Foundations of Hearing Loss and Cognition

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All right guys, today you are here for Foundations of Cognition and Hearing Loss. My name is Carmen Pustejovsky. I am one of the clinical trainers for Phonak in the South Central region based out of Texas. Again, as I said, my name is Carmen. I am a clinical trainer and I am employed by Phonak.

I have no other financial or non financial disclosures. So with that we'll go ahead and get started. We're excited to have you with us today to learn about this important topic. Over the course of the next hour, we'll discuss the relationship between hearing loss and cognition, as well as recent evidence, and how we can put those pieces together when talking with patients. Thinking critically about research is important, especially when you have a lot of hype about a certain topic.

We've likely all seen sweeping headlines in magazines about this relationship that use very strong and at some times very fear mongering language rather than using responsible claims. They oftentimes leave even us as professionals wondering about the purpose or clinical implications of studies in which the aim is to explore relationships, investigate associations, look at the risk factors, or examine correlations. What exactly do all of those things mean? When reading research findings, it's important to understand the difference between risk factors, association and causation. This is one of the topics that we'll clarify a little later.

We know that cognition has been identified as an important topic by hearing care professionals just like yourselves. Phonak conducted research involving 203 hearing care professionals from the USA, Canada and the Netherlands and the result showed that 89% rated the topic of cognition as important or very important. We also know that cognition is a topic that is often brought up in the clinic. Again, when recently surveyed, hearing care providers were asked how often they encounter cognition as a topic of concern in their everyday practice, 71% of hearing care providers reported that they encounter it often or always as a topic. These findings highlight the need to further integrate cognitive health discussions within hearing health care.

If you have questions regarding the study, you can contact marketinsightonact.com if you want further information on the study.

So let's imagine that this is your new client, John and his wife Pam. During their initial visit, they tell you that they're concerned because they've noticed changes in John's memory and thinking. Imagine what that situation must be like for them as they're going through this unsettling time. It would be incredibly important to have a hearing care professional who is up to date with the latest research and clinical best practices essential for the best holistic treatment. With this Training, you will be competent and confident in talking about the benefits of hearing technology beyond hearing loss.

With a focus on maintaining his cognitive health and overall well being. Phonak aims to be your trusted partner in hearing health care so that you can provide John with personalized care that addresses his cognitive and hearing health. First, we're going to just go over some general background on what we know about the aging population, hearing loss and cognition as we get older.

When it comes to the aging population, the numbers are big. They're quite impressive. Firstly, there is a global growth of the general population. There are currently 8 billion people living in the world and by 2050 there will be 10 billion. Secondly, we know there is a growth of the aging population.

Specifically, the population of older persons is increasing both in numbers and in share of the total. The share of global population at ages 65 and above is projected to rise from 10% in 2022 to 16% in 2050 globally. Globally, by 2050, the number of adults older than 65 will double. The number of adults older than 80 will actually triple. This is why we often refer to aging societies because we know that the aging population is growing at such a fast pace.

The numbers around hearing loss are also noteworthy. According to the Global Burden of Disease Study, age related hearing loss is ranked as the fifth leading cause of disorder disability across ages. In

comparison, low back pain, headache disorders, depressive disorders and diabetes are the other top four. The fact that hearing loss ranks fifth as a disability can partly be explained by its high prevalence. In March of 2021, the World Health Organization updated their information and now State that globally, 1.5 billion people live with some degree of hearing loss.

These numbers are projected to increase drastically over the coming years. It's estimated that by 2050, 2.5 billion people will have some degree of hearing loss. Of those with hearing loss, around 430 million people have disabling hearing loss requiring hearing care services. And as we know, the older population is more at risk. Currently, 65% of adults over the age of 60 have hearing loss.

One reason that we pay so much attention to hearing loss in the context of cognition is because we know the ears and brain act as equal partners. While the ears pick up the acoustic signal, the brain puts the sound puzzle together in a way that makes sense. The better the quality of the incoming signal, the better the chances for speech comprehension. The better the cognitive resources, the better they can potentially compensate for missing information due to a hearing loss.

Of course, hearing loss impacts more than audibility and the incoming signal. Let's Think about what that means for the well being of your patients. We know that hearing loss has a cascading effect and can make communication feel like hard work, making our patients tired and anxious. When communication becomes more effortful, your patients might reduce their social engagement, having an effect on how willing and motivated they might be to engage in daily activity. So we know it impacts things like reduced audibility or self perceived hearing difficulties as well as things like challenges maintaining attention and working memory as well as all of those other items you see there on the screen.

When we look at the different stages of verbal communication, hearing is the first stage and is a precursor to listening, comprehending and successfully communicating. This slide illustrates that

hearing provides the foundation for your patient's verbal communication as well as their social functioning. Hearing also plays a significant role at all three levels of perceptual, cognitive and social emotional function as it impacts overall well being. Good hearing can be a precursor for being active, for being involved, for participating in the social parts of life, for managing daily life and activities of daily living, and for preserving one's cognitive and functional level.

When it comes to cognitive performance, things are not set in stone. Instead, we know they're fluid and influenced by a myriad of factors. Certainly your patients all bring their own unique starting point based on their talents, education and training. As you can see on this slide, there are many different factors that influence your patient's cognitive performance. Things like metabolic functioning, things like medication and substance use, stress and distraction, various medical conditions.

And we know that that also includes sensory functioning, especially hearing loss.

We also know that cognitive change is a normal process of aging. As we age, the brain naturally changes. The process of aging involves a series of losses and gains in physical, cognitive, psychological and social abilities. For example, physical stamina gradually decreases with age, but accumulated knowledge or wisdom tends to gradually increase. Individuals vary greatly in the extent, rate and pattern of age related cognitive changes experienced to age well.

Individuals must adapt to and compensate for the changes which may impact speech understanding a critical part of communication.

Cognitive aging, again which is normal aging, involves slow cognitive changes which typically occur over a period of decades. Typical cognitive changes include reduced speed of information processing, reduced capacity of working memory, greater effort required for learning new information, and difficulties dividing or switching their attention when processing parallel or interfering information.

However, these cognitive changes do not interfere with the capacity for independence in everyday activities.

As we mentioned earlier, aging is different for everyone. We have what's considered normal or healthy aging. And then there is pathological aging. Pathological meaning that it involves or is caused by disease. This figure is a Simplified and general illustration of normal versus pathological aging in cognition in normal healthy aging, we would expect that as a person gets older, there will be some diminishing cognitive functions as they move towards old age.

This upper solid curve shows what we have described so far, a fairly slow decline in cognitive functioning as age increases, but a relatively good ability to perform in daily life in dementia or pathological aging. On the top of this image, the decline of cognitive function occurs much faster and to a much greater extent compared to the decline we see in normal aging over time. These changes impair the ability to perform basic activities of daily living. Dementia is a progressive disease, and the faster decline is linked to accumulating pathology in the brain. Unfortunately, differentiation is not always easily seen in the beginning of the disease as only minor symptoms are present.

It's also not black and white between normal aging and pathological aging. There is a lot of gray in between, and in most cases only the progression of symptoms over time will tell a differential diagnosis. And there we have conditions involving mild cognitive impairment and the middle curve in the figure. Mild cognitive impairment involves cognitive difficulties beyond those expected on an individual's age and education. However, they are not significant enough to interfere with the ability to independently perform everyday tasks.

With mild cognitive impairment, we can see a risk for this to develop into dementia, but that is not always the case. With mild cognitive impairment, we can also see improvement back to the changes we expect to see in normal healthy aging, meaning that MCI is sometimes reversible. For example, if

cognitive difficulties are related to medications or sleep deprivation and the appropriate changes are made, we can then see improvement in the MCI symptoms. It is important to remember these two things. For most of your patients, healthy aging is the general case, and not everybody with mild cognitive impairment will then develop dementia.

When we talk about pathological aging, we tend to think of dementia. But what exactly is dementia? How is it defined? Dementia refers to a spectrum of brain disorders, all of which involve memory, thinking, behavior, and emotion, but vary widely in terms of the cause, course, and prognosis. Dementia is more than just memory impairment and involves impairment in several higher order cognitive functions, as well as a substantial decline from a previous level of performance.

It is accompanied by gradual deficits in the ability to perform everyday tasks. Cognitive decline is implied as relatively permanent and irreversible. It is considered a progressive and degenerative brain disease that is typically fatal within years. The early diagnosis is crucial for identifying and treating reversible causes, exacerbating factors and associated psychiatric problems.

Dementia is different from normal aging because it does interfere with the capacity for independence in everyday activities. The changes in cognition associated with dementia involve not just memory impairment, but impairment of several higher order cognitive functions. For example Learning. They forget things they have learned and may have trouble putting them in the right order. Also language.

They may not be able to find the right words or use a related word, for example book instead of newspaper. It can impact executive function. Things like difficulty getting dressed or feeding themselves, complex attention, trouble paying attention and multitasking perceptual motor. They may not be able to connect that a hairbrush is for brushing hair just by seeing the object, as well as mood and behavior, including inappropriate behavior in social situations or personality changes.

We also know that the cost to society is over $1.3 trillion and rising rapidly every year as well. Approximately 50% of these costs are attributable to care provided by informal carers like family members and close friends, who provide on average 5 hours of care and supervision per day. Alzheimer's disease is the most common type of dementia and accounts for up to 60% of all cases. Other causes of dementia include vascular disease, dementia with Lewy bodies, or abnormal deposits of protein inside nerve cells. Frontotemporal dementia Degeneration of the frontal lobe of the brain and may affect different areas of the brain and present with different symptoms.

On the topic of hearing loss and cognitive decline, we're also curious about the relationship. Although not yet fully understood, there are several pathway theories underlying the association between hearing loss and dementia proposed. Of course, it's likely that no one pathway alone accounts for the link between hearing loss and dementia. The current four potential pathways are cognitive load, sensory deprivation, social isolation, and a common pathological process. Let's take a look at each to better understand how hearing loss may impact cognitive abilities.

The first potential pathway is called cognitive load. If we have an impairment in the cochlea and have damaged hair cells, then we don't have the same sensitivity to encode that signal and there ends up being distortion when the sound is encoded. So instead of a crisp, clear signal being sent to the brain, it's garbled and degraded and the brain has to work harder to decode it. The amount of effort the brain has to put into decoding the signal can be at the expense of something else that the brain may be doing instead. Decoding that garbled signal increases cognitive load.

A second potential pathway in which hearing loss may cause cognitive decline is by sensory deprivation. Studies with individuals have found that for those who have hearing loss, a number of changes in their brain occurred as compared to individuals who don't have hearing loss. The sensory deprivation hypothesis surrounds the idea that prolonged untreated hearing loss subsequently can lead

to general atrophy or the wasting away of the area and consequently changes to brain structure and function. This means there is a smaller pool of resources available for other cognitive tasks and other processes such as working memory.

The third potential pathway in which hearing loss may cause decreased function in older adults is through social isolation or loneliness. When we talk about social isolation, this can be a measure of the number of quality social connections or how many people can a person rely on or go to if they need help. In addition, loneliness or a perceived lack of social connection is about the quality of their connections, about how someone feels about their connectedness. Both social isolation and loneliness have been recognized as important public health issues and are associated with adverse health outcomes, including cognitive decline.

The last pathological pathway is that there is a common pathological process for both hearing loss and cognitive impairment. The idea here is that there's a factor that affects the cochlea, the auditory pathways as well as the cortex. So again, these are the four current potential pathways studied to explain why hearing loss is associated with decreased cognitive function, common pathological process, cognitive load, sensory deprivation, and social isolation.

With that background in place, let's switch gears and talk more in depth about the research around hearing loss and cognition. Understanding all the research can certainly feel overwhelming, and it's often difficult to discern what is important information within a research article. Today we'll go through some of the recent evidence and get a clearer understanding of what the research tells us. As we evaluate research, accurate terminology is also something we need to clearly communicate with our patients. As mentioned at the start of the presentation, often media outlets will present dramatic headlines to get the biggest possible reaction.

This quote from industry experts Drs. Jan Bluestein and Barbara Weinstein is an important one to keep in mind. In their recent article, they highlighted that while the scientific community is still uncertain about the nature of the hearing loss dementia link, the public tends to interpret messages about hearing loss as a warning sign of dementia. It is our role as hearing care professionals to responsibly translate this evidence to help the public understand the evidence and avoid jumping to inaccurate conclusions such as hearing loss causes dementia.

For example, the LIN study, Hearing Loss and Incident dementia, published in 2011 in the Archives of Neurology, shows that with untreated hearing loss comes an increased risk of dementia. In fact, Lynn and colleagues found that those with mild loss had two times the increased risk compared to their normal hearing peers. As the amount of hearing loss increased, so did the risk of dementia. Those with hearing loss had a risk factor five times greater than those with normal hearing. This study talks about risk.

What exactly does that mean? So, just to review current terminology, risk is something that increases your chance or probability of something happening. For example, I know that if I get sunburnt every summer, my risk of developing skin cancer will increase. It doesn't necessarily mean that I will, but I have increased my chances. The same goes for hearing loss and dementia risk.

We know that you are at a greater risk of developing dementia if you have unaddressed hearing loss. However, this risk is from a population perspective and an individual's risk may vary depending on multiple other variables and it does not ascribe a cause effect relationship.

Association quantifies the statistical relationship between exposure and disease outcome. In this case, the exposure is unaddressed hearing loss and the outcome is dementia. We know there is a strong association, but we cannot say that hearing loss causes dementia.

Causation is when we know the exposure produces the effect. For example, too much exposure to loud noise causes noise induced hearing loss. We know this is a direct cause effect relationship with that context, let's look at this publication. You're likely familiar with this diagram published in the Lancet in 2017 and again in 2020. This is the newest version from July 2024.

The diagram outlines modifiable risk factors for dementia across the Life course, with 13 different risk factors totaling 45%. The other 55% are due to factors that we cannot reduce risk, things like genetics. Essentially. If we could control for all of these risk factors, we could reduce our risk of developing dementia by 45%. The most consequential of these risk factors are age related hearing loss and high LDL cholesterol, each contributing to 7% modifiable risk.

This means that proper management of hearing loss could reduce the number of dementia cases. Given that we know hearing loss significantly impacts the aging population, and we know that risk of dementia increases as we age, this reinforces that unaddressed hearing loss is important to address. Of note, also listed are depression at 3% and later in life, social isolation at 5%, which are also associated with untreated hearing loss. Of course, it's important to note that these are associations and risks and their meaning can vary depending upon the context. These findings were based on population data, not at an individual level.

And again, they do not explain causality.

Naturally, your next question may be we know hearing loss is a risk factor for developing dementia, but do hearing aids act as a protective factor. First and foremost, it is unequivocal that hearing well is important for your patient's overall well being and hearing aids can significantly improve their listening abilities and communication. But the question everyone once answered do hearing aids reduce the risk of developing dementia? What does the research actually suggest? There has been some evidence in past studies around the beneficial effect of hearing aid use, but these studies did not answer the

question fully as there were limitations of study design, e.g.

differences or flaws in the way cognition was measured, cross sectional or short follow up, and research biases. So we knew that hearing aids could have a short term beneficial effect on cognition and could mitigate the risk of cognitive decline. However, we needed a more powerful study design to fully understand if hearing aids can be a preventative intervention. We did not yet have the evidence to support that until now.

As we talk about the most recent research and what makes it so impactful, I think it's useful to remember the hierarchy of evidence at the base of our pyramid. We have expert opinion, case report, and case control study. These can be a good starting point for identifying if further research is needed. Because of the relatively small group of cases, they are not seen as robust. They also look retrospectively above those and what we've been missing until recently are a cohort study and randomized control trial.

A cohort study is an observational study, meaning the researchers simply observe and do not intervene. Cohort studies recruit and follow a group or cohort of participants who share some common characteristics and then compare outcomes with a cohort that does not share that characteristic. Randomized controlled trials are structured, comparative controlled experiments in which two or more interventions are studied across groups of individuals who are randomly assigned to receive the interventions. The randomization reduces selection bias and other judgmental errors. Although randomized controlled trials are in the second tier of the pyramid above, it is not unusual to find hierarchies which place them in the top level.

While each of these study types has a time and place, today we want to highlight two recent studies in the field of cognition and hearing a strong randomized control trial and or a cohort study when it comes to landmark studies, the ACHIEVE study stands out as one that you should know about. The ACHIEVE

study, which stands for Aging and Cognitive Health Evaluation in Elders, is a randomized control trial that was published in the Lancet in July of 2023. The trial aimed at finding an answer to the question whether comprehensive hearing care, including a hearing aid fitting, helps to mitigate cognitive decline in an elderly population. This study represents the first longitudinal randomized control trial testing this hypothesis over a three year period comparing hearing intervention with a successful aging program in two different cohorts.

Participants in the ACHIEVE study came from two distinct study populations, a group of adults who were already participating in a heart health study and a group of healthy volunteers who were newly recruited from the community. The study had a sample size of 987 participants. The 238 participants who came from the Heart Health study were on average older and had more risk factors for cognitive decline than the 739 new Healthy Community volunteers. The participants were randomly assigned to a group that received hearing intervention of comprehensive hearing care including a hearing aid fitting and the control group which received health education only. There was a three year follow up when both groups of participants were analyzed together.

The hearing intervention was not better than the health education control on slowing declines in thinking and memory abilities at the end of the three year study. However, when both groups of participants were analyzed separately, researchers found that the effect of hearing intervention differed significantly between the two groups of participants. Let's take a look at what each of the groups included. First we'll look at the hearing intervention group.

Hearing intervention included an individual needs assessment, engagement in shared informed decision making, goal setting, as well as development of self management abilities for hearing loss and communication in real world settings. During the first session of the ACHIEVE hearing intervention, each participant identified individualized goals for hearing improvement and those goals drove the

focus of the intervention. Hearing aids, hearing assistive technologies and related supplies were donated by Phonak. All participants were fit bilaterally with receiver in canal hearing aids coupled to domes and a breakdown of the device's fit can be seen in the pie chart. Electroacusis analysis was conducted throughout the study to ensure the hearing aids were within ANSI standards and acceptable tolerances using an audioscan VeriFit2 hearing instrument verification system.

Real ear measures performed on all participants verified match to target within national acoustics laboratories nonlinear NAL NL2 prescriptive fitting formula. Participants were provided with at least one hearing assistive technology. Hearing assistive technologies were used to stream the television to the hearing aids, stream cell phone or other Bluetooth electronics to the hearing aids, stream a remote microphone to the hearing aids and or were used as a remote to control for volume and or program adjustments. The first subjects were fit in 2018 at the time belong was the current Phonak technology.

Communication partners are considered key to successful intervention for older adults with hearing impairment. In this study, communication partners were invited to join the study and asked to contribute data related to their own quality of life and their observations of the effects of the hearing intervention on the participant. They were encouraged to attend hearing intervention sessions as part of the intervention.

Next, we'll look at the health education group. The Health Education Control Intervention, also referred to as the Successful Aging Intervention, adapted content and protocols from the 10 Keys to Healthy Aging Program, an evidence based program that gives older adults tools to reduce the risks of chronic disease and increase the likelihood of healthier old age. The premise underlying the Successful Aging Education program is that many older adults face multiple chronic medical conditions. A holistic approach to health endorsed by the 10 Keys program provides a range of opportunities for participants to engage in the self management of their medical conditions and overall health. Like the hearing

intervention, the Successful Aging Education was delivered across four sessions over the course of eight to 10 weeks.

Participants in the successful aging group received information on health related topics of their choice with opportunities to practice skills and learn about the importance of preventing disease and disability to further enhance retention and perceived benefit. Each session also included five to 10 minutes of active upper body extremity stretching from the Lifestyle Interventions and Independence for Elders program.

Hearing intervention benefited the Heart Health Study participants the most. On average. These participants again were older and had more risk factors for cognitive decline. When we look at this group, the hearing intervention reduced cognitive change by 48% over three years compared to the control group. Again, Heart Healthy study participants still older, still more at risk factors showed a decrease in memory if they were not actively receiving intervention.

In the newly recruited HEALTHY volunteer group, hearing intervention had no effect on reducing cognitive decline within three years. Why did we not see the effect of hearing intervention in the Healthy volunteer group? Investigators believe that the effect of hearing intervention on reducing cognitive decline was only apparent in the Heart Healthy study participants because this group had a faster rate threefold faster of cognitive decline over the study period than the Healthy Volunteer group. Thinking and memory abilities changed more slowly in the newly recruited Healthy volunteer group. When thinking and memory abilities change slowly, it's harder to see if hearing intervention can further slow any declines in these abilities.

Investigators believe that the hearing intervention could also have beneficial effects on reducing cognitive decline in the Healthy volunteer group. These effects just may take longer than three years to see. Our primary takeaways here are that treating hearing loss in older adults at increased risk for

cognitive decline slowed down loss of thinking and memory. The other landmark study that's been in the media lately is the ENHANCE Study. ENHANCE stands for Evaluation of Hearing Aids and Cognitive Effects.

This is a prospective cohort study out of Australia. This study investigated whether remediation of hearing loss in older adults with hearing aids will delay or prevent cognitive decline.

It had 160 participants that received hearing intervention including hearing aid fitting that were followed for three years. Their performance on a computerized battery of cognitive tests was compared to 102 participants of the Australian Imaging Biomarker and Lifestyle Study of Aging, a study in which participants did not use hearing aids.

Key findings showed that comparatively, cognition at the three year follow up was stable overall for hearing aid users but declined for the non hearing aid user group, suggesting that treatment of hearing loss with hearing aids may delay cognitive decline. The findings also suggest that referral to hearing screening and rehabilitation may assist with delaying or minimizing cognitive decline in older adults.

This new research provides more compelling support for hearing aid use. However, it is important that we do not take this research as meaning that hearing loss causes dementia or that hearing aid use can prevent dementia. We can still not talk about causality.

Also, it is important to note that both studies used best practice audiological management in their protocols. The researchers recognized that hearing aid use alone was not enough. For example, in the ACHIEVE trial, hearing intervention included hearing aids and hearing assistive technologies like remote microphone systems, person centered goal setting, hearing related psychosocial adjustment, counseling, self management training for participants, prioritized listening goals as well as comprehensive hearing aid orientation. Participants also receive counseling on how to best manage

difficult hearing situations. By understanding that risk in different contexts can mean different things, you can help your team understand the latest research and equip them with the confidence to talk about the benefits of hearing technology beyond hearing loss.

With this knowledge, you can also help your patients understand the meaning of risk within the context of population health rather than an individualistic layperson risk so they are accurately informed. We know from the evidence that hearing loss is a modifiable risk factor for dementia. However, the pathways that explain the interplay between hearing loss and cognition remain unclear. Because risk does not mean causality, we cannot say that hearing loss causes dementia, but we can say that treating hearing loss not only has a positive impact on overall well being, but can have protective effects for the brain. Translating these research findings for patients could help them move forward and take action if there is a hearing loss diagnosis.

Now that we understand some of the recent research in cognitive health, let's look at what you can do in your audiological care and counseling to address cognition.

Addressing cognition with your patients truly benefits everyone. For you as a provider, integrating cognition into your services will allow you to offer differentiated personalized care compared to other providers, in turn delivering better outcomes, promoting and translating evidence around the link between hearing loss, cognition and hearing aid use will bring more people into your practice, people who are willing to take action. By addressing cognition, you'll change the conversation around hearing health so that it includes well being. By prioritizing cognition, your patients will have accurate information for decision making and be empowered to take action and invest in their cognitive health and well being, which is a benefit that extends beyond just hearing better.

When we're opening and having these conversations, Bluestein and colleagues give some helpful recommendations regarding phrasing. They state, we favor constructive messages that minimize harm

while motivating people to act. One such message might be hearing better can help you think better. We would omit mention of dementia when addressing the hearing challenges faced by millions. Think of how much better our patients would feel receiving a positive message like that when you are counseling them.

When we talk about following best practice guidance, there is good news. Expert guidance is available in a new publication Promoting Health and Cognitive Health and Audiological Rehabilitation for the well being of Older Adults. The recommendations can support you in addressing hearing loss and cognition in your older adult patients to assist with maintaining their functional ability and supporting them in living an active and socially engaged life. The authors are worldwide experts working with the editor, Professor Julia Sarant.

There are several evidence based recommendations for hearing care professionals working with patients who have hearing loss with cognitive decline. Things that you could implement right away in the clinic. Today we're going to focus on five of those. We'll list them first, then go into more detail for each. Listen and respond, modify your clinical practice, involve family inpatient care, offer a holistic solution and provide person centered care.

Let's go through each of the five recommendations with some examples. Again, let's go back to the beginning. Imagine that we have that patient John, who's coming in with his wife Pam to listen and observe. You could watch the patient and observe carefully by listening to what they say and the way they say it. The following question could be used during the past 12 months, have you experienced confusion or memory loss that is happening more often or is getting worse?

In the case of John, he mentioned that he has noticed some cognitive changes. It would be worth asking more questions and observing his behavior. Use your patient's own words. For example, with John, he said his memory or his ability to think. Take notes and ask for specific examples.

The conversation can start as early as your intake form. Incorporating a simple screening question about cognitive problems to identify if a patient needs to be referred for further assessment is well within our scope of practice. The WHO proposes something like do you have problems with memory or orientation, such as not knowing where one is or what day it is. The Gerontological Society of America offers during the past 12 months, have you experienced confusion or memory loss that is happening more often or is getting worse? A screening question like this gives you as a provider a chance to both listen and respond when discussing cognition with your patients.

Here are five recommendations. Number one Focus on your patients needs. Ask about the situations where it is most important that they hear better so that you can focus on their specific goals. Match the language they use. If your patient says they are interested in learning more about how they can support their brain health, use the term brain health in your conversation.

Use positive framing. Choose positive statements such as hearing care supports brain health or hearing care supports healthy aging.

Focus on the benefits of comprehensive care. Discuss the benefits of treating their hearing loss rather than just the benefits of hearing aids. For example, let them know that they will also benefit from person centered goal setting, counseling and training on how to manage their hearing aids. Don't be afraid to talk about research in both a simple and accurate way. Again, for example, hearing better can help you think better.

To modify clinical practice, you can use communication strategies and modify the physical environment. For example, after John and his wife Pam report cognitive difficulties, you could reduce noise in the room, ensuring a relaxed environment when speaking. You can use shorter, simple sentences and give John more time to respond when testing. You could be flexible and abbreviate

testing if you see that he is having challenges. To ensure family centered care, there are several things you could start doing right away, including training your front staff to always invite a family member when booking appointments, setting up the physical environment so that family are comfortably included in the conversation.

They're at the table rather than having a chair that's in the corner of the room and starting the appointment by letting the patient and the family member know that input will be sought from both of them. To offer a holistic solution that incorporates cognitive well being, you can ensure all interventions and support approaches are related to the individual and family needs. In the case of John, you could ask him about his lifestyle to ensure your interventions support his needs.

A holistic approach also means having a referral network of professionals to refer so that you can pass along that information to your patient. This means you could provide John with the name of a specialist who can formally assess his cognition. In all of this, we want to be sure to provide person centered care, keeping in mind John's specific needs, strengths and lifestyle for personalization. These are some examples of what you could do tomorrow to begin addressing cognition in your daily practice. If you have many changes you'd like to implement, start with one or two and build from there to switch gears just a little, we're going to talk about a few Phonak features that address cognitive well being.

We're proud to have a variety of features that research shows decreases listening effort. Some of those features include Adaptive Phonak Digital 3.0, Dynamic Noise Cancellation, Speech Enhancer Speech Sensor, our CROs technology as well as ROGER technology.

The latest research shows us that with Speech Enhancer activated on strong, our end users can expect to be less fatigued at the end of the day. This is thanks to less listening effort. In fact, 34% less listening effort when listening to soft speech 2 meters away from them and 45% less listening effort when listening to someone speak from another room. In this situation, participants again could use up to 34 to

45% less listening effort.

An even newer study we know shows decreased fatigue at the end of the day and improved memory and comprehensive performance. We know based on data logging that clients spend at least 68% of their day in listening situations that are classified as calm situations. Let's hypothesize a bit here. What could your patients do with their day because of being less fatigued? Would they feel like potentially involving themselves in some sport or physical activity?

Would they go to that social event because they don't feel so tired? We know these are real possibilities that could have a very positive impact on their overall well being. Next, we'll highlight the benefit of Spheric speech clarity enabled by Deep Sonic. Spheric speech clarity receives as input a full spectrum of 64 frequencies. This spectrum contains the full audio signal information so the further processing can work with maximum precision.

Utilizing the Deep neural network with 4.5 million parameters, the DNN on the deep sonic chip computes a 64 frequency mask that separates speech from noise which is then applied to the audio signal. The result is a clean speech signal. Test results indicated that with spheric speech clarity on, participants could withstand 2.9 dB poorer SNR without a corresponding increase in subjective listening effort compared to spirit speech clarity off. This means that patients can be in noisier environments without having to work harder.

And here we see that Roger technology improves speech understanding by up to 61% and 75 DBA of noise when compared to users wearing only hearing aids in a group conversation. Think of how often our patients are in this exact situation. At family meals, out at restaurants, socially engaged in parties. What a difference this could make in listening effort and patients being able to keep doing the things they love.

To help with those conversations, we've developed resources that are available to you. The Conversation Starter Guide has reminders for you as well as answers to common questions. The Cognition Flyer is a patient facing and is intended to build interest in cognition. We have a host of tools to support you. However you want to integrate cognition into your practice, reach out to your local Phonak team.

For those. You can Also check out phonak.com cognition for more information on both the Achieve and Enhance studies that we discussed earlier in the presentation.

Additionally, we have brochures both in English and in Spanish, as well as community seminars that you could present to your patients and more importantly, physician marketing that you can go out to your local referral sources again. To gain access to these, please reach out to your local Phonak representative.

We're going to review some key takeaways before we wrap things up today. We know from evidence that hearing loss is a modifiable risk factor for dementia. However, the pathways that explain the interplay between hearing loss and cognition still remain unclear. Hearing aid features that reduce listening effort can have benefit on cognitive load because risk does not mean causality. We cannot say things like hearing loss causes dementia, but we can say that treating hearing loss not only has a positive impact on overall well being, but can have protective effects for the brain.

We know that our clients need good hearing in order to make social connections. A better social life is related to a longer life, it's related to better quality of life, and it's related to maintaining cognitive skills. As we grow older, social engagement, along with the use of some form of hearing technologies, may serve a protective function for cognitive health. Again, it's also very important to make sure we're using positive language. We know that a lot of what's out there can sometimes cause patients to feel fear around hearing loss and what that means for overall cognitive health.

It's important for us to be responsible in our messaging to make sure that we use those positive phrases like hearing better can help you think better so that they are encouraged to pursue amplification rather than feeling like they need to pursue amplification from fear based messaging. Phonak is established as a leader in promoting holistic care through our well hearing as well being initiatives over the last four years. We are the ideal partner to help you leverage this well being trend that focuses on healthy aging to change the way you counsel and discuss the benefits of hearing technology beyond just hearing loss to differentiate your services with more holistic care and to strengthen your patients outcomes and advance hearing health care. If there's any way that we can provide you additional support, please let us know because we recognize that together we change lives. Again, please reach out to your local Phonak representative if you have interest in any of the resources displayed earlier in the presentation.

Lastly, you should have access to this, but I'm just going to pop up the list of references for the various studies that were discussed throughout the presentation.

All right, thank you so much for your participation. That brings us to the end. It does not look like we have any questions, so again, thank you so much for for your time and attention today. Have a great rest of your Monday.