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Cognition and Hearing Health: Research and Clinical Application Part 1

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Thanks for joining our course today. I'm Laurel Christensen. I'm the Chief audiology officer at GM Hearing and I am joined today by Dr. Hannah Fehlberg and she's one of the field training audiologists for Resound. We actually decided to put this course together some months ago for a lot of reasons.

One of them is it's just really hard to keep up with the research today going on with dementia and hearing loss. And I think even harder than that is how do we talk about it? How do we talk about it with our patients? And then what do we do with the information? Do we, you know, how do we, how do we do this in our clinic?

How do we assess patients? And then importantly, how do we use that information in our hearing aid fittings? And so we started to think about this and put this course together some months ago and then turned it into an audiology online course. It is a two part audiology online course today. The first part being more of the research and some of the clinical aspects, and then the second part being more of the hearing aid fitting.

What you should consider with hearing aid fitting in cognitive decline. So, so what we hope you'll be able to do after the course is to identify risk factors for developing dementia. You should be able to explain the patient appropriate terms or explain in patient appropriate terms the connection between hearing loss and cognitive decline. And you should be able to discuss how to make an appropriate hearing recommendation based upon your patient's hearing and cognitive abilities. Today's agenda, as I've talked about, is really a research overview.

What are those hearing loss impacts on health? What's the relationship between hearing loss and cognition? And what's the relationship between hearing aid usage and cognition? And finally, we'll go through the role of the HCP throughout that patient journey, including baseline diagnostic testing and the rehabilitation process.

So we love to get some responses while we're giving these courses. We want you to participate, we want you to be thinking about things. So we want to ask you first, how comfortable are you discussing the relationship between cognition and hearing health with your patients? So take a look at those reaction buttons so you'll find those reaction buttons and give us a little bit of an idea. Got someone here who says, hey, I'm good on this topic.

A lot of people just comfortable. And then a few, I really just avoid the topic. A lot of people, it seems like right in the middle, they're comfortable enough to answer patient questions.

So thanks for that. I mean, it's really interesting. I think, you know, we're comfortable enough to answer patient questions, but maybe that's not enough. Maybe we should be doing a little bit more. And that's why I think so many of you are joining today.

And hopefully Hannah and I will give you some great information that you can apply, you know, right away, clinically. Like I said before, this is part one, and, and part two is on Wednesday. And the brunt of part one will be presented by Hannah after I go through a few things by the numbers here. And then most of part two, I will present on kind of hearing aid considerations. What should we be thinking about when we're evaluating our patients for hearing aids that might have cognitive decline?

What should we think about when we're fitting hearing aids just to prevent cognitive decline? What do we need to think about not just in terms of audibility, but also your ability to hear noise and other aspects of the hearing aid? So we'll be doing that on part two. So let's get started here and look a little bit more at the numbers. So this should be a familiar slide, if not the slide, but the numbers to you.

About 37 and a half million adults that report some hearing trouble. This is data from 2015, but looking at the 2024 data, it's very stable. You see exactly the same thing. So about 28, almost 29 million adults could benefit from hearing aids, but only one in four of those are wearing them. And you can actually

break that down into age ranges.

So the age is between 20 and 69. That's about one in six adults. And over 70, it's one in three adults.

So we do get more people wearing hearing aids over the age of 70. So what's the, what are the consequences of those hearing losses?

And I think, you know, all of these are things that you'll all be familiar with. Irritability, negativism, anger, fatigue, tension, stress, depression, all of these things when you start to have a hearing loss. I was thinking this morning, coming off of the Thanksgiving holiday, I mean, many of you listening probably, you know, were with grandparents, some older relatives. I know I was. And in my case, the older relative does not have a hearing aid.

And so, you know, these things really show up, especially the next one, avoidance or withdrawal from social situations. Is the person without the hearing aid that's the first to leave the party, go to the living room, watch tv, read a magazine, get on their phone because they really can't interact with everybody else. You see social rejection and loneliness, reduced alertness and increased risk of personal safety, reduced job performance. And we know that also comes with Reduced earning power and diminished psychological and overall health. So these are things we are very familiar with.

But how many times do we think about that and think, okay, mild cognitive decline might be something there too? And then we know that there's a very strong association between hearing loss and cognitive decline. So let's look at dementia by the numbers. So 35.6 million estimated out of 2010, and that was in 2010. That is a number that is growing over time.

46% are in Asia, 30% in Europe, and 12% in North America, which is interesting because the majority live in low and middle income countries. However, the increases are, you know, are just really happening all over the world. There's expected to be a 40% increase in dementia in Europe over the

next 20 years, a 63% increase in North America, and then you can see these just huge increases in other countries. In 2005, it was estimated that US\$315 billion for costs of dementia care. So this is really something that is growing aging populations and it's something that we see more and more and continuing, and we see, we really are seeing in the media, a continued interest in dementia and even how to prevent dementia.

So the next this slide, I would imagine, is something that many of you have seen before. This is the 2024 Lancet report on Dementia prevention, intervention and care. And if you haven't read this, I suggest everybody read it cover to cover. There is a hearing section, of course, that we'd be very interested in. But the whole report is actually really good information on dementia.

And it talks about what are these modifiable risk factors that you can do something about to try to prevent dementia in the future. And so it's things like getting more education in early life. And then you see the midlife section there, which includes hearing loss, your LDL, bad cholesterol, depression, traumatic brain injury, your amount of physical activity, diabetes, smoking, hypertension, high blood pressure, obesity and excessive alcohol consumption. All things that are modifiable that you can do in midlife. And then going into late life, social isolation, air pollution and vision loss.

So all of these things that are modifiable. And if you add all of these 14 risk factors up, it's about 45% of the preventable modifiable risk. So then we want to take a look at hearing loss. So hearing loss is 7% of that modifiable risk. But I think I look at it a little bit differently because hearing loss also comes, if it's untreated, with social isolation and depression.

So when you look at Social isolation, depression and hearing loss, untreated hearing loss. You know, that's a. That's a big portion, 15% of the modifiable risk factors. So hearing and being able to get hearing aids and get them early and make sure that we, you know, we not only just have audibility with the hearing aids, but the ability to hear in noise with the hearing aids. Do all of the things possible to

make your ability to communicate with the hearing aids the best that they can.

Then we're doing something with that modifiable risk factor. So we talk about mild cognitive impairment first, and we will see in the clinic a lot of mild cognitive impairment. About 12 to 18% of people over the age of 60 are living with mild cognitive impairment. That does not mean they will develop dementia. It does mean, though, that we should be doing the preventable things that we can to modify that risk.

Only about 10 to 15% of those individuals living with mild cognitive impairment will actually develop dementia. About one third of people living with mild cognitive impairment that is due to Alzheimer's disease will develop dementia within five years. Then you look at 42% of Americans say they worry about developing mild cognitive impairment or Alzheimer's disease. 80% know little or are not familiar with mild cognitive impairment at all. So I think that's where you kind of stop to think about what we know and what is our role as hearing healthcare professionals.

How do we talk about this when we know that there's a very strong association between hearing loss and cognitive decline? What do we do in our clinics? How do we talk about it? What is all the information that we need to know? And I'm going to hand it over now to Hannah to start to talk about some of the research and some of those clinical implications.

Thank you, Laurel. So we are going to kind of work through a timeline of research connecting cognition and hearing loss. And we're actually going to start by taking a look at one of the first studies to highlight that there was a connection or is a connection between hearing loss and cognition. And this was actually published over 30 years ago. So this was a study that looked at 100 individuals with Alzheimer's type dementia and compared them to 100 individuals without dementia.

These participants were matched by age, sex, and education.

And basically all of these participants had to complete audiometry, speech testing, a cognitive screener, and had their medical history evaluated. So when calculating out the risk for dementia relative to hearing loss, they took confounding factors like head trauma, depression, depression diagnosis, and family history of dementia controlled for them. After doing this they found that participants in the Alzheimer's group had a significantly higher chance of having 30dB or more of hearing loss. They also found that regardless of which group the participants were in, Alzheimer's or not, the degree of hearing loss that a patient had was associated with higher odds of having dementia. And this was just an early indication of this connection.

Right. It took several years really until 2011 for the topic to really resurface again. So we'll Fast forward to 2011. And this was when Dr. Franklin completed his as landmark study on hearing loss and incident dementia.

This was actually a subset of a larger study, the Baltimore Longitudinal Study on Aging. With the original study, participants would travel to Baltimore to do a battery of tests every other year so they could collect information over time. Patients were followed for about 12 years. Now, the patients who were included in Dr. Lim's study were selected as people who were between the ages of 36 and 60.

They had to have completed a baseline hearing test and a cognitive screening test. And they were not supposed to have any initial signs of cognitive decline. So these were normal cognitive functioning patients, and they were supposed to have been seen for at least one follow up over those 12 years. So when they go back and they look at what ended up being 639 subjects who participated, they all started with normal cognitive performance. And at the end of the study in 2008, they found that 58 of those participants had developed all cause dementia and 37 of those were diagnosed with Alzheimer's.

To determine the relationship between the hearing loss and cognitive performance of these patients, they did correct for factors like age, race, education, diabetes, hypertension. And what they ended up

finding was that for every 10dB of hearing loss, the risk of dementia rose 20%. And the risk of dementia doubled for those with mild hearing loss, it tripled for those with moderate hearing loss, and it increased fivefold for those with severe hearing loss. So the study really confirmed that there is some relationship between hearing loss and the risk of developing dementia. But it really raises the question, why?

So in 2017, a really great article, kind of reviewing some of these possible hypotheses for the relationship, was written by Stahl. The first of these hypotheses is called the common cause hypothesis. And this assumes that there's an existence of some sort of common cause that's responsible for the degradation in multiple systems. So in this example, of course, we're looking at hearing loss and cognition. The assumption would be that there's something else going on underlying that's causing a decrease to both symptoms.

An example would be cerebrovascular disease. And what I find to be very interesting about this hypothesis is that if this is indeed what's causing the connection between hearing loss and cognition, we wouldn't necessarily expect to see an impact of wearing hearing aids. Now, the second theory, which I think is the theory that most hearing care providers are familiar with, this is called the cascade or deprivation hypothesis. And I like to think of this one as the use it or lose it hypothesis. So according to this, uncorrected hearing loss likely leads to cognitive decline and eventually dementia because the hearing impairment is causing some change to brain integrity.

This is really supported by several MRI studies showing accelerated brain atrophy and smaller total brain volume for patients with hearing loss. This is also supported by the idea of neuroplasticity or cross modal reorganization. The idea behind this is if your auditory cortex isn't being used, it's not being stimulated, it's going to be repurposed by another system like the visual system. So in 2020, actually, Dr. Glick from the University of Colorado completed a study looking at the neuroplasticity of the brain of hearing impaired individuals.

She completed visually evoked potentials on patients with and without hearing loss and found that patients with hearing loss and who were untreated exhibited earlier visually evoked potentials. And this is essentially a sign that the visual system is recruiting more resources from another area of the brain, like the auditory cortex. She kind of took this study to the next level by examining the same potentials on these patients after they then wore hearing aids for six months. And what she found was that the evoked potential timing returned closer to normal, suggesting that that reorganization that had happened when the patients had untreated hearing loss was reversed to some degree. And this also was correlated with improved performance on global cognitive function testing.

It's a really cool study. An alternate view or path of the cascade hypothesis is that hearing loss may actually have a link with cognition, really because it leads to reduced physical activity, lower mood, and poor engagement in social activities. I mean, we know there have been studies showing the strength of the association between hearing impairment and cognitive decline is reduced after controlling for social variables. And we also know that physical inactivity, depression, social isolation are all risk factors for dementia. So this isn't really a surprise.

So really, with the cascade hypothesis, it's saying there is a link between hearing loss and cognition, but we're not sure if it's a direct link or an indirect link. Now, the last hypothesis that's been used to Underlie that link between hearing loss and cognitive decline is called the cognitive load hypothesis. And this assumes that in the presence of hearing difficulty, the, the neural activity that's required for patients to understand spoken language becomes more demanding. Basically, the brain has to recruit additional neural populations in order to achieve accurate performance. So the brain has to reallocate attentional resources to help with deciphering and decoding garbled auditory signal.

So all of this comes at a cognitive cost. So both of these later theories, the cascade hypothesis, the cognitive load hypothesis, they both kind of make an assumption, assumption that intervention with

hearing aids would help with cognition or at least decline or decrease cognitive decline. So let's take a look at a few of the studies that actually look at that relationship between hearing loss and cognition. Some of the earliest data actually to show a correlation between hearing aid use and cognition was data from the National Health and Nutritional Examination Survey. So this was a program that actually began in the 60s to evaluate specific populations and health topics.

But in 1999 it became a more continuous like umbrella program with multiple focuses and this was one of them. So from 1999 to 2002, participants within this examination all went through audio testing and cognitive testing. They ended up having about 605 people participate between the ages of 60, 65. And what they found in this study was that hearing loss was associated with poor cognitive function and that hearing aid use was associated with higher cognitive scores. However, a limitation within this study or this data was really that there were only a small number of individuals using hearing aids.

Okay, so we couldn't put too much weight into it, but it's a really promising start. We then Fast forward to 2018 to a study that was conducted as a part of the Pacwood survey, which is like a French epidemiologic study. And this actually followed patients over a period of 25 years to look at the relationship between their depression, disability, dementia and even cause of death and how that associated with their self reported hearing problems. So they ended up having almost 4,000 participants in this study. About a third of them reported issues with hearing and 2/3 of them reported no issues with hearing.

And what's kind of interesting is these patients did not do a hearing test. They only did a self reported questionnaire on hearing. But then they went through very thorough cognitive testing and patients had to be dementia free to start. They're followed about every two years to see how their cognitive status changes. The findings from this study showed that participants who reported issues with hearing had an increased risk of disability and dementia.

Also found that there was a much higher risk of depression, specifically in men who reported hearing problems. But cool enough, this relationship was not seen in the patients who wore hearing aids. So the patients who wore hearing aids were not at a higher risk of developing dementia, disability, and depression. The study also showed that people who reported hearing problems that wore hearing aids had the same chance of staying independent as the folks who reported no issues with hearing. So obviously a big takeaway from this is, you know, fitting people with hearing aids is a great way for us to improve quality of life.

We already know that. But it may be one of the ways that we can keep patients remaining independent and keep them from relying on, you know, assisted living and care facilities. I also think another cool takeaway from this is we may want to start using just simply the self report of hearing loss as a reason to start taking a closer look at someone's cognitive performance.

So our next study actually was published in 2023 by Dr. Lynn, and this was the Achieve study. So this is a really cool study looking at 977 patients with untreated hearing loss to see how their cognitive performance changed over three years, depending on whether they were fit with hearing aids or were enrolled in more of a health education program. So of the 977 participants, 24% of them actually were recruited from a previous study. The study was called the ERIC study.

And these patients were really already at a high risk for dementia. So they were patients who had cardiovascular issues to begin with. The remaining 76% were volunteers, new recruits. And when they looked at the data of these patients over three years and how their cognition changed, they found that there really was no significant effect of the hearing intervention on patients cognition. But when they separated out the groups into the ERIC study versus the volunteer group, they found that there was a significant effect of hearing intervention within the ERIC study patients.

Essentially, they found that in older patients who are already at an increased risk for cognitive decline, hearing intervention could slow down the loss of thinking and memory abilities by about 48% over those three years.

So really, in summary, results over the last 30 years have shown that there is some sort of correlation between hearing loss and cognition, whether it's direct or indirect. And studies do suggest that the higher the amount of hearing loss, the higher a patient's risk of developing dementia. We're also seeing early research to suggest that treating hearing loss with hearing aids, hearing aids, does have a positive effect on slowing cognitive decline for patients, especially those who are already at a high risk for dementia. We obviously still have a Long ways to go. But these findings are very promising that there is something that we as hearing care providers can do to delay the upstream effects on cognitive function.

So now that we've gone through all that research, I want to take a second to check in and see how this information is going to impact how you treat and counsel your patients so you can go ahead and use your reactions again. Will you start telling all of your patients that hearing aids stop the progression of cognitive decline? Will you feel more comfortable answering patient questions and counseling on the relationship between cognition and hearing health, or are you not sure you need to learn more? And I'm seeing quite a few of all reactions, mostly the middle, mostly feeling more comfortable. I love that.

Now, one thing to bring up with this part of this was a little bit of a trick question. The first category, and we'll start telling all of my patients that hearing aids will stop the progression of cognitive decline. I want to caution you on doing that because with everything that we've gone through today, there are really good indications that hearing aids can slow the progression of cognitive decline, but there is no evidence that it 100% is going to stop the progression of cognitive decline. So we need to be careful in how we word this information when we're presenting it to patients. And this will come up a little bit more

throughout the rest of our presentation.

So we're going to move now on to the role of the hearing care provider through the patient's journey with hearing aids. And I like to think of our responsibilities as the hearing care provider as two things. We have to think about how we can support our patients in the beginning of their journey, starting with diagnosis. And then we also have to think about how we can support them through their rehabilitation process with our selection of hearing aids and services. So, regarding diagnosis, hearing care providers really are very well positioned to provide cognitive screenings and approach the subject of cognitive impairment with patients for several reasons, the first of which just has to do with appointment duration.

And even though it doesn't feel like we have enough time with our patients, we actually spend more time with our patients than their PCPs. So an average primary care appointment is only 20 minutes, whereas the average patient will spend 1.2 hours with their hearing care provider over their first two months of hearing aid usage. The second reason is related to case history questions. So the cool thing is that you guys are probably already integrating appropriate questions into your intake questionnaires. So when we think about it, we as hearing care providers, are constantly evaluating the communication abilities of our patients.

And while we may be really trying to focus and hone in on hearing. Communication abilities are also really strongly influenced by cognition. So we're already asking these questions. It's also important for us to talk about this with patients because we need to know what a patient's cognition is like so we can appropriately recommend hearing devices and technology and know how to best support them in learning about their devices. The third reason is that hearing care providers are already seeing these patients.

Right? The age population at which we're seeing patients, and we see a higher number of folks with mild cognitive impairment and dementia. We're also seeing patients who are coming to us largely because of social and emotional concerns. That's their motivating factor. So our patients are coming to us with hearing and social emotional concerns that really prime us to talk about our dementia risk factors and hopefully catch them in earlier stages of mild cognitive impairment.

So I think the natural question next is to ask, how do I start integrating cognitive screenings into my clinical practice? And honestly, it can be really easy. You can simply add cognitive screening questions into your normal case history routine, asking questions like, do you find yourself having difficulties with forgetfulness and memory? Do you find yourself losing track of conversations and trouble with focusing? Do you find yourself having trouble making simple decisions?

So you can, as easy as that, just add a few questions. Now, if you want to use a true cognitive screener in your practice, there are a few things to keep in mind before you make it a normal part of your practice. First of which is how you're actually going to use all of the information. So how are you going to present the screener to your patients? Is it going to be part of their intake paperwork?

Are you going to do it every. Are you going to do it every year at their annual follow up? Do you just administer the screening if concerns arise? And do you feel comfortable actually telling the patient why you're having them complete a screening? You also have to think about what you're going to do.

If your patient completes the cognitive screening and the results are abnormal or outside of the normal range, are you prepared to discuss the results and the next steps with the patient? You also have to be prepared to make appropriate referrals. So do you have a list of providers that you can refer your patients to for full evaluation? This is actually a great opportunity to do some physician marketing. Get your name out there to neurologist, neuropsychologist, or geriatricians.

These are really the providers who will end up doing the full cognitive evaluations on these patients. And if you're not sure where to start. You can find local providers by visiting your local chapter of the Alzheimer's Association.

You're also going to want to carefully consider which type of screener you're going to use. So different screeners will target different cognitive domains and different cognitive domains are affected throughout different stages of cognitive impairment. So we as hearing care providers are typically going to be looking for people in early stages in that mild cognitive impairment failure. So we really want to make sure that our screener aligns appropriately. And early signs of this mild cognitive impairment would be issues with executive function, so that would be issues with working memory, processing speed.

So we want to make sure that we find a screener that targets those things.

And keep in mind, if you do select a screener that is more appropriate for something like dementia, something that's in the later stages of cognitive decline, you're probably going to experience a Celia healing effect and you're going to miss more of those early stage mild cognitive impairments. So the last thing that you want to consider is whether your screener is sensitive to hearing loss or other impairments. There are a lot of cognitive tests that are administered verbally and I'm not going to tell you you shouldn't use those either. But you have to consider, is your patient's hearing loss going to have a negative impact on their performance?

If you are going to do a test that is administered verbally, you really need to make sure that you are providing optimum testing conditions for the patients. And this is not a new thing for all of us. Like these are things we talk about every day, just standard, best communication practices. If you're going to administer these tests, please make sure that you are facing the patient face to face, that you're in a well lit room, there's a low level of background noise, and that the patient is wearing appropriate,

appropriate amplification.

And this quick study actually highlights why it's important to make sure that your patient is using appropriate amplification if you're going to do a verbal test. This is actually a study out of the Portland VA in 2018 and it looked at how amplification impacted patient results on a common cognitive screening test called the MOCA or the Montreal Cognitive Assessment. In its original form, the MOCA relies pretty heavily on verbal administration. So the study had 61 participants, 42 with hearing loss, 19 with normal hearing. Some of the patients in the hearing loss group were already wearing hearing aids and others were untreated.

Each patient in this test completed some word testing, speech and noise testing, and the mocha, and they actually went through this battery of testing twice in no particular order. And what was really interesting about this, actually, this part's not interesting. It's pretty predictable. Patients with hearing loss didn't perform as well on the MOCA as normal hearing individuals. That's no surprise.

And hearing aid users performed better on the MOCA when they were wearing their hearing aids, which is also not a surprise. But what is interesting is that those patients who were not wearing hearing aids were provided Pocket Talkers to do the aided testing. Okay. And what they found was that the pocketalker users performed worse on their mocha when using the Pocket Talkers versus being unaided. And the authors really highlight that this performance could have been related to the fact that Pocket Talker performance and noise was really poor.

So this could have been an issue with the pocket talker's noise reduction, whatever, signal processing, whatever's going on in the environment. But what I think it really brings to mind is that we have to make sure that we are supporting patients as best as we can. And that means that if we're going to administer a cognitive screening test on patients and we're using verbal auditory information, we need to make sure that they are using appropriate amplification, or at least in their most familiar setting. So make sure

that your patient's hearing aids are working appropriately. And if you're going to fit someone with a set of demo hearing aids.

So to do this testing, it would probably be a good idea to make sure that the hearing aids are providing a benefit by verifying or validating that.

Now, another thing that you can think about doing is just simply reducing the impact of hearing loss on your cognitive screener by picking a screener that doesn't use any auditory information at all. So here on the left, you see a list of cognitive screening tests that are commonly used in audiology clinics. And one of the screeners listed in here is the MOCA that Montreal cognitive assessment that I just brought up. And one thing that I learned while looking, doing, you know, research for updates for this is that the MOCA has had quite a few updates over the years. So the MOCA that used to be primarily verbally administered is now available multiple versions.

They have a version for hearing impaired, they have one for the visually impaired. They also now offer several digital versions that hearing care providers can use for free on a limited basis. They also offer paid versions that you can directly integrate into your EMR systems. And there's even a new app version that's currently being researched, called the Espresso by moca. This is an app that anyone can download to screen their cognition.

I actually did it the other day, happy to report everything's fine, but just they're extending all the ways that they can, you know, provide cares to patients and look out for some of these different impairments. And then of course, on the right, we have the Cognivue. I'm sure all of you have heard of the Cognivue before. It is a screening system that has really been marketed to hearing care providers because there's no auditory information on it. So this is just another option for you guys if you want a cognitive screener that has no verbal administration.

So the last thing to really consider when working with patients within this baseline or diagnostic phase is counseling and referrals. Thankfully, many of the ways that we counsel patients already is not much different from what we're going to have to do. So first of all, it's really important to make sure that patients are accompanied by family members so they can act as a second set of ears and support system. It's also important to review good communication strategies with these patients. I mean, that's good regardless of what cognitive state they are in.

This can be empowering for family and friends to even work on with patients. I also really want to make sure that you talk about realistic expectations. So it really is not appropriate to tell patients that wearing hearing aids is going to keep them from experiencing cognitive decline. That is over promising. Rather, what we should and can share with patients is information about how hearing health or how hearing loss can affect their health, how their general health can impact cognition and hearing.

We can provide positive messaging around the known benefits of addressing hearing loss, like how it can improve your communication, your quality of life and aging process in general. And we can also discuss that there are few negative side effects of hearing aid use. And research really is more and more suggesting that hearing aids might play a role in slowing the progression of cognitive decline.

You also will want to provide resources on the information you discuss. Clinic branded handouts on communication strategies, next steps, healthy aging, those modifiable risks for dementia. Those are great additions to provide your patient. Help them to remember what you discussed and make it a little more salient. And then of course, this is the time where you do want to make appropriate referrals to a neurologist, neuropsychologist, or a geriatrician.

So the next way we really want to think about how we help our patients with cognitive decline is in making sure that we recommend appropriate hearing aids and provide necessary services throughout the rehabilitation process. So when selecting a hearing aid style for these patients, there are several

things to keep in mind. Of course, the basics remain. We have to make sure that hearing aids are appropriate for the amount of hearing loss our patients have. But other things to really consider would be factors around how to make hearing aid adoption and daily use easier for our patients.

So think about dexterity. Does the patient have any dexterity or visual limitations that might make it difficult to place their hearing aids? Can they see to tell the difference between the right and left hearing aids? Can they open a package of batteries and place them? You also want to think about durability.

I mean, for any patient, this is important. But for patients who have some sort of cognitive impairment, this is extra important. They're more apt to forget to clean their hearing aid or even how to clean their hearing aids. So taking advantage of easy maintenance features that can be done by the patient, their loved one, or by you in the clinic, features like microphone protectors, wax filtering systems, dryers, those are all important things to consider for these patients. These patients are also more likely to forget things like their hearing aids on their ears when they hop in the shower.

Or they may forget that they had put their hearing aids in their pant pockets and then put their pants in the washing machine. So that means that offering them a hearing aid with a higher IP rating is also necessary. And then ease of use. This one's easy. If hearing aids are too hard to use, they're not going to be used.

So we really need to focus on making hearing aid usage as easy as possible. We can do this by offering features like rechargeability, easy to access push buttons and rocker switches, or even the ability to turn these things off and modify them. We also want to think about offering telecoil with automatic activation for patients who use landlines. And consider how the patient may use their phone and accessories. We want to make sure that these things are simplifying their lives, not making it harder.

So I want to highlight just a few examples of hearing aid style considerations by looking down nexia line of hearing aids. So starting with custom devices on the left, Resound does offer fully featured rechargeable in the canal and in the ear devices. And these both include a large easy to use push button that can actually be programmed within the software. The customer chargeables also include replaceable mic filters that you can do within the clinic and offer number of wax protection solutions. So for those of you who are familiar with the HF3 filter, that's the red and the blue larger filter, the whole idea behind that is that it can, it's bigger so it can fit more wax in it before the filter needs to be changed.

Resound actually offers an option that's even a little bit smaller, so it still will collect more wax, but it doesn't take as up as much room within the custom device and we call that the HF filter.

Other things to consider with the custom devices is the shells can be modified to include patient name, right or left indicators. They can even be made in different colors to help your patient differentiate right from left. And then for receiver in the ear options, I want to highlight that Resound does offer different battery options. So whether your patient is interested in or used to using rechargeable batteries, 312 or 13 batteries, there's something to offer all of them. And Resound also has an ear mold lab where you can have custom ear molds made to again help with differentiating right and left hearing aids.

Finally, our BTE options which have quite a few notable features for patients who might have cognitive impairment. All BTE options, the standard, the high power, they're all rechargeable for the ultimate ease of use. They all feature built in telecoils, replaceable microphone filters and programmable LED lights. So those LED lights can be programmed within the software to flash continuously and are a really great option for patients who might have a caretaker that needs to be able to quickly check to see that the hearing aids are turned on. And again, custom ear molds are just another way that you can make these devices easier for the patients to differentiate and use.

So besides this, there are even a few more features amongst all of these hearing aids that can help our patients with cognitive impairment. And one is battery life. Obviously we want our hearing aids to last all day for patients, they need to wear these all day. So regardless of which rechargeable hearing aids style you would select from Resound, custom receiver in the ear or BTE, battery life is on average 24 hours and 20 hours if a patient's streaming 50% of time. And for ease of use, all of the rechargeable products have some sort of LED light indicator to confirm when the devices are charging.

We also offer multiple charger options for your patients. So a premium charger is available for receiver in the ear devices and this actually includes a built in battery that holds three charges. It's great for patients who are on the go and it's also great for patients who may not always remember to plug in their charger. Standard Charger is a stationary charger that features a lid so that the hearing aids have extra protection. And then of course, for those who want a charger that's as simple as possible to use, there's a desktop charger, stays in one place, can be plugged in 24/7 and it doesn't have a lid so that it makes a really great option for patients who have really large ear molds. And then finally, our customer chargeable devices feature a customized charger.

So these come with a custom printed insert to make sure that hearing aids sit easily and securely within the charger. They also can be removed for really easy cleaning.

IP rating as well. So all Resound hearing aids are IP68 rated inside and out. This includes receivers. And this is what makes our hearing aids all weatherproofed. I call it all weatherproofed because I like to highlight that the IP68 rating is the same as other manufacturers that claim to be waterproof.

However, calling a hearing aid waterproof kind of insinuates that it's meant to be worn in the water, and that's not true. We really want to think of IP rating as insurance against accidental water exposure. And this is just another great thing to bring up when you're talking about realistic expectations with patients.

So another part of picking out the right hearing aids is selecting the right technology. We're going to talk a little bit more more about this on Wednesday in part two of our series. But speech and noise performance is a big thing, is actually another risk factor for dementia. It's kind of the subset of hearing loss. And Dr.

Christensen is going to talk about that more on Wednesday. So it really is especially important that we provide technologies to patients that can give them the best signal to noise ratio boost. We also want to make sure that technology works to the patient's advantage. And automation is a great way to do that. So nowadays a good environmental classification system can ensure that a patient's hearing aids are adjusting in a variety of listening environments so they don't have to make adjustments.

Some of these adjustments include changes to the directionality. We want to make sure the directionality is providing the best speech clarity while not cutting your patients off from their environment. We also want to make sure that noise reduction is automated so that we can reduce the listening effort on patients, reduce that listening fatigue. And of course, we want to consider automatic telecoil activation and using automated streaming processes, or at least something that's easy for patients to access. It's also good to keep in mind what kind of adjustable features that you have at your disposal within the software.

So this again is a feature that we'll talk about on Wednesday. But the attack and release times of hearing aids are something that can really impact speech understanding for patients with cognitive impairment. So it's a good thing to have access to adjust these within your patient's hearing aids. And spoiler alert, Resound hearing aids do offer adjustable tech and release time times. It's also important that you be able to apply customizations within the software, especially for some of those automated processes.

That way again, everything is totally automated for the patient. They don't have to worry about switching programs. And then finally, it's important to consider what accessibility options your patient might utilize. Now, every hearing aid manufacturer offers a variety of accessories. Remote microphones and TV streamers really helped to boost signal to noise ratio for patients, help them to hear things better.

And there's also remotes to help with accessing and adjusting their hearing aids. But I think it's important to evaluate whether these devices are something that the patients really need to hear better. What's their auditory need? And it's also important to consider whether they're going to be able to use use them. You may also want to consider whether the patient's willing and able to use Bluetooth connectivity and what kind would best suit their lifestyle.

So one thing that's kind of special about Resound nextia hearing aids is that they utilize the newest Bluetooth technology. Bluetooth Low energy audio. And Bluetooth Low energy audio is really beneficial for all patients. It's not just those with cognitive impairment. But the three reasons why they're beneficial is when it provides better sound quality and preserves battery life.

So our patients can, you know, get that all day wear. The second of which is that it allows for multistream, meaning patients will be able to switch between devices more seamlessly without having to turn off and on Bluetooth on all their different devices. It's also something that's going to allow for hands free calling with Android phones. Finally. And then the final benefit is one that we talk about the most and that's something called AuraCast.

And OraCast is really just a platform for audio streaming and broadcasting. So quick into what what AuraCast is, many people are still a little bit confused about this one. So I'm going to try to make it simple. You are all familiar with classic Bluetooth because that's what you use every day. That's how you have your headphones connected to your phone, for example.

But what you know also is that classic Bluetooth only allows for a one to one communication between devices. The new Bluetooth Low Energy Audio allows people to broadcast audio simultaneously to an unlimited number of devices around. And you don't have to go through a true pairing process to share this audio. Selecting this is almost like selecting a wifi network. So it's kind of open.

And what's really cool about it is that this is not restricted to a specific hearing manufacturer, specific person. All consumer electronics are moving into using this technology. So in the near future we could have an elderly woman wearing Nexia hearing aids and her grandson wearing Jabra headphones audio sharing the same information. So they are on the same page. And this is going to be really helpful for people in public places like the train station, buses, airports.

Great for sharing in private, you know, watching a TV show together or watching something on a tablet. It's also a great way to actually connect and listen in on public television sources. So with that this being such a eventually universal thing, I think ease of use and availability is going to make this really great for our patients who have cognitive impairment.

The last thing to consider here is what you can do as a provider to best serve your patients during their fittings and follow ups. So of course counseling is very important. Remember to make sure that your patients have a family member present. Part of this is also providing written instructions for patients. Customizing written instructions is one way to help not overwhelm them with information.

And because patient feedback from these patients who have cognitive impairment may be limited or not clear at times, you're more likely to rely heavily on hearing aid verification data logging. You may even want to incorporate questionnaires that utilize input from family as well. Keep in mind that these are also patients that you're probably going to see more often for reprogramming and maintenance appointments, as they may not be as good about identifying issues with hearing aids. It may also take

longer for those appointments, so you can plan ahead for that. And then finally, keep in mind that you're probably going to want to continue screening cognition over time.

You're going to see patients over a large span of time and when you first see them, they may not exhibit signs of mild cognitive impairment. But you need to be prepared to bring out a cognitive screener or make an appropriate referral if you start to have concerns. So super quick here, I wanted to highlight just a few features within the Resound Smart Fit software to hopefully improve your efficiency during the rehabilitation process. The first of which is the new Resound Smart Fit software actually has a catalog. This catalog Allows you to quickly filter hearing aids by features like telecoil.

Great. If you're not as familiar with resound technology. The second thing is autorep. So autorep runs real ear measures through the SmartFit programming software. It makes those adjustments automatically for you, hopefully reducing the time it takes you to perform verification, which I think is, you know, very important if you're going to be doing a lot more real ear measurements with these patients with cognitive impairment.

And then the third thing is customized patients for patient reports. So within the software, you can edit what information you want to provide patients based on their needs, and you can also enter specific patients notes, patient notes that can even be translated into various languages, which just makes it a lot easier for your patients to learn about their hearing aids. Okay, so I know we've got three minutes. We're going to tidy up really fast and go through just three quick case studies to bring together everything that we talked about today. So this is Peter here.

He's a restaurant consultant with no hearing aid experience. He's had problems hearing for the last five years, and he has a severe high frequency hearing loss. He recently saw a report about hearing loss and cognition, and he wants to know if wearing hearing aids will keep him from developing dementia. So I want you guys to use your reactions and tell me what would be an appropriate way to address

Peter's concern. Provide resources on modifiable risk factors for dementia and consider completing a cognitive screening.

Would you discuss the connection between cognition and hearing health and make sure to emphasize the known benefits of addressing hearing loss? Or would you tell him he has nothing to worry about if he buys hearing aids? And I love that I'm seeing a lot of claps and hearts. Those are both, both very good answers. Again, I'd be cautious about the last one telling him he has nothing to worry about if he buys hearing aids, because that is an unrealistic expectation and we cannot tell people that.

Great. So this is Greta. Greta has a severe hearing loss and 18 years of hearing aid experience. She complains of issues hearing in noise of their current hearing aids. She does have a second program that helps, but due to dexterity issues, she's really struggling to manually change the programs.

She finds herself pulling away from social situations due to her problems. And she does use a smartphone, but she isn't always able to have it on her at work. So how might you address Greta's concerns? Would you choose a hearing aid with automatic directionality and noise reduction features so she doesn't need to manually change into a second program. Would you consider a remote microphone that Greta can use in social situations and can control via her phone, hearing aid or remote?

Or would you choose a hearing aid that can accommodate for Greta's poor dexterity, featuring large push buttons, rechargeability, and wireless connectivity? And I'm seeing a little bit of everything, which is wonderful because these are all three very valid things that you can do to help Greta with her next set of hearing aids. Fantastic. And very last one here is Sam, a retired pilot. He has a severe high frequency hearing loss and no previous hearing aid experience.

He's very active and he loves traveling, but he has a hard time understanding tour guides and navigating public transportation. And he does report in his intake questionnaire that there is family history of dementia. So how might you address Sam's concerns? Will you reassure him that wearing hearing aids and staying socially active will keep him from developing dementia? Will you complete a cognitive screening and make appropriate referrals if necessary?

Or will you choose a hearing aid with Bluetooth low energy audio technology so that he can utilize AuraCast and reduce reduce listening fatigue when traveling? Awesome. And I see a lot of hearts and thumbs up, which is perfect. Both of those are very reasonable things to do. I would just caution you again on promising that a patient will not develop dementia if they wear hearing aids.

Perfect. Well, thank you all for joining us. I hope you all feel a little more comfortable after this. And I also hope that we'll see you on Wednesday for part two of our training.