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Variability in Hearing Aid Outcomes and the Role of Mild Cognitive Impairment

Presenter: Hannah Glick, AuD, PhD, CCC-A

It's my pleasure to welcome back Doctor Hannah Glick. She's coming to us from the University of Northern Colorado. If you'd like to learn more about Doctor Glick, you can read about her bio on the course registration page, but at this time I'll hand the mic over to you. Doctor Glick, thank you so much for having me today. I'm really excited to be with you all today.

I am a clinical audiologist and cognitive neuroscientist and currently serving as a professor at the University of Northern Colorado. I have such a passion for working with older adults with hearing loss, and I'm interested in better understanding the link between hearing loss and cognitive decline so that we can improve outcomes for this very special population. So I will take questions throughout the webinar. Some of the questions I might save until the end. So feel free to type your questions into the Q throughout today's webinar and I'll try to catch them as we go.

But there will be some questions where I might skip just because your questions might come up later on in the presentation or allow for us for some discussion at the end. Here are my disclosures and here are the learning outcomes for today's session. So, after this course, participants will be able to discuss the impact of hearing treatment on cognitive function in adults with hearing loss, differentiating between those at risk and not at risk for mild cognitive impairment to assess the influence of hearing treatment on depression levels and self perceived satisfaction and benefit among adults with hearing loss, distinguishing between those at risk and those not at risk for mild cognitive impairment and finally, to explain the importance of considering an adult patient's baseline cognitive status in clinical decision making and the hearing treatment process, elucidating how such understanding enhances the efficacy and the appropriateness of interventions.

So, before we get started, I always like to start with the inspiration for my work. I think that behind every clinical research endeavor lies a narrative or a story, often fueled by

personal experiences that echo beyond the walls of a laboratory. So behind the story of my work is my grandmother. She experienced hearing loss like many people beginning in midlife, and eventually she started showing signs of dementia. I was able to see the toll that her hearing loss and her cognitive decline took on her life, both cognitively, emotionally, and psychosocially.

And as I walked with my grandmother through the end of her life and reflected after she passed, I've continued to wonder what support could have been provided earlier that could have prevented or delayed the onset of dementia, or what types of interventions or supports could have been provided that could have improved her quality of life as she aged. So, you know, she's really the source of inspiration for the work and what drives me to seek to answer some of these questions.

So today we're going to start with an overview of mild cognitive impairment, or MCI, and dementia. We're going to differentiate between these two terms. We're also going to talk a little bit about what the screening, referral, diagnosis, treatment, and management of MCI and dementia looks like. Although we as audiologists are probably involved in only a tiny or small part of the process, namely the screening portion, I think that with a more solid understanding of this process, it provides some context that allows us to be our patient's advocate and to be a better part of a multidisciplinary team. I also think that cognitive screening can truly help us to better support our patients from an audiological perspective, after we talk a little bit about what is MCI, what is dementia, what does this process look like for screening, diagnosis, and intervention?

We're going to talk a little bit about the link between MCI and dementia. These are two very hearing loss, and MCI and dementia are very comorbid. And we're going to talk about this in terms of implications from a public health perspective. Then finally, we're going to dive in to some new preliminary data looking at holistic health outcomes in

older adults with hearing loss who are at risk for mild cognitive impairment. How this knowledge might impact audiological treatment and intervention.

Let's go ahead and dive in. I put this in big letters and bold in red because I think this is really important to start out. So, contrary to popular belief, not all older people develop mild cognitive impairment or dementia. It's not an inevitable part of aging and getting older. I want to be clear that MCI and dementia are distinct and different from typical aging.

So to help visualize this, I've got a nice graph here. This first graph shows expected declines in cognitive function with age. We've got age on the x axis and cognitive decline on the y axis. You can see in typical aging that in the very advanced years, there is some decline in cognitive performance. While it's true that there are some very specific areas or domains of cognition that decline or get worse with age, these declines in typical aging are very small and very gradual changes.

It's quite distinct from what we see in mild cognitive impairment and dementia in typical aging. The areas of cognition that we typically will see decline very gradually include things like processing speed. We get a little bit slower in terms of our reaction time and decision making with advanced age things like complex attention. So our ability to do divided attention tasks where we're trying to do two things at once, that gets a little bit more challenging with typical aging, then very small aspects of memory, language, visuospatial, and executive function abilities can also decline with typical aging. But this trajectory of typical aging looks very different from what we see in mild cognitive impairment, or MCI.

Here in this graph in blue and yellow, you can see at first there's a typical, small, gradual decline in cognitive function with age, but then we start to see this sharper decline. This represents the stage of mild cognitive impairment. The term mild cognitive

impairment represents an atypical transitional stage between typical aging and dementia. So in this stage, what we see is measurable impairments in cognitive performance that is worse than age and education matched peers. So the gray dotted line represents typical aging.

But at this stage, there's no major impact of the cognitive impairment on daily functioning. In the MCI stage, often the patient themselves, the individual or a family member or a loved one or a skilled clinical provider, will notice there's been a change in the individual's cognitive abilities. But even though they're noticing some small changes, the cognitive impairment at this stage is not really impacting a person's activities of daily living. They might be a little bit more forgetful than they used to, they might take a little bit more time to do a task, maybe perform a task less efficiently, but they're still able to perform those activities of daily living.

A portion of adults with MCI will continue in a downward trajectory and eventually go on to be classified as having dementia. Dementia is characterized by a significant impairment in cognitive function compared to adults of the same age and educational level. However, with dementia, the key difference here is that the cognitive impairment at this stage is now negatively impacting the individual's daily functioning. You can see a much sharper decline in red here and at this stage, the cognitive impairment has begun to affect daily functioning. Now, the impact of the cognitive impairment on daily functioning might range from mild to severe and might progress or worsen over time.

In the very mild stages of dementia, a person might have difficulty performing instrumental activities of daily living required for independent living. So they might have some difficulty cooking or driving, cleaning, taking care of finances is a big one. In the more moderate stages, the individual may have difficulty performing more basic activities of daily living required for their physical needs, such as dressing, personal hygiene, and feeding. And in the severe stages, the individual might have difficulty

performing most of the activities of daily living and might be quite dependent on caregivers or family for support with these kinds of activities.

Now, before we go on, I've been using the terms mild cognitive impairment and dementia. For the purposes of this presentation. I'm going to continue to use those terms. Those are terms that tend to be more widely known and understood, especially by our patients. But it's important to note that the current DSM five criteria, the Diagnostic and Statistical Manual of Mental Disorders that's published by the American Psychiatric association, that actually provides the criteria for classification and diagnosis of mental disorders.

It does not include MCI as a separate category from dementia. And in fact, the DSM five replaces the term dementia altogether in favor of new diagnostic categories.

While this might seem confusing and you might be wondering, why did they do that? Why did they replace the term dementia with the new DSM five criteria? There's actually some reason behind it. The term dementia is commonly associated with degenerative changes exclusive to older adults, often with the assumption that the underlying cause is Alzheimer's disease. The new DSM criteria takes the old term dementia and it replaces it with new categories, major neurocognitive disorder and minor neurocognitive disorder.

By not using the term dementia, these categories are actually meant to be more inclusive for diagnosis to adults who are younger, who are not necessarily in that advanced stage of age, but maybe in midlife, as well as adults who have different underlying etiologies that are not Alzheimer's disease that are causing their cognitive impairment, such as mild traumatic brain injury or traumatic brain injury.

Just briefly, I'm going to just touch on and clarify these new diagnostic categories in the new DSM five. Minor neurocognitive disorder is characterized by modest decline in cognitive function compared to a previous performance, as well as impairment in at least one cognitive domain. But with minor neurocognitive disorder, the cognitive impairment has not negatively impacted activities of daily living. In other words, you can think of mild neurocognitive disorder as mild cognitive impairment, or MCI, because, as we previously discussed, MCI is described as an impairment in cognitive function without major impacts on activities of daily living. It's important to note that in the DSM five, the cognitive impairment, in order for it to be classified as minor neurocognitive disorder, it can't be attributed exclusively to delirium, a disturbance in attention and awareness, or another disorder such as a mental or substance use disorder.

In contrast, major neurocognitive disorder, or major NCD, is characterized by a significant decline in cognitive function from previous levels of performance in one or more cognitive domains, but we do see that the cognitive impairment is interfering with activities of daily living. You can think of this category as adults living with dementia. Just like minor neurocognitive disorder, the cognitive impairment can't be attributed to delirium, which is a disturbance in attention and awareness, or another type of disorder, such as a mental or substance use disorder.

In terms of cognitive domains, I won't spend too much time on this slide, but here are the cognitive domains described by the DSM five. These domains include things like executive function, which is higher level cognitive abilities things like planning, decision making, problem solving, and cognitive flexibility complex attention, which is the abilities to sustain attention and concentration over a long period of time, as well as the ability to divide attention between multiple tasks language, which involves comprehension of spoken and written language, including vocabulary, grammar and semantic knowledge, learning and memory. So the acquisition of the acquisition,

retention, and retrieval of new information, as well as the ability to remember past events or experiences perceptual motor function, which involves integration of sensory information with motor responses, including skills such as coordination, motor planning, and visuospatial processing and social cognition, which involves the ability to perceive, interpret, and respond to social cues and interactions, including empathy, theory of mind, and social judgment. So, again, for either major or minor neurocognitive disorder or MCI or dementia diagnosis, there must be a significant impairment in at least one of these domains.

Now, we've talked a lot about cognitive impairment today, but I think it's important to also emphasize that there are other behavioral symptoms of mild cognitive impairment and dementia. Here are just a couple up on the screen. So, things like depression, anxiety, feelings of apathy, irritability, changes in nighttime behaviors, changes in appetite and eating, certain types of motor behaviors, movement differences. These are other behavioral symptoms that may coincide with and dementia. And in fact, these behavioral symptoms can sometimes even precede the cognitive impairment itself.

So I think this is important just to be aware of as we're interacting with patients and talking with family members and caregivers.

Now, as the audiologist, we're not going to be the ones that are diagnosing dementia or the different types of dementia. But I think having a basic understanding of these different types can be important.

We can think of dementia as an umbrella, and there are different types of dementia that fall underneath that umbrella. Each of these different types of dementia has a different underlying cause or etiology, sometimes multiple different causes or etiologies. Important things to know is Alzheimer's and vascular dementia are the two most common types of dementia. Alzheimer's disease is characterized by the buildup of

abnormal proteins in the brain, so beta amyloid plaques and tau tangles. Vascular dementia is caused by reduced blood flow to the brain, typically due to stroke or other types of small vessel diseases.

Alzheimer's and vascular dementia are oftentimes comorbid, and they actually have very similar behavioral profiles in terms of symptoms in the early stages of Alzheimer's or vascular dementia. Often some non cognitive symptoms that we might see are things like depression, anxiety, irritability and agitation. In the later stages, we tend to see things like psychosis, appetite changes, sometimes even aggression can be more common. Lewy body dementia is the third most common type, and under Lewy body dementia there are actually three different subtypes. There's dementia with Lewy bodies, Parkinson's disease, dementia, and a Lewy body variant of Alzheimer's disease.

Depending on the specific type of Lewy body dementia, there may be movement disorders associated with the diagnosis.

Sometimes we see different types of non cognitive behavioral symptoms as well, things like anxiety and sleep disturbances, irritability and apathy. Because there is a lot of overlap between the different Lewy body types and other disorders like Alzheimer's and Parkinson's disease, lewy body dementia is often misdiagnosed. Had some patients that I've worked with in the past who have eventually gotten a diagnosis of a Lewy body dementia, and I've heard that it can take a long time, multiple different specialists to reach an accurate diagnosis. Frontotemporal dementia is a less common type and there are two different variants. Under frontotemporal dementia, there's a behavioral variant and a language variant, and frontotemporal dementias are caused by degeneration to the frontal and the temporal lobes.

For the behavioral variant, apathy is very common. We see some appetite changes, some impulsivity. For the language variant, early changes might include changes in language abilities, but less other behavioral types of symptoms. So while you as the audiologist aren't going to be involved in diagnosing dementia or identifying this specific subtype, I think it is helpful to know these types and to recognize and appreciate that the cognitive changes are not the only behavioral symptom associated with dementia, and that the behavioral symptoms that we see may vary depending on the dementia type. So in other words, an individual that has a diagnosis or will eventually be diagnosed with Alzheimer's disease versus a patient that may eventually be identified as having a Lewy body dementia, they may actually have very different behavioral presentations of their symptoms.

So it's a bit more complicated than just evaluation of cognitive function. In making the diagnosis as you are watching and listening, if you've got questions, please feel free to type them into the q and a. I'll monitor that throughout our time today and try to answer those as they come up. So, kind of wrapping up. Introduction to MCI and dementia in terms of screening audiologists are uniquely positioned to be performing cognitive screening in many healthcare systems, including the United States.

Primary care providers, or pcps, often serve as the initial point of contact for adults with concerns about MCI or dementia. However, we know that there's a national shortage of primary care physicians in the United States, United States in the first place, and that there are disparities in healthcare in which some older adults don't even have access to a primary care physician. And furthermore, there's not a lot of time during these primary care physician visits, or even specialized physician visits, to allocate to cognitive screening and to discuss with patients or family members concerns about an individual's cognitive abilities. So, just to kind of put this in context, the average primary care physician visit is 21 minutes, 20 minutes, sorry, 21 minutes.

For a specialized physician, that's not a lot of time, and that is not even the amount of time actually spent with the physician themselves.

So if we compare this to audiology, where an audiologist, on average, has about 1.2 hours for counseling over the adult audiological treatment process, the availability, the amount of time to perform cognitive screening, and to have these conversations with our patients and family members and caregivers, it's much more available. So not only do we have more time as audiologists to perform in cognitive screening during our visits, but these conversations about cognition also kind of more naturally come up during audiological visits, oftentimes. I know that when I've been providing care to patients, there's a lot of conversation between myself and the patient and family members and caregivers about the person's communication abilities, about the individual's communication goals. And we know that communication, speech understanding, particularly in noisy environments like background noise, is strongly influenced by cognition. So we have this captive time, and we already have some, you know, common language and discussion that we're having about cognition in our typical patient visit flow.

It is important to know that a cognitive screening is not a cognitive evaluation. It is under the scope of practice for an audiologist to perform a cognitive screening, but it is outside the scope of practice for an audiologist to perform a comprehensive cognitive evaluation. A cognitive screening is a standardized measure, usually just one test, that is used to quickly identify individuals who might have a cognitive impairment and to determine need for further referral and evaluation. In contrast, cognitive evaluation involves comprehensive testing of cognitive function using several standardized measures. Results of a cognitive evaluation will provide more detailed information about a person's cognitive abilities across different domains of cognition that can be used for diagnosis and for treatment.

And again, cognitive evaluation is outside the scope of practice of an audiologist, but it can be performed by a neuropsychologist, a geriatric psychologist, a geriatric psychiatrist, geriatricians, neurologists, psychiatrists, clinical psychologists, and even speech language pathologists. There was a question in the chat about Rbans, which is a test that is used by slps. This test is a battery of standardized tests to evaluate cognitive decline or cognitive improvement, so it would fall under the evaluation category. It is not a screening test. It is a diagnostic test that's used for evaluation.

So here are examples of some commonly used cognitive screening tools. There are a bunch up here, and this is not an exhaustive list. So typically for a cognitive screening, just one test is selected. So one of these up here on the screen, the cognitive screenings are usually very short. They take about five to ten minutes to administer, and they're standardized, meaning that they've been validated for their psychometric properties in terms of sensitivity and specificity.

I personally do not endorse any one specific cognitive screening measure. I think it depends on your level of training, your comfort, your experience, and the specific needs and time constraints within your practice. So most of these cognitive screening tools are available online for free. So in red on the screen, the asterisks indicate which screening tools are available for free. The one that is not free, the cognaview thrive.

This one is an automated test. So it's something that the clinician or the audiology assistant would not administer, but it would be performed automatically by the patient, automated by the patient, through a computer. Essentially, something that is really important, I think, to know is that only a few of the commonly used cognitive screening tools have been adapted or designed specifically for use in adults with hearing loss. So even though I don't endorse any one particular cognitive screening measure, I do think if you're an audiologists doing cognitive screening, particularly on patients who have hearing loss, that is untreated, that it's important to think about the audibility factor. We

know that hearing loss or lack of audibility can affect performance on cognitive tests, especially if the test involves verbal presentation of the test instructions.

So on the screen here, the red asterisks indicate which cognitive screening tools have been specifically adapted or designed for use in individuals with hearing loss. So there is a hearing impaired version of the moca, the Montreal cognitive assessment. It's called the Mocha H, and it uses written instructions alongside verbal instructions, reducing the reliance of the reliance on verbal presentation. In the case of hearing loss, it is also validated for delivery through telehealth. There are also paper and app based versions of the moca available.

cognaview is an automated, computer based test that doesn't require any verbal delivery of test instructions.

If you are using cognitive screenings in your practice, but maybe not using one of the versions that have been adapted for hearing loss, here's some advice. If you choose not to perform a cognitive screener that's compatible for use in individuals with hearing loss, I would recommend testing with a pocket talker during administration of the cognitive screening if you're performing the test before, like a hearing aid fitting, for example. Or you could perform the cognitive screening acutely on the day of hearing aid fitting or cochlear implant activation. This way, you can be much more confident that the screening test results are accurate and that the patient's performance can't be attributed to their untreated hearing loss. So if you've got more questions about that, feel free to type those questions into the chat.

But those are just some suggestions when thinking about integrating cognitive screening into your own practice.

Here's just an example script of what I tend to say to patients before beginning a cognitive screening. So I might say, okay, the next test we're going to do today tells us about how your brain processes information. Your brain's ability to process information plays an important role in communication. Understanding how your brain processes information can help shape your hearing. Healthcare plan do you have any questions before you begin?

You'll notice here that I don't use the term dementia or mild cognitive impairment, or even the word cognitive. What I've found is that the idea of cognitive screening can be a little bit intimidating for some older adults. They may actually get a little bit anxious when you tell them you're going to be putting them through a cognitive screening. And so I tend to approach this more from a brain processing perspective, which is essentially what cognition is, but I tend to put it in a little bit more positive light and then to explain why it's important how this information is going to be used to shape the hearing healthcare plan after I perform the cognitive screening, one of the first things I will say to patients is I'll just ask them an open ended question about how the test went for them. A lot of times, especially if this is early stage cognitive decline, the patient is going to be typically aware of their performance.

They may recognize that they really had difficulty with one or several of the tasks on the cognitive screening, and I just go ahead and validate those feelings. I might say, yeah, that section was really difficult for you. This is a challenging test. After I perform the cognitive screening, I will typically wait to score the cognitive screening until after the patient has left again, just not to add additional anxiety for the patient. So I might say to them, I'm going to score the screening after our visit today, after I'm done scoring the screening, I'd like to share the results with your primary care physician, if that's okay with you.

And then I might steer the conversation to discussion of the patient's. My recommendations for the patient in terms of their hearing health. So, not hyper focusing on cognition, but really tying in the cognitive piece to other aspects of the patient's life, including communication difficulties, the audiological evaluation that I just performed, and those hearing test results.

In terms of communicating your cognitive screening results, you want to make sure that you share the cognitive screening results with the patient's primary care provider. I like to go an extra step further. I don't just share the results with the primary care provider, but I actually talk with my patient and encourage them to discuss the results with their primary care provider and to really voice any concerns that they might have. For example, if the patient really struggled on a particular part of the cognitive screening and they recognize that themselves, I would just validate the patient's concerns and then encourage them to speak about that difficulty with their primary care provider. I'll also follow up with the patient at their next visit, so I'll ask the patient, hey, did you have a chance to talk with your primary care provider, and do you know if they received your cognitive screening results?

Following up can be really important to making sure that that conversation is taking place in the medical home with their primary care provider. Elizabeth asked if I share the results of the cognitive screening with the patient as well as the PCP. Yes, I will typically share those results with the patient. I'll typically tell them what their score was, their global score, and then what the cutoff score was. Remember that a cognitive screening is just a screening.

It doesn't tell us if someone has mild cognitive impairment or dementia, but just if a person may be at risk for mild cognitive impairment or dementia. Basically, it tells us, do we need to refer the patient back to their primary care provider or to another specialist for further testing? That's something to also emphasize with your patients as

well, so I'll often hear audiologists say, well, I don't think I should perform cognitive screening because it's the primary care physician's job. If that's the patient's medical home, why isn't the primary care provider doing the cognitive screening? Well, it's a good question, but the reality is that primary care physicians are simply not screening.

We know there's a shortage of primary care physicians. There's limited time during those appointments. But the reality is more than 50% of adult patients with dementia have not received a clinical cognitive evaluation by a physician. In fact, physicians are often unaware of cognitive impairments in more than 40% of their cognitively impaired patients. And as many as 60% of cases of dementia go undetected globally.

And dementia is even more under diagnosed and more pronounced in underserved populations, especially older adults with lower educational attainment. So my answer to this question is just do cognitive screening? You have the time and availability to do it. Maybe one day there'll be changes where this is more widespread and performed in primary care settings, and when that day comes, wonderful. But until then, we have the time to do it.

It is under our scope of practice in order to do it. It ties in really nicely with the work that we do as audiologists in terms of improving and enhancing communication for our patients with hearing loss. So my answer is, unfortunately, cognitive screening is not happening as much as it should in primary care settings. But we as audiologists have the ability and the power to do cognitive screening and to provide that piece of information and that peace of mind for our patients, for their families, for their caregivers, and to communicate that information to primary care providers.

I got another question. Do geriatric physicians do a better job of screening for this? Great question, Sydney. In my experience, yes. I tend to see that geriatric physicians have just a better understanding of the aging process.

They're a little bit more comfortable performing cognitive screening and having those conversations with their patients. But we've got a shortage of geriatric physicians. So that's wonderful if your patient sees a geriatric physician, but there may not be a geriatric physician in the area where your patient lives, or their primary care doctor may not have that training. Got another question in the chat. How do you reply to a patient if they do not verbally give you permission to share the results with their primary care provider?

One thing that you might do is you might provide the results to the patient themselves and encourage them to have that discussion with their primary care provider. This is another reason why? I always like to also invite family members, friends, caregivers to those audiological appointments, because the family members and the caregivers can also play an important role in talking with the patient and kind of encouraging them to bring up these things with their primary care provider.

Another question. Does having a very poor word recognition score on the audiogram test, where it should have been louder enough for them to understand the words, have anything to do with cognition or dementia? This is a great question. So when we are doing a word recognition test, so we're presenting individual words in isolation, there's not a whole lot of higher level cognitive abilities involved with word recognition. But if you're doing a sentence level test, something like the quicksand test, where you're evaluating speech understanding in the context of background noise for sentences, that's a much more higher cognitive demand task.

So this is one of the reasons why I really advocate for including some type of sentence level speech and noise tests like the quicksand, the AZ bio in your hearing evaluation for an adult, because we tend to see performance more poorly on those speech and noise tests where there are greater cognitive demands. If a person has poorer cognitive

abilities, Sylvia asked, how long does a screening typically take? Screening is usually less than ten minutes. So five to ten minutes. The Montreal cognitive assessment, for example, the moca, takes about five to eight minutes to administer.

So very quick and easy to do. Most of the cognitive screening tools that I had up there on the screen, most of them are freely available. And if you go online to their websites, there is a wealth of training materials, videos, scoring manuals, etcetera, to help you feel comfortable administering and scoring. Those cognitive screening tools doesn't involve too much work on your end, just a little bit of practice and a little bit of training.

Okay, we got to move along here. So, in terms of diagnosis of dementia, I will often start with primary care physicians as the first source, the first referral. So if a patient does not pass their cognitive screening, I will send that information back to the primary care physician. But if your patient comes back and they tell you their primary care physician wasn't concerned, even though the patient is concerned, or for some reason there's not good follow up happening, then you might want to look into connecting your patient with a dementia diagnostic center. You can look at your local area council on aging.

They will typically have a list of dementia diagnostic centers. You can go onto the Alzheimer's association website in the area that you live, and you can also use the Alzheimer's association online community resource finder for identifying a dementia diagnostic center in your area, who can perform the comprehensive cognitive evaluation to determine a formal diagnosis for your patients.

So we know that undetected dementia, which, you know, 60% of cases of dementia go undetected globally. But the importance of performing cognitive screening, just to put it in context, is that if we don't perform screening, if cases of dementia and MCI go undetected, this can lead to delays in treatment and management. A lot of people tend

to think that, okay, dementia, mild cognitive impairment, it's degenerative, it's nothing that we can do to intervene, and that is simply not the case. There are many pharmacological and non pharmacological interventions that can be used and useful and effective in the treatment and management of dementia. This area of treatment has come a long way, and there's constantly new discoveries happening, both in terms of behavioral modifications, lifestyle modifications to reduce risk, as well as different types of medications and pharmacological interventions.

Undetected dementia can also present safety issues for our patient and for their family members and caregivers. So the failure to evaluate memory and cognitive complaints, it's likely to hinder treatment of underlying disease and other comorbid conditions.

All right, so before we jump into the research, I just want to highlight this. So hearing loss and MCI and dementia, they're highly comorbid conditions. They commonly co occur with one another. Prevalence of hearing loss is higher among adults with cognitive impairment compared to typically aging adults. So 71% of adults with mild cognitive impairment, 83% of adults with dementia will also have hearing loss compared to aging adults, where only 64 65% of the population will have a hearing loss, so much more common when there is a cognitive impairment involved.

In my last webinar that I did with audiology online, I presented some research looking at the impact of hearing treatment. So, treatment with hearing aids in adults with mild to moderate hearing loss. We took a group of adults with very normal hearing a group of adults with mild to moderate sensorineural hearing loss, and we fit the adults with mild to moderate sensorineural hearing loss with hearing aids. And they wore their hearing aids for six months, and we made sure that the hearing aids were appropriately fit. We performed real ear testing, probe mic measurements to make sure they were appropriately fit in the group of adults with hearing loss.

In previously published work and work that I've presented through audiology online, what we found was that in the hearing loss group, the group of adults with mild to moderate hearing loss, that treatment with hearing aids significantly improved global cognitive function. That's shown here on the left, you can see a significant improvement on the Montreal cognitive assessment, or moca, at six months post hearing aid treatment compared to baseline hearing treatment and this baseline testing. We perform this acutely on the day of hearing aid fitting, so there was no effect of audibility or hearing loss influencing test performance. In that study, we also looked at depression. So we administered a depression questionnaire at baseline and then six months post treatment.

And what we found was that at baseline, there was much higher depressive symptoms in the adults with hearing loss compared to the adults without hearing loss, and that after hearing aid treatment, there was a reduction in depressive symptoms. But it was not quite statistically significant.

So recently, I decided to look back through this same exact data set. I took the same exact 21 participants with mild to moderate hearing loss. Ten were female, eleven were male. Average age was 64 years, and none of the adults with hearing loss had previously reported neurological impairment. And what I decided to do was to look back retrospectively to divide this group of participants into those with poor cognitive function on the moCA test versus those with good cognitive function on the moca test to see if there were differences in hearing aid outcomes in the group of adults who are at greater risk for mild cognitive impairment.

Just looking at the chat here, there's a question. When the studies categorize mild to moderate hearing loss, does that category commingle hearing loss across the board with hearing loss restricted to only the high frequencies? Great question. This is the

profile of the hearing loss participants. They had normal to mild hearing loss in the low frequencies and a sloping configuration to moderate in the higher frequencies.

They had that typical age related presbycusis, sloping type of configuration of hearing loss.

Okay, so, basic study design. Before hearing aid fitting, we administered a depression screening questionnaire. It's called the center for Epidemiological Studies depression questionnaire at hearing aid fitting acutely, on the day of hearing aid fitting, we fit the hearing aids to Nal NI, two prescriptive fitting targets using real ear probe Mic measurements within about five decibels from 250 targets. And then we performed cognitive screening using the moca test. And we did this in an acutely aided condition, so there was no impact of audibility on test performance.

The group of adults with hearing loss then wore their hearing aids for six months. And at the end of six months, we read ministered, the depression screening and the cognitive screening. So excited to show this all to you. Here's what we see in terms of cognitive function. If we split the two groups, the group of adults with mild to moderate hearing loss into those who perform poorly on the moca test at baseline versus those that perform well.

What we can see is that over the course of six months, the group that is at risk for mild cognitive impairment shows the greatest enhancement or benefit from hearing aids in terms of cognitive function. We saw some slight improvements in the group that was not at risk, but actually the group that's at risk for mild cognitive impairment, they're the ones that are getting the most benefit cognitively from hearing aids. Isn't that interesting if we look at depressive symptoms? I was fascinated by this. In the group that is at risk for mild cognitive impairment, we did not see as significant a reduction in depressive symptoms as the group that was not at risk.

In other words, treatment with hearing aids provided the greatest benefits in terms of depression in the not at risk group, but the group that was at risk did not show as much benefit in terms of improvement in their depressive symptoms. Keep in mind that with mild cognitive impairment and dementia, depression, and mood changes, these are often behaviors that coincide with MCI and dementia.

And finally, if we look at benefits, self perceived benefit with hearing aids, this was on using the IOI Ha, which is a common outcome questionnaire. What we found was that the group of adults who was at risk for mild cognitive impairment who performed more poorly on their cognitive screening at baseline, they did not perceive as great of benefit with hearing aids compared to the group that was not at risk. Same thing is true with satisfaction. The group who was at risk for mild cognitive impairment was not as satisfied with their hearing aids as the group that was not at risk.

So what does all this mean? Well, this is just preliminary data. This is 21 subjects, and we hope to begin to look at this in larger subject numbers and looking at hearing aid outcomes from more of a holistic perspective. For so long as audiologists, we were focused on looking at improvements in communication with hearing aids. Right, reduction in hearing handicap.

But these data are showing us that there are benefits from hearing aids that may extend beyond just communication benefits, but extend to things like cognition and depression, and the differences that we see between the group at risk for MCI versus the group that is not at risk. That may help us identify individualized treatment plans and support plans for patients, especially those that fall into that MCI category.

So, just to kind of drive these points home, adults age 60 and over with a dementia diagnosis, they have a 54% lower odds of persistence in hearing aid use compared to

typically aging adults. And we kind of see this play out with some of the data I just showed you. On average, the adults that are at risk for mild cognitive impairments, they're less satisfied and they perceive less benefit with hearing aids than the not at risk group, even though they're the group that is getting greater cognitive benefit.

So what are the implications of this? Well, I think that screening for cognition is really, really important in audiology, audiology, clinical practice, because it influences our decisions about treatments and rehabilitation for our patients. It influences things like our specific recommendations on hearing technology, the signal processing characteristics that we choose, how we involve family members and frequent communication partners into the rehabilitation process, how we work within a multidisciplinary team, and other types of recommendations that we might make in terms of rehabilitation. Just a couple things to think about for those patients that you're working with, who maybe you perform a cognitive screening and they don't perform as expected on that cognitive screening, they're below the cutoff score. You might want to think about that in the context of your recommendation for hearing technology, things like cognitive ability.

If they've got poor cognitive ability, you might want to think about choosing a more simplistic device, more simplistic charger that's easier for the patient to manipulate and use. If we're working with older people, we've also got to think about physical dexterity as well. Self efficacy is huge. Self efficacy refers to a person's confidence in their ability to use and look after hearing aids successfully, at least in the context of audiological care. So if a patient has got low self efficacy or low motivation, likelihood of success with hearing treatment may not be good.

We got to think about how we can integrate family members and caregivers into the process.

Just a couple of other things to kind of think about as we wrap up today. Specific signal processing characteristics research has shown, and there's a study here that you can look up, that fast acting compression, high compression ratios, and strong levels of noise reduction can actually introduce distortion of the speech envelope. And this can make speech understanding even more challenging for someone with poor cognitive abilities. So if I've got a patient that I'm working with who did not pass their cognitive screening, who has MCI or dementia, I'm going to be paying attention to my compression ratios, making sure that they're below three if at all possible. I'm going to be cautious with setting noise reduction too high because I know that those advanced signal processing features and characteristics can influence the speech envelope.

They can make speech sound more distorted. And for someone who has poor cognitive abilities, that might actually be detrimental and make speech understanding more complicated.

Involvement of communication partners. This is an obvious one, but one that I don't feel like we do enough. As audiologists, I encourage attendance of family and caregivers at every single audiological appointment. At every single audiological appointment, if the family or the caregiver is there, I try to elicit their perspective. I want to hear from them about how things are going where difficulties are arising so that we can support the individual, so that we can help them be successful.

Importance of the multidisciplinary team if we're in frequent communication with the patient's primary care provider and other care providers, this can help us identify any barriers or facilitators that might be impacting a person's ability to use their hearing aids and their cochlear implants, and it can help us support the family and caregivers towards more successful hearing aid use. And finally, this is hopefully where I'm headed down the pipeline. Things like group oral rehabilitation, identifying ways to support our patients with hearing loss, especially those that are at greater risk for mild

cognitive impairment and dementia. This might be an area where we might develop a targeted support group for those individual patients that might help to improve outcomes in the future. We might be able to develop additional types of interventions.

So, for example, cognitive interventions, certain types of cognitive therapies that might actually further enhance outcomes for our patients. Those are just a couple of ideas of where we might be headed in the future. I know I'm a few minutes over. Thank you for hanging in there with me to the end. If anyone has any questions, feel free to put them in the q and A and I'll try to answer them.

And thank you for having me today.

Thank you so much. Doctor Glick, would you mind advancing to the final slide just to let the participants know that there will be an exam at the end? If they wish to earn the CE credit, we can open up the floor here just for another question or comment for Doctor Glick. In the meantime, just know that the exam doesn't populate immediately. It might take ten to 15 minutes, but just be patient and that should be loaded into your account and just complete that exam within seven days if you wish to earn credit for today's course.

Doctor Glick, it doesn't look like we have any more comments or questions in the queue, so we'd just like to take this time and thank you for your expertise and your time and for returning for audiology online to share your wealth of knowledge. We hope to see you again real soon. Thank you so much everyone, and I hope you have a great day. Thank you, everyone.