.

We can be vigilant in looking for those obvious signs of frailty like the extremes of body weight, either having low or high body mass or slow walking speed. Do they become quickly winded or fatigued. As they're walking back to your treatment room, do they use their hands to help lift themselves up out of the chair? Are they relying on walking aids or their companion? Do they walk down the hallway using a

handrail or with their hand against the wall?

Are they shuffling their feet? Do they have visible signs of prior falls like bruises on their arms? These are all very easy observations that we can be attuned to.

So what are the underlying reasons that could help explain why hearing ability could be affecting fall risk? As it turns out, there are actually a variety of ways that our ears could be mediating fall risks. As you know, maintaining balance is also a very complex process that involves a variety of senses and body balance, vision, somatosensory and proprioception. The musculoskeletal system. All of these senses come together and must be integrated by the central nervous system, and this uses a large portion of our brain's responses.

Results from the Franklin's Achieve study provided further confirmation that hearing loss increases cognitive decline, especially for older adults with comorbidities. We also know that processing auditory information with hearing impairment is more cognitively demanding and can reduce performance on secondary tasks, including walking. It's also easy to understand how hearing impairment can reduce environmental awareness and deprive our patients of the important auditory biofeedback that we're accustomed to while walking.

To assist healthcare providers like us, the CDC developed a fall prevention initiative called Steadi. STEADI is an acronym that stands for Stopping Elderly Accidents, Deaths, and Injuries, and it's a program designed to help us identify the modifiable risk factors of an individual patient and use that information to direct them for more specific assessments and treatments. STEADI is based on the American and British Geriatric Society's Clinical Practice Guideline for Fall Prevention, and it was designed with input from healthcare providers, so it's intentionally brief and streamlined, but it also covers a wide breadth of risk factors. The STEADI toolkit is intended to help guide a collaborative team of clinicians through three screening, assessment, and intervention. Using Steadi, providers can screen

older patients for fall risk.

They can assess at risk patients modifiable risk factors and intervene to reduce the identified risks by using effective strategies.

If you'd prefer to reduce the number of questions on your intake form or during your patient interviews, there are actually three key questions that have been identified from the state independent questionnaire that you can look to. The research has found that a yes response to any of these three questions has a 95% sensitivity for identifying at risk individuals. These questions are have you fallen in the past year? Do you feel unsteady when standing or walking? And do you worry about falling?

And let's acknowledge and appreciate that hearing loss is indeed a modifiable risk factor. And to support this notion, I'll highlight one particular paper that was published in the American Journal of Preventive Medicine, which reported on a cohort analysis of nearly 53,000 adults. The purpose of that study was to investigate the association between the risk of falls and self reported hearing loss. Interestingly, the researchers found that patients with self reported hearing loss who did not use hearing aids were 2.7 times more likely to fall than patients with self reported hearing loss that was being managed with hearing aids, and patients who used hearing aids were not significantly more likely to fall compared to patients with normal hearing. To say it in a slightly different way, these findings support the use of amplification as an evidence based intervention that may help to reduce the risk of falls.

What the authors also pointed out was that this evidence also supports the notion that physicians should consider screening for hearing loss as part of their routine falls risk assessments. And this may be another area where we can work to build awareness among our medical arts colleagues in our own communities for other risk factors we may need to make appropriate referrals. We can also refer back to the primary care physicians and let them oversee the additional assessments and treatments. I

believe that our goal should primarily be to help make sure that we are casting a wide net and helping to get the individuals at risk on the radar of their support network. Pharmacists are another good reference, especially if the patient is reporting polypharmacy to us.

It's the pharmacist's job to monitor medication interactions and they often have the unique visibility into seeing all of the medications that a patient is being prescribed from their various different physicians. Physical therapy and occupational therapy is where many of the patients at risk for falls will end up, so it doesn't hurt to get them on that path sooner rather than later. And it's always okay to refer the patient and their caregivers to the CDC's Steadi website. They have a lot of information there for both providers and patients. And finally, there's a variety of evidence based falls prevention exercise programs that are likely being offered in your local communities.

If you Google evidence based falls prevention programs, one of the first things that pops up should be the National Council on Aging list of programs, which is a fantastic resource. When hearing loss coexists with balance concerns, management should extend beyond amplification alone. Incorporating fall risk screening, vestibular assessment when appropriate, and counseling on environmental safety becomes important, as well as coordinating with additional medical professionals.

As I said, Steadi has a wide array of clinical resources available to you. They've really simplified everything to make it digestible and approachable. They have scoring sheets and instructions for all of the screening tasks that we talked about. They even have sample referral forms. So it's definitely worth your time to take a look.

For many patients, hearing loss is not just about reduced auditory input. It can also involve the perception of sound that isn't externally present. Tinnitus very often is associated with hearing loss, and understanding this association helps us to better address both conditions in clinical care.

Tinnitus is one of the most common health conditions within the United States. It's estimated that 1 in 10 Americans experience some form of tinnitus throughout their life. The National Institute of Deafness and Other Communication disorders, or the NIDCD, estimates that from the subset of 1 in 10, approximately 2 million Americans are experiencing debilitating tinnitus. With the amount of people affected, this is certainly something that you will see within your patient demographic.

When we look at factors such as severity of hearing loss, the type and cause of hearing loss, or onset of hearing loss, tinnitus seems to be a free agent, meaning that it can occur with any degree or type of hearing loss, with any cause or type of onset. The severity of the tinnitus is not necessarily related to the severity of the patient's hearing impairment. Changes in hearing loss and changes in tinnitus seem to occur independent of one another. The tinnitus can increase or decrease without any change in hearing, both noticeable or measurable, and the patient's hearing could get worse. But the tinnitus could remain unchanged or even seem to fade slightly.

A study conducted in 2020 looked at 73 patients who were divided into groups based on their hearing loss, and then they were asked to rate their tinnitus and using the Tinnitus Functional index, or the TFI. The group with normal hearing was comprised of 34 participants, and the group with sensorineural hearing loss was comprised of 39 participants. There was no correlation found between the tinnitus severity and the measured hearing threshold. This just further backs up the notion that we do often see tinnitus and hearing loss together. However, they don't necessarily relate to each other.

Tinnitus can affect anyone, and no two people will report the effects of their tinnitus in the same way. When you have a tinnitus patient reach out to you, it's important to examine their quality of life and the impacts that tinnitus is having on their daily routine. In extreme cases we see that tinnitus patients are reporting extreme despair and beyond. 18% of tinnitus patients report problems sleeping which can not only exacerbate their tinnitus but it can also lead to other health concerns as well.

So when it comes to treatment options for tinnitus patients, there are really three main categories to provider driven treatment options, patient driven options, and when to refer to another professional. Treatment for tinnitus is often centered around trying to limit the negative thoughts associated with tinnitus which which hopefully will mitigate the emotional effects that they are feeling and minimize disruptions to their lifestyles.

Maskers that are found in hearing aids are used as a form of acoustic therapy. This refers to using sound stimulation from amplification of external sounds or the generation of additional sounds. There are many different masker options built into hearing aids. Generally, tinnitus maskers are additional sounds generated that are typically set at a level below a patient's tinnitus to potentially cover it up. A study in 2021 followed 26 individuals over an eight week field trial wearing hearing aids that provided acoustic therapy via three tinnitus masker options.

The Tinnitus Handicap Inventory was used before and after treatment to measure the patient's tinnitus handicap.

Results from the study showed that after going through the treatment, patients reported a significant reduction in their tinnitus symptoms and on average about 34% of the time they were using a masker.

Sound or sleep apps have been around for quite some time now and they certainly have a place in the world of tinnitus, but how effective are they? A study completed in 2023 explored the potential benefits of a smartphone application for tinnitus relief. The study was comprised of 22 participants who reported having subjective tinnitus. Each participant was instructed to use the tinnitus application for six months. Results showed a significant reduction in subjective tinnitus.

Loudness and annoyance and subjective stress levels were also observed. The Tinnitus Handicap Inventory scores were also significantly decreased after the six month period. In addition, participants

reported high satisfaction with the application and the music and environmental sounds as tinnitus options. The findings from the study demonstrate the potential benefit of an application such as these for tinnitus improvement when it comes to patient driven treatment options. The goal is to help the patient deescalate the attentional focus away from their tinnitus and these really look at building healthy habits and lifestyle changes that can help Manage their tinnitus symptoms on their own.

There are many different lifestyle changes that a tinnitus patient can enact to help them manage their tinnitus symptoms. Quitting smoking or vaping and diet changes are two really big ones. Regular exercise helps the body achieve a higher level of well being and in most cases this helps people to ignore and cope with their tinnitus better. Increased exercise can also help you to sleep better, which in turn leads to being well rested. That coupled with practicing relaxation or meditation exercises, can help patients manage their symptoms well.

And finally, we have treatment options that involve referring out to additional healthcare providers. One of the most common treatment options that we might see is cognitive behavioral therapy. This has been shown to have a great improvement in the quality of life of patients with severe tinnitus symptoms and its focus on changing the mindset of the patient and in the way that they think about their tinnitus. It does this by focusing on building mindfulness skills, teaching the patient how to manage their tinnitus perception, using sound enrichment, and making behavioral changes that can better help them manage and cope with how their tinnitus makes them feel.

Now, tinnitus will probably never go away completely for a tinnitus patient, but by utilizing the appropriate treatment, what we hope is, is that we can no longer have tinnitus be the main focus. An analogy that we could use to conceptualize this is to think of a candle in a dark room. The flame of that candle is very bright, but once you move it to a more well lit room, it's still there, but it's not the focus. It's a lot less noticeable. In essence, tinnitus is most noticeable when in a quiet environment with

nothing to distract the brain.

But by bringing in more environmental input, hopefully it can help to kind of mitigate those symptoms or noticeably enough to help at least more comfortably go about daily life.

In recent years, the connection between hearing loss and dementia has gained substantial attention. In this next portion, we'll review what the research suggests about this association.

Cognitive decline ranks high among baby boomer concerns The Alzheimer's association found that 70% of baby boomers fear dementia and Alzheimer's more than any other life threatening disease. So much so that 50% say that they would delay retirement if it would benefit their brain health.

Cognitive processing is even more important for individuals with hearing loss than for individuals with normal hearing because auditory information is deficient as a result of cochlear pathology. To compensate for degraded input signals, a listener will need to rely more on cognitive processes to reconstruct the message and fill in the gaps of anything that they may have missed. We counsel patients on this fact every single day. It's important to note that just as patients vary in terms of their hearing abilities, they differ in terms of their cognitive abilities as well. While we sometimes refer to cognition as a single entity, it actually includes multiple different abilities.

Working memory is holding information in memory while processing the same or new information at the same time. It refers to the ability to simultaneously store and process information. Processing speed is rapidly responding to a simple stimulus that's presented through any sensory modality. Selective attention is focusing on and reacting to certain stimuli which, while ignoring irrelevant information.

General sequential reasoning refers to reaching a solution to a problem by taking multiple steps based on rules and conditions. And finally, lexical knowledge refers to understanding the correct meaning for a

word. I also want to mention listening effort here. In contrast to cognitive demand, listening effort refers to the resources or energy actually used by the listener to meet cognitive demands. We sometimes discuss listening effort of hearing aid users, but what isn't discussed is how closely tied it is to cognitive abilities.

In 2020, a survey of over 1,000 audiologists found that 88% reported that they do not administer formal cognitive screening, varying by practice type. Across all respondents, the most common reasons given for not screening were that they were not comfortable administering screening questionnaires, they did not have time, or that they felt that screening was not in the audiologist's scope of practice.

According to both ASHA and aaa, screenings related to this area are within an audiologist's scope of practice. Going back to the previous study, the number of audiologists who reported that they were trained to perform cognitive screening during their graduate education has more than doubled within the last 10 years preceding those receiving graduate training increased from 20% to 44%. There are a number of screening instruments available for professionals to use, but why is this important? The prevalence of both dementia and hearing loss are projected to have staggering increases as a result of the rising number of older adults and overall life expectancy. By this point, I'm sure you've all heard of the ACHIEVE study.

ACHIEVE stands for Aging and Cognitive Health Evaluation in Elders. Interestingly, the ACHIEVE study showed that those patients with comorbidities such as hypertension, diabetes, and lower cognition showed a 48% reduction in cognitive decline if they wore hearing aids compared to the cohort who didn't receive hearing aid treatment. The Lancet Commission is a report that lays out a framework and recommendations for addressing dementia at a global population health level. The collection of research that informs this report shows that 40% of dementia is influenced by 12 modifiable risk factors. That's 40%.

Hearing is listed as one of the 12, but not only is it on the list, treating hearing loss is the largest modifiable risk factor for the prevention of dementia. And this is a risk factor that should be addressed in midlife, not towards the end of life for optimal benefit.

One of the earliest symptoms of hearing loss is what people call the cocktail party problem or hearing in a noisy environment. This can have a large impact on day to day functioning as people struggle to follow conversations and fully engage at the table. When a patient notices difficulty in social situations, they gradually start to become more isolated. We've heard about this for many years from patients, but it was always unclear whether difficulty hearing, speech and noise was associated with developing dementia.

There is data now that shows that speech and noise hearing impairment is associated with an increased risk of dementia. A 2021 study from the Alzheimer's association showed that even a moderate degree of speech and noise impairment increases the risk of dementia by 61%. And as that progresses to a severe degree of SNR deficit, it's over 80% increased risk of dementia. The good news is that treating speech in noise and addressing the cocktail party problem early has the potential to decrease the risk of dementia to patients. The concept of a modifiable risk factor is a little vague, so I'd like to bring more clarity as to what that means to say that hearing impairment is a modifiable risk factor for dementia.

Here's a study from 2018 that was published in the Journal of the American Medical Association Otolaryngology. The goal was to look at and measure the memory in people, or, excuse me, the memory deficit in people with hearing loss. At the top of the chart, the gray line represents average memory function among people with hearing loss. A memory deficit is any data point below the gray line. Memory advantage is any data above the gray line.

So the first group that the study looked at was people with hearing loss who do not use hearing aids. In people with mild hearing loss and moderate severe hearing loss who do not wear hearing aids, there is a significant degree of memory deficit compared to those without hearing loss. However, in a similar group of people with mild and moderate severe hearing loss, in those who did wear hearing aids, their memory function was significantly better and much closer to normal. This suggests that hearing loss does not mean that someone is destined for dementia. This shows the silent value of hearing aids and is very important to share with and educate your patients.

When cognitive concerns are present, care should be adapted to reduce the cognitive load. This may include simplifying device use, providing clear written and visual instructions involving family members or caregivers, and prioritizing consistent device use to support communication and cognitive engagement.

Hearing loss can extend beyond physical changes and really begin to affect social interaction. As communication becomes more effortful, individuals may withdraw from conversations in social settings. This raises important questions about the relationship between hearing loss and loneliness, which has been increasingly explored in the literature.

The Surgeon General from 2014 to 2017, Dr. Vivek Murthy, labeled loneliness as an epidemic in the United States. Other countries, including the U.K. Denmark, Australia and Japan, have all made addressing loneliness a social priority.

Loneliness has been shown to affect 1 in 3 adults over the age of 45. Loneliness increases risk of dying early by 45%. There's a 60% increased risk of functional decline, and it's as or more harmful as 15 cigarettes a day.

The statistics are certainly alarming, but it does beg the question of why. What goes haywire in the body when we're lonely? What is the biological explanation that leads from loneliness to those chronic illnesses? Have you ever been so thirsty that you can't focus on anything other than finding something to drink? Or the same goes for hunger and getting very hangry.

You're like a mad person until you get food in you. Hunger and thirst are adaptive protective sensations for survival. Humans need other humans to survive. It's safer to be part of a tribe. So when you feel lonely, that's an adaptive protective sensation to go out and find social connection.

So what happens when we don't get food or water that is a threat to our survival? And not finding meaningful social connection is a threat to our survival. And when our survival is threatened, the body's sympathetic nervous system kicks into gear.

This is the part of our nervous system that evolved during our hunter gatherer days to protect us from threats like lions. It's a part of our nervous system that doesn't think, it just acts. Because if you see a lion, you don't have time to think. You have to get from 0 to 100 instantly. So what happens when your sympathetic nervous system senses a threat and starts firing?

Your brain sends a coordinated set of nerve signals to the body that put your body in a heightened state of alert and you get ready to fight battle. You pump out adrenaline or cortisol, so your blood pressure and your heart rate increase to get more blood flow and muscles. The small airways in your lungs dilates that you get more and fresh oxygen to your brain. Your immune system downshifts and goes into standby mode. And all of that is good.

In short term, we escape the threat. But what happens when we are in a constant state of threat, Whether it be hunger, thirst or loneliness? An ongoing state of high blood pressure and increased heart rate leads to heart rate, or, excuse me, heart disease and stroke. Chronically high levels of high blood

pressure can lead to diabetes. Immune cells that are not constantly scanning the environment for viruses in the world may mean that there could be viruses and cell activity that isn't kept in check and gets out of control and could potentially lead to cancer.

And loneliness begets loneliness. It is truly a vicious cycle because cortisol also has an impact on the prefrontal cortex of the brain, the part of the brain that gives you your filters, your personality. When you are in a fight or flight mode, you are well served by being aggressive and distrustful. But when it's persistent, this behavior leads to being not so fun to be around. This decreased opportunity to interact, decreasing stimulation of the brain, leads to dementia and loss of memories.

But again, why? MRI scans show decreased brain volume associated with loneliness. And there are a few possible mechanisms. The first is damage from persistent flood of cortisol, the fight or flight response, and the high blood pressure that goes along with it. The second, when the brain stops being stimulated, it's not learning and making new nerve connections.

So the brain behaves sort of like a muscle. You use it or you lose it. It's not making new nerve connections and it's not using old ones, so they shrivel away. And the third is when that loneliness is due to decreased hearing. The distorted sound encoding could cause structural brain changes and make it harder to focus on learning.

So yet another vicious cycle. Now, let's tie this all back to hearing. There are multiple risk factors for loneliness. Most of them are not reversible, such as getting older. Or they are ones that are not easily reversible, such as living in rural areas, low income, low education, or poor health status.

But hearing loss is a risk factor that we can do something about addressing Hearing loss means that you can have an impact on a number of health conditions.

Hearing impairment leads to poor communication between patients and their healthcare providers. This study from the Journal of the American Geriatric society showed that 12% of people over the age of 50 say their hearing difficulties is severe enough that they had trouble communicating with their doctor. Those people had 32% higher risk of being readmitted to the hospital. When researchers looked at healthcare costs over 10 years among about 4,700 adults age 50 and older with and without untreated hearing loss. People with untreated hearing loss had an average of 22,000 more in healthcare costs than people without hearing loss.

In a secondary analysis of the ACHIEVE study, a hearing intervention was found to have a positive effect across multiple distinct but related measures of social isolation and loneliness. The hearing intervention was found to be associated with retaining a mean of one additional person in a participant's social network over three years. Findings from this secondary analysis suggest that hearing interventions should be routinely considered along with other interventions to mitigate social isolation and loneliness, particularly given the high prevalence of hearing loss among older adults. For patients experiencing social withdrawal or loneliness, management should go beyond device fitting. Counseling should really emphasize communication strategies and when appropriate, encourage re engagement in social activities or community resources to improve overall well being.

More broadly, hearing loss has been associated with cardiovascular health. Because the inner ear relies on rich but delicate vascular network, it may be particularly sensitive to compromised circulation. This has led to researchers to investigate hearing loss as a potential marker of cardiovascular disease.

A study completed in 2018 examined the associations between cardiovascular comorbidities and hearing loss in 433 patients age 80 and older in the U.S. they found that treating the underlying cardiovascular disease may prevent or slow the progression of hearing loss and conversely, hearing loss may suggest underlying cardiovascular disease.

So can cardiovascular disease cause hearing loss? Yes. Research shows a clear link between hearing loss and heart health, with blood flow being the most important factor. Good circulation plays a vital role in maintaining good hearing health. Conversely, inadequate blood flow and trauma to the blood vessels of the inner ear contribute to hearing loss.

This is because the delicate hair cells in the cochlea depend on a healthy blood supply in order to work properly. When circulation is poor, these cells don't get the oxygen that they need and can therefore become damaged. A 2024 review of 10 studies found that people with hearing loss had a higher risk of stroke, coronary artery disease, or any type of cardiovascular disease than those with normal hearing, which suggests a consistent association between cardiovascular disease and hearing loss.

There have been several studies that have found that the inadequate blood flow negatively affects the peripheral and central auditory systems, especially in older adults. We often see that adults with poor heart health have worse hearing at 2000 and 4000 Hz. Other audiometric results with these low frequency excuse me, those with low frequency hearing loss are considered at risk for cardiovascular events. Hearing loss occurs 54% more often in people with heart disease than the general population. Oftentimes, patients that are being tracked for cardiovascular disease are looking to make other health conscious changes in their lives.

Heart Healthy lifestyle can benefit hearing Although hearing loss caused by heart disease is permanent, you can take steps to lower your risk or preserve your remaining hearing if you already have some loss. But by adapting a healthier lifestyle, suggestions include getting regular exercise, eating more fruits and veggies, whole grains and healthy fats, limiting sodium and added sugars avoid smoking, keeping blood pressure and cholesterol in check, maintaining a healthy weight, managing stress and having regular checkups with your gp. Activities that get your heart pumping may be especially beneficial. A study by researchers at Miami University discovered a positive relationship

between hearing acuity and cardiovascular exercise. The study followed 102 non smoking volunteers from Indiana and Ohio, ranging in age from 22 to 78, whose hearing was evaluated after riding a stationary bicycle.

Researchers concluded that those with higher cardiovascular fitness levels had better hearing, especially among those age 50 and older. In patients with cardiovascular disease, hearing loss may be part of a broader vascular picture. This highlights the importance of interdisciplinary care, encouraging patients to maintain cardiovascular health while monitoring for changes in hearing that may warrant reassessment.

As discussed, the auditory system is highly dependent on adequate blood supply, making it vulnerable to vascular changes. Hypertension, as a common vascular condition, has been linked to hearing loss in a number of studies. Understanding this relationship can help inform both prevention and management strategies.

Hypertension is associated with several ear related health challenges, including hearing loss, tinnitus, vertigo and ear pressure. For the purposes of today's talk, we will be focusing on its relationship specifically to hearing loss.

Hypertension, also known as high blood pressure, occurs when the force of blood on the walls of your arteries is high enough to cause damage to your cardiovascular system and other organs. Since your cardiovascular system is an intricate part of many other structures and systems in the body, high blood pressure can impact many parts of the body, including the ears. Your ears rely on a delicate internal pressure that helps you maintain your spatial awareness in the environment. Parts of the ear essential to hearing, like the cochlea, are also highly vascularized with a complex network of tiny vessels. When you have high blood pressure, the changes in blood flow and pressure can cause damage to the ear and disruption in its functions.

Studies show an existence of an association between hearing loss and arterial hypertension in individuals between 45 and 64 years old. A study conducted in 2013 confirmed that there is a possible association between hypertension and an increase in hearing threshold. Patients with hypertension have greater increase in hearing threshold as compared to those without hypertension. The increase in hearing threshold was most marked among those with grade 3 hypertension, particularly at higher frequencies in 2021, a cross sectional study found that participants who had had hypertension for more than five years had significantly greater levels of hearing loss than those without hypertension. It's believed that hypertension may cause restrictions in the vascular supply to the stria vascularis, potentially leading to hearing loss.

With hypertension, management includes awareness of its potential impact on the auditory function over time, reinforcing adherence to medical treatment. Promoting regular monitoring and maintaining consistent hearing evaluations can help identify changes. Early metabolic disorders can have widespread effects throughout the body, including on the auditory system. Diabetes has been consistently associated with an increased risk of hearing loss, possibly due to vascular and neural changes. The research in this area provides important insight into these mechanisms.

High blood sugar levels can lead to damage in the small blood vessels and nerves in the inner ear over time. Low blood sugar levels over time can damage how nerve signals travel from the inner ear to your brain. However, both types of nerve damage can lead to hearing loss, which may develop gradually and often goes unnoticed until it begins to interfere with communication and daily functioning.

To better understand the broader impact, it's important to consider how prevalent diabetes and pre diabetes are and what that means in the context of hearing loss. According to the CDC, of the 115 million adults in the US who have prediabetes, the rate of hearing loss is 30% higher than in those with normal blood glucose levels, and more than 40 million people in the US have diabetes, and studies

have found that hearing loss is twice as common in people with diabetes as it is compared to those who do not.

In the November 2025 issue of Otolaryngology, Head and Neck and Surgery, a systematic review and meta analysis analyzed data from 17 studies encompassing 3,910 individuals with diabetes and 4,084 control subjects. The findings revealed a concerning picture. The prevalence of hearing loss among patients with type 2 diabetes ranges from 40.6% to 71.9%, and compared to the control group, the risk of hearing loss is 4.19 times higher in those with diabetes, hearing loss was predominantly observed at higher frequencies, with the mean pure tone audiometric thresholds of the diabetic group 3.19 dB higher than in the control group. For patients with diabetes, hearing care should take into account the potential for progressive changes. Emphasizing routine hearing monitoring, supporting good glycemic control, and thorough patient education and adjusting expectations around the progression is all what can contribute to better long term outcomes.

Hearing loss has traditionally been viewed through a sensory lens, but emerging research suggests that it may also intersect with overall health in less obvious ways. One example is obesity.

Now, obesity doesn't directly cause hearing loss, but it can lead to it. Many researchers are yet to give a clear link, but we but one thing is for sure, there is a relationship between hearing loss and obesity. Hearing loss is linked to high blood pressure and diabetes, which is also linked to obesity. Furthermore, obesity affects the circulatory system, hence impacting one's hearing. As we've discussed, the ear depends on an adequate blood flow in order to work well.

Obesity, on the other hand, compromises blood flow because it narrows the blood vessels.

There have been some studies that have begun to examine this connection. A systematic review and meta analysis was completed in 2020 that pooled together 14 observational studies with the aim to

provide further clarification of the potential association between body mass index, or bmi, and hearing loss. What they found was that obesity raised the odds of hearing loss by 40%. When BMI was bumped up to 5 points, the risk of hearing loss went up to 14%. An additional study completed in 2013 examined the relationship between obesity and hearing loss specifically in adolescents.

What they found was that obese adolescents were more likely than their normal weight counterparts to have hearing loss across all frequencies. They were also almost twice as likely to have unilateral low frequency hearing loss. In the context of obesity. Hearing loss management may benefit from a broader discussion of overall health. Encouraging healthy lifestyle changes while maintaining a focus on communication needs supports both auditory and general health outcomes.

We've demonstrated the complex connection between hearing loss and overhealth in today's discussion. There are countless quality of life consequences to letting hearing loss go untreated. Not only is poor hearing annoying and inconvenient for millions of people, especially the elderly, but it's also an unmistakable health hazard, threatening mind, life and limb. Think about your typical clinic day and the patients on your schedule. Many of those conditions that we've discussed today aren't rare or separate. They're happening at the same time in the same individuals.

For every 20 patients that you see, two of them are experiencing depression, four are lonely, eight have high blood pressure, and 15 will experience a fall in the future.

However, the data tells us that hearing aid owners show more signs of living fully compared to non owners with comparable levels of hearing loss. Here you see comparisons of hearing aid owners in blue and non owners in gray who say that they regularly exercise, socialize, engage in life, and find that they are not becoming more forgetful.

Now, don't forget to include the caregiver in this process as well. These individuals are valuable allies. Include them in the counseling education phase as they are just another set of ears for reminding that loved one about care, practice and reminders of what to do. They also act as cheerleaders for patients and provide encouragement when it's needed. It's interesting when you look at data around the differences between patients and family regarding improvement with hearing aids, family members tend to see more improvement than the patient does. This may be because they spend a significant amount of time with the individual and they see firsthand the benefits that the hearing aids can provide.

On the patient side, it could be more likely that they don't see as large of an improvement due to the gradual onset of hearing loss, but in general, the family members rate relationships and social life improvement higher than the individual with hearing loss. Ensuring that you have a partnership with this caregiver is going to increase the likelihood that the patient will be successful with hearing aids and be reminded of the benefits of them. Remember, you're not only taking care of the patient, but their caregiver by also improving their quality of life as well.

Starkey's Hear Share app is an app designed for caregivers or loved ones that allows the patient to share data with them. From the My Starkey app, you can really think of Hear Share as data logging for caregivers. Maybe you help your mother's hearing aids, but you don't live in the same state. Hear Share allows you to do this remotely in an unobtrusive way for both you and the patient and provides you with a peace of mind even when you can't be there in person.

The hearing care professional plays an important role in the journey with not just amplification but also the patient's goal of healthy aging. Using a variety of methodologies in your clinic can help you provide more comprehensive care for your patients, but in a manner that's clear and easy to understand. Keep in mind professionalism, efficiency and quality of counseling all matters. People want to feel that their needs are your priority and appreciate when their expectations are managed properly. They want

evaluations and processes that are comprehensive and still easy to understand.

They want leading edge technology and data driven techniques that demonstrate the benefit or the value and they are also very impactful.

We know that hearing aid use leads to many positive changes for an individual and including the overall ability to communicate effectively to the ability to participate in group activities, improved relationships and even to improve memory and physical health. Patients who are candidates for amplification have a lot to gain from moving forward.

As I wrap up today, I'd like to encourage you all to check out an article in the December 2023 hearing review entitled Aging with Dignity with Assistance from an audiologist. I think all of us as hearing professionals would enjoy this experience that the patient had in the article that they had with better hearing and how hearing and the professional who fit him truly impacted his quality of life. With that, I want to thank you all so much for joining me today for today's course. I hope you all have a wonderful rest of your day.