Michael McKee: Thank you so much. So before we begin, I want to also disclose that I have a congenital hearing loss and wear a cochlear implant in my right ear and a hearing aid in my left. And so my personal experiences really has led me to a career in clinical and also research interest in these individuals. So I'm excited about this talk, and I want to acknowledge and thank OptumHealth Education for hosting this timely webinar.

So before we go a little bit further, I just wanted to also thank and acknowledge our research funding from NIH and NIDILRR. We don't have any other commercial interests to disclose.

So we have several objectives today. First of all, we're going to really just cover how hearing loss affects personal health and also affects the healthcare access and use. And we've learned so much over the last five years compared to the last few decades, and so there's a lot more to cover now.

And then the second objective is to identify techniques for in-person and telephonic communications. I will also cover a little bit on virtual health, given the COVID-19 pandemic as well.

The third one is to educate deaf or hard of hearing individuals and clinicians about how we can effectively communicate with these individuals.

And then last we -- one of the key things I want to hopefully end up with today, it's really empower each one of you to have a list of tools and resources and strategies to be able to communicate and work with these people more effectively. And then last we will talk about exploring new technology for hearing loss.

So in this slide, it's a recent infographic that we developed. And really what we're trying to do is highlight not only how common hearing loss is, but also how poorly we address it and how this actually cascades in a variety of ways. Unfortunately, most of them are after events. So hearing loss right now has already been recognized as a major source of healthcare communication breakdowns, but unfortunately, very little training for providers, healthcare systems is current [active].

And so depending on the datasets that we use, we know that the hearing loss prevalence varies from a low of 12% to as high as 17% and some people even put it up as up to 20%. But because there's a stigma connected with it, many people also assume that this is simply something that we age into and not something that's relevant for younger adults. And we know that that's not true. Even one study demonstrated that even people in their 20s can get hearing loss. And one actually reported even mild hearing loss that was measurable in 8.5% of these younger adults, and much of that possibly could be due to the heavy use of electronic devices and earphones.

Also, I wanted to just highlight that hearing loss is also very heterogeneous group. In that above number, the 1 in 6 Americans with a hearing loss also includes the group will be described as deaf American Sign Language users. And this is a group that we'll also touch briefly in this presentation has very different needs and also struggles with even

more healthcare marginalization.

And then the other thing I wanted to just move over is how expensive hearing aids are. So when you look at the cost of hearing aids, these are -- they're the most expensive material item that you're going to purchase on average. So after a house and car, hearing aids ranging anywhere from $2,200 to $7,000 for a pair of hearing aids. So it's really unrealistic in most cases to expect many people often with limited income or retirees to be able to come up with that amount of money. And the other thing I wanted to just highlight that has unfortunately affected how well we're addressing hearing loss in the country. And less than 20% who qualify for hearing aids actually get or use the hearing aids.

So going onto the lower row, this actually seems to affect not only how often they go to the emergency department. And when we compared it to their hearing peers, there's 17% increased risk when they -- of going to the emergency department when compared to their hearing peers. But the other thing is that readmission, so after a hospital discharge, these individuals are much more likely to also be readmitted. And we have a couple studies ranging from 32% to 44% greater odds of hospital readmission for those who have hearing loss and also trouble communicating.

And then finally, these individuals have a higher accrued healthcare cost. And it has been reported that these individuals have costs of 46% greater than what we see with those that don't have a hearing loss. So there's a lot that we could do to really tackle this.

So why do we want to really focus on deaf or hard of hearing individuals? So the first thing is that it globally affects us in many different ways. So when you think about how it impacts us, it's psychological, cognitive, social and even physical. And so it affects the quality of our relationships. It can affect our ability to be employed or advance in our careers. So it's really important that we need to make sure that we think about how it affects their lives, and what can we do to improve not only their health, but also get them and empower them with different strategies so that they can actually navigate through life more effectively.

And one of the hot topics lately over the past several years is the connection between hearing loss and cognitive decline. And what we have found is that hearing loss individuals seem to carry a 30% greater risk for cognitive decline. And these are among individuals who acquire hearing loss later in life compared to their hearing peers. So that actually seems to have a lot of potential healthcare costs and consequences as we go forward. We're still exploring some of the roles and how that actually comes about.

But the other important thing is that hearing loss is also associated with a number of health conditions and even having a reaction to certain medications. So some of the health conditions that we have seen much higher with individuals with hearing loss is such as diabetes, cardiovascular disease and even cancer. So we need to do a better job engaging these individuals in our healthcare system.

So I wanted to change gears a little bit, talk a little more in depth about the access and utilization of health care. So as I mentioned, over the past few years we've had an explosion of really great articles, great research that actually explores how hearing loss affects the ability of our individuals navigating the healthcare system and also how it affects our personal health as well.

So on the upper left, we have the first article by Dr. Genther back in 2015 demonstrated that with advanced and severity of hearing loss seems to also increase the risk of

hospitalization for older adults. So in this case, mild hearing loss seems to carry a 16% greater risk of hospitalization compared to their hearing peers. When you go up to moderate range for hearing loss, that number jumps up to 21%.

The next thing is down below by Dr. Reed, actually looked at the per capita basis found that these individuals with hearing loss had a $22,000 increased healthcare cost over 10 years. And he also found that emergency department and hospital rates were much higher than their hearing peers. And this was, again, after adjustment. There were many socioeconomic, demographic and health factors.

Again then on the bottom left by Dr. Chang found that those who actually had hearing loss and also reported trouble communicating with their medical staff, and this was again the older adults, had a 32% greater risk of hospital readmission. So this again just highlights that we need to make sure that we have effective commination for these individuals.

And then on the top right, I really feel that this actually offers potential promise. So by actually providing hearing aids, this actually demonstrated that we might be able to reduce the hospitalization among these individuals. So this article by Dr. Mahmoudi found that among those with hearing loss who were able to get hearing aids, their hospitalization and emergency department were actually reduced by 9% and 10%, respectively.

So I wanted now to talk about some strategies, how we can actually improve deaf or hard of hearing communication. Before we begin, I wanted to just briefly just highlight how communication breakdowns occur and how they actually start to affect the quality of our relationship with our deaf or hard of hearing patients. And so obviously with communication breakdowns among these individuals has already been well documented. What we have not done is demonstrated how little awareness and provider training is currently among our medical and health training programs. And this actually affects the ability to care for these people effectively.

So you can imagine when you have poor communication with your provider, healthcare provider, you're not only going to be less satisfied, but also less likely to understand what's going on with your health. And what will end up happening is that you're probably not going to be able to understand and follow through on their recommendations. And we already have a variety of articles demonstrating that treatment adherence and misunderstandings are recognized factors for emergency department visits, as well as readmissions in the general population. This has not been well-studied for the deaf or hard of hearing population, but I expect that that would be the same case for this group as well.

The other group I want to just highlight is that deaf signers, keep in mind there's roughly about 0.5 million to 1 million deaf American Sign Language users in this country. And one of the key things that I see with this population is frequency of misdiagnosis or mistrust within this population. And many of these individuals have compounded issues about language and communication barriers. So they are not only communication different language, but they also have the same barriers in terms of communicating and not able to hear.

But what's different about this group compared to the hard of hearing population is that they view very differently from what we have in our medical establishment is that hearing loss is not a disability in their viewpoint. They actually view it as a cultural identity. And so that differs quite a bit from the rest of the deaf or hard of hearing

population in which they view their hearing loss as a disability. So it's important to understand that patient values may differ among that group, and we need to make sure we understand it before just labeling it as a disability or something negative. This also, because of this rift often with healthcare providers, has generated quite a bit of mistrust. And I see that, unfortunately, in mental health and also in primary care.

And then the other thing, just to complicate things further, deaf or hard of hearing individuals are 7 times more likely to have inadequate health literacy compared to their hearing peers. So that actually impacts their ability to navigate health care and also to understand and manage their health conditions.

So we are right now celebrating our 30th anniversary at the Americans with Disabilities Act. And this is really a landmark law that really paved the way and provided greater access for many people, including those with hearing loss. But unfortunately, the law is still pretty vague in terms of what's required. But one of the things that is certainly clear is that it expects healthcare systems and providers to ensure effective communication. Now that may vary among from one individual to another individual, but it's important that we need to understand that any accommodations are not the responsibility of the patient, but the responsibility of healthcare providers and healthcare systems. And so we need to be treated that as a business or an operating expense.

So unfortunately, despite 30 years later, we regularly and inconsistently provide accommodations. And this was highlighted in a Lancet article in which they had a small group of deaf patients, and they were able to follow them and found -- and these were deaf individuals who communicated sign language. And they were given interpreters only 17% of the time that they met with their primary care providers. Only 17%. And what was even I thought was striking and worse is that the doctors were overly confident and felt that their communication was [effective], even though they did not share or communicate in the same language. So you could see that we need greater provider training just to be able to work with these people effectively.

So I wanted to just go onto the next slide to the Universal Design and Inclusion Principles. And I think this also lends well to this population as well. So on the next one here, I'm going to just go through a list of things that we have largely incorporated at our get Deaf Health Clinic, which is held at the Dexter Health Center here in Michigan Medicine. And we tried to incorporate many of these principles. So the one key thing and I tell people is that we need to be humble. We need to understand that we are largely not the expert, but that they are often the experts. And we need to be able to understand how can we achieve effective communication with these individuals. And the best way to do that is to simply ask and learn about them. But we also need to make sure that we have these accommodations set in place early on so that it's not a last minute scramble for many providers as well.

The other thing is, going down a little bit further, is really thinking about how clear communication principles do work really well here. And so again, speaking clearly at a normal pace. Face the patient, make eye contact. I'm amazed on how little eye contact that we have in medicine nowadays. So we're often -- we have a laptop or a computer. We're looking at the electronic health records and not facing these individuals, and that's going to affect the quality of the communication with them.

And one of the ways that I actually was able to get rid of the computer prior to the COVID-19 situation came up was actually using a scribe. So a scribe is a great way to take that computer out, be able to engage directly with the patient and look at them directly. And I just found that to be super helpful.

The other way is also make sure that the electronic health record is a useful tool for yourself. So I often flag charts. I put who may need additional communication assistance. How that can actually be appropriately achieved. And I'll show you in the next slide how we can actually put that in different areas.

The next thing is really important, again, from the health literacy principle is just picture is worth a thousand words, and it's important to incorporate digital aids and pictographs. We are able to pull up a lot of things online, Google images and so forth. So try to incorporate that.

And then going on to the last two, it's really useful to do teach-back and [teach-the goals], principles to make sure that these patients are truly interested in what you're saying. Don't just simply accept that or assume that they understand where if they just nod their head. But actually inquire and see if not only providing a summary, but have them be able to explain what has been shared with you.

Again, the other thing is with the use of door knock alarms. We use this, and I have also found this to be incredibly helpful to make it a more welcoming and more comfortable environment. So you can imagine that somebody's knocking on the door, they're not able to hear. They may be in a vulnerable situation, maybe changing. So the door knock alarms that actually has a light alarm instead of a sound is able to notify that somebody is going to be coming in. So again, I encourage people to think about those ways to make it more comfortable.

And then lastly, we have not used this in our clinic. It's a personal sound amplification product. But I have heard a number of people say that this has been very useful, especially in nursing homes or in inpatient settings. But keep in mind that this is not a one size fits all. So many people, while they don't have hearing aids, it's only useful for those with mild to moderate hearing loss. It probably is not going to be a useful tool for those with severe and profound hearing loss.

So in the next slide here, just an example of a fake patient. And I'm going to just briefly just talk about where we can actually flag these charts. So in the first box sort of on the top in the middle in [mid-sector] is actually under the patient's name, and there's an FYI box. It may be hard to see, but there's an FYI box and there's also a little sticky note. So these are often great spots to put specific communication accommodations that may not necessarily be a sign language interpreter. So that's a really ideal spot for me to put things in there.

And in the second one, going over to the right upper box, this is really useful for people who don't speak English or prefer sign language interpreter, especially for deaf signers, so that if they see other providers other than myself, we can get interpreters set up to be able to take care of those patients and effectively communicate with them.

And then the third box down below, it's a problem list. And I encourage people to make sure that they put hearing loss, try to be specific, because that actually helps to highlight and increase the awareness of providers knowing, okay, so this is the person that has a hearing loss. I'm going to need to be aware of that and make sure that they understand me.

So the next one here is talking about ways that we can improve the system, the healthcare system and how it actually impacts the quality of communication. So one of the things I will emphasize is that we need to have a diverse healthcare workforce, and we need to

understand that disability is part of the diversity equation. I encourage and challenge healthcare systems to have more people with a hearing loss so it actually reflects what's out there in the patient population. Because many of these people will have life experiences and also tech-shooting skills, and even empathy that could help them find creative ways to improve healthcare access for these patients.

The other thing is that healthcare systems need to prioritize policies to make it clear that accommodations must be provided. And it's our responsibility; not the patient's responsibility. So that needs to be clear from leadership and trickling down to all of the staff and providers so that they understand and carry that out.

And the other thing is we need to make our healthcare system a user friendly system. It's amazing how complicated our system is, not only just trying to navigate through the forms, but also trying to go through different clinics, trying to go through referrals. So we have a lot that we can do to try to simplify that.

The next thing I wanted to just highlight and just give a shout out to our staff members at the Dexter Health Center. They are really key players. They play an important role with the deaf or hard of hearing patient care. And when these patients ask for appointments, the staff are really the ones that help to not only document their communication needs, but also set up accommodations as needed. So waiting for until your arrival on the appointment slot, it's really just a recipe for disaster. So we're trying to avoid that, minimize that, and so we try to be proactive and prepare.

The other thing is that staff have also, they made a number of simple forms to help with check-in and check-out processes just to really kind of make it easier to get in and out. And that really has been also effective in minimizing some of the confusion up there.

And then the other thing I -- you can see this little picture here is something called a UbiDuo2. There's also another equipment, an older one called Interpretype. And these are two-way typewriters, and they can be very useful typing back and forth. The reason why these are better, no writing back and forth. It's hard to understand people's handwriting at times. So this is a more effective, quicker way to go back and forth. So that's another tool that can be useful in a number of clinics, too.

And then lastly, we offer -- generally once a week we do like a lunch hour sign language class. A great way to really improve the hearing loss awareness. Also get some of our staff members to be more comfortable with conversational sign. And that also, again, really makes it more welcoming for the patients.

So the next slide here, wanting to talk about ancillary communication. So, many deaf or hard of hearing individuals use relay services. And this is available for anybody free of charge, and it helps them to be able to use the telephone. And the other thing is that it can be provided both in a text telephone or video relay service. So an example of a deaf hard of hearing person, they may be able to call or relay operator or interpreter. And if they're calling the interpreter, they're going to be using a tool call a videophone. And so when they communicate with the operator or the interpreter, that person then voices whatever is being typed out or signed to the hearing person. So they're really sort of a tech interpreter or a technology person to kind of facilitate that call. And then when the hearing person such as a staff member speaks back, the operator or the interpreter will be able to either type our or sign out the message, and then they can go back and forth.

So again, this is free of charge, but it's important for staff members to be comfortable knowing how this works. And then the other thing is also really useful is to identify what

kind of telephone preferences they have. Do they use a video relay service? Do they use a videophone? Do they have a cell phone they prefer, or does it need to be set up so that they can hear you better? And then for certain clinics, unfortunately we don't have this here yet, but texting is also a great way to be able to mitigate some of those gaps, too.

And then we often try to assign proxy family members as backup contacts. That's been very helpful, along with patient portals. So patient portals, again, just remember for certain individuals, if they have lower literacy or even online or digital literacy issues, these are pretty tricky for those individuals. So just a caution there. And then lastly, set up the television in the waiting room with closed captioning. This is just yet another example of making them comfortable when they come to your clinic.

The other thing I wanted to just highlight how important it is to screen our patients. I'm a big believer that you need to screen everybody to identify who may be at risk for communication barriers. And this was part of the project. We have a screenshot from a best practice alert. And one of the interesting things that we've learned from this project is that by doing this best practice alert and prompting healthcare providers to simply ask, "Do you think you have a hearing loss?" And then prompting them for possible audiology referral to address a hearing loss. But what we noticed is that there was a huge indirect benefit is that it made the providers more aware who and who did not have hearing loss. And so we noticed that certain people started to pay more attention on how they were talking or communicating with these individuals. So that was exciting to see. And I hope that this will be expanded and just provide so many tools so we can identify these people better.

So the next slide here, I wanted to just briefly spend some time talking about the COVID-19 pandemic. This has certainly affected us in so many different ways. And with the COVID-19, it's really affected deaf or hard of hearing people not only in the healthcare setting, but also across society. So hospitals and designated clinics have set up to manage COVID-19 positive patients by doing a number of restrictions, reducing ability for the deaf or hard of hearing patients to communicate. So a classic example is using a face mask. And unfortunately, many places have not really come up with good solutions to overcome that. So I wanted to spend a little bit of time talking about how that could be overcome and what do we do to improve the quality of the communication in this unfortunate time.

And then the other thing is we need to just remember that despite the pandemic, we are still obligated through the Americans with Disabilities Act to ensure effective communication. And so I can even just tell you personally that even a simple trip to the store is now much more difficult for someone like myself. Everybody is masked. It's hard to understand. And so while masking is a critical tool to help reduce people's risk, and I encourage that, but we also need to decide how we can mitigate some of those communication barriers. And so on the next slide, I want to just talk a little bit about ways that we can actually overcome that.

So one of the things is that we have greatly ramped up virtual health. So we have virtual care appointments. These are often available in telephone, but also in video visits. But video visits, we need to pay attention; are these actually creating barriers, or are we making them accessible? So an example of deaf signers, we need to make sure that we ensure a three-way video visit because that allows an interpreter to participate. And I'll show you a mock three-way call in the next slide. But Zoom, especially if you subscribe to a Zoom that has HIPAA compliance, greater security, will allow you to do that.

But many of our electronic health records are able to work with virtual health and

Amwell, which can provide capabilities for these three-way video visits. Many academic centers also offer these because a medical student in education, they have preceptors, medical students and patients participating. So check and see if you have that capability because it really allows for the deaf person, the interpreter and yourself to participate in a video format.

And video formats are really, really critical. They provide a lot of information. So we can actually see the person. We can see if they're clinically well. And that actually allows us to have interpreters who are medical interpreters rather than those who are like relay service interpreters who are not medically certified interpreters. And then by going through telephone visit through a relay service, we're not going to be able to see these people. And that's going to reduce not only the amount of information we can learn from the patient, but also lower the provider-patient engagement they report.

So this is an example of we have two -- just demonstrating a mock three-way call. So both of these are staff interpreters here at Michigan Medicine. So just demonstrating calling this mock deaf patient, and then the interpreter's actually signing "sick" for that patient. And so this format can really help me not only see that that patient, is she feeling okay, but the person also could see me, but also have acceptable communication through the interpreter.

The next thing is what can you do about the mask? And the need for clear mask is exploding. And fortunately, there are two FDA approved mask suppliers. Safe'N'Clear and ClearMask are both now currently approved. Both provide a clear viewing of the lips, which could be helpful for reading lips or seeing the facial expressions. These masks are also useful for children and other people with communication difficulties. And I just recently gave some trial masks to behavioral peds clinic, and they actually have found that to be super helpful not only to reduce the anxiety among pediatric aged patients. So, something to think about. Again, this is just yet another principle of universal design. This should really expand the number of these clear masks everywhere.

And then the other thing is so in the bottom picture here, for highly aerosolized situations, we cannot use the above Safe'N'Clear or ClearMask. They are not approved for that purpose. And so in that situation, you have to think about using a powered air purifying respirator instead. And these are not cheap, but it does provide another way to have a clear viewing panel.

So this is an example, it's a picture. I am standing next to our iPad mounted on a pole unit. And these mobile pole units were quickly set up to -- because the staff interpreters were no longer able to meet patients in a variety of clinics. So we had to quickly ramp this up and allow for patients to have access to interpreters. And so our staff interpreters were able to call through these iPad devices. This was done to not only to serve our precious personal protective equipment early on, but the staff interpreters were also being protected until we could get them trained. Our staff interpreters are now available to come in person since there's more availability for PPE. And there are certain situations in which an interpreter needs to be present. So in this case, deaf/blind needing tactile signs, there's no way to overcome this even with a more remote interpreting setup.

There are additionally a number of other ways that can help for the greater deaf or hard of hearing population, and those are writing tablets or communication boards. We call them boogie board. So they are available to inpatient units. These are really helpful tools to be able to do quick chats back and forth. For anything longer, though, I would strongly encourage to not only have an interpreter or to provide captioning services. These are useful for just short conversations.

And then lastly, you can see this picture below with a bar going through the ear. It's a universal picture that's used to demonstrate that a person has a hearing loss. I can't emphasize enough that signage, especially properly placed signage, really can play an important role improving that communication quality. When the providers or the staff members are aware that there is a person at risk for communication breakdown, you will often see a change in their behavior and their approaches and hopefully improve the quality of communication with that patient.

So in personal devices, we fortunately arrived at a time in which our smartphones and tablets are so critical in terms of how we communicate effectively. And many of these smartphones or tablets come with apps, and they have automatic speech recognition. So examples would be Google Live Transcribe, Otter, Ava and Interact Streamer. Many of them actually provide a short or a limited number of hours for free. But if you need more hours or need a better quality program, there's a small subscription fee. Many of them are usually around like about $10 or so per month. So it can be another tool, especially for those in the community, again, for short conversations. It's important that you need to speak clearly into the phone for these to work effectively. There are still going to be some errors, but again, they're improving on the accuracy. So, it's an exciting tool and resource to check into as well.

There are limited availability. It's again a subscription plan where deaf signers can actually contact other interpreters online through apps. And these are more used in a community setting. Keep in mind that we are responsible to provide these accommodations free of charge for our patients.

So one of the other changes that I have started to do since the COVID-19 pandemic has hit us is really thinking about how we can empower our deaf or hard of hearing individuals and their caregivers. So I actually now spend a couple minutes with my deaf or hard of hearing patients to really explain how they can actually prepare for possible hospitalization. Keep in mind that many of us are going to be hospitalized due to the COVID-19 situation, so how can we prepare for that?

So just briefly just talking about some of the technology tools that may be useful. Also having a hospital kit or a bag. Not very different from what a lot of mothers and fathers do when they get ready for the birth of their child. So it's important to really just have a bag ready. The bag can also include the chargers that have extra batteries for hearing aids or cochlear implant batteries as well. But the other thing is it's really just trying to get them to be comfortable, not be shy, but talk to the healthcare team members and say, "I have a hearing loss. I need to borrow accommodations. Please be patient with me." And then the other thing that's also useful is to bring prior records, as well as family history and medications.

And then the other thing that I encourage them to do is be proactive. Call ahead. Make sure that accommodations are being set up. Check regularly so that if not, they don't arrive without accommodations being set up.

And then lastly, wanted to just really talk about communication access plans. These are also kind of like birth plans. They provide how you can achieve accessible and effective communication with these individuals. And so they're really useful, and they should be part of a medical chart as well. And they can be placed with the head nurse to be able to communicate with the rest of the team as well.

So, other assistive devices. We obviously know much about hearing aids and cochlear

implants. They both have been very helpful for millions of Americans. But it's important that during a hospital stay, you need to make sure that they're in good working order. We need to make sure that batteries, there's enough batteries for them to get through the entire stay. Do they need battery chargers? So this again is something that we need to be aware and help them so that they can be able to communicate with the team.

Hearing assistive technology, again, I mentioned earlier personal sound amplification products can be very useful. But keep in mind that this is not going to be a solution for those with severe and profound hearing loss. But it can be a useful tool for mild to moderate. And they're not expensive. So some devices like a Pocket Talker, it's going to be about $100. Some of them are even cheaper than that.

And then the other thing I was talking about earlier is this speech to text apps. So again, Ava and Live Transcribe, these are again programs that we can have ready. It might be a good idea to have that downloaded on your phone, be able to facilitate for these quick, spontaneous conversations to be able to work with these people.

But then lastly, it's again the closed captioning in the hospital TV is really critical. And when I was in the hospital with my wife when we had our second son, I was amazed at how much information was shared through our hospital TV, not only for health education videos, but notification about meals and so forth. So make sure that the closed captioning is also working.

So in terms of future steps, they're not quite there yet, but there are a number of research programs. They're very experimental at this time, but signing avatars. So these are really going to be helpful for people who are deaf signers and primarily communicate in sign language. Again, I expect that this will be something down the road, possibly in the next decade would be another tool that can actually facilitate communication back and forth. And then keep in mind, it's amazing how much better in terms of the automatic speech recognition with many of these programs now are free apps. So take advantage of them. They are continuing to improve.

And then lastly, the wearable devices. So not only smartwatches, but smartglasses really will offer another tool and delivery mode to provide accommodations. They have captioning or even interpreter be able to be visible through these devices. So it's an exciting time with technology potentially helping in a number of ways.

Then just wanted to wrap up here. I want to just emphasize that remember that the patient through their life experiences are often the experts. And we need to be humble enough. We need to really ask them and learn from them as well.

So I'm going to wrap up here. And I will also provide my contact information if there's anybody who wants to reach out or has additional questions. And I'll stop here and then I'll take a look at the question-and-answer and hopefully get through as much as I can. Thank you so much.

So I see the first question here. "In terms of working telephonically, I was wondering if there are any kits for talking with hard of hearing individuals over the phone." So again, one of the important things to recognize is that when you talk to these relay service operators or video relay interpreters, many of them may initially sound like a sales call. So be patient. It's important to learn what they sound like so that you're more prepared for the next time. And also remember to speak clearly, slowly. Make sure that the communication's going through.

Some people may actually just prefer an amplifier on their phone. So, some people may need just a brief few seconds to be able to hook up their amplifier or to adjust it. So, just be patient working with these people and just simply asking if you have a notification in the chart saying that they have a hearing loss, just say, "Can you hear me okay with this?" And then see if they can. If not, what else can be done.

Then the next question I have here, "What are the accommodations for cognitive impairment due to deaf or hard of hearing individuals?" So this is an extremely difficult group to work with because of the lack of accessible tools. We don't have many validated tools for this group, not only to assess their cognitive in terms of the cognitive decline, but this is a group that you're going to need to understand -- are going to require more effort to communicate. I would strongly recommend the use of teach-back, teach-the-goal, work with them, use of visuals. Caregivers also could be really critical. They could be very important to help facilitate some of this as well. But this is a group I think we're going to see more research, try to figure out what are best approaches. Also, how can we assess these people effectively? So it's a hot topic, and I expect there'll be more to come in the upcoming years. But again just to take the time, also summarize, provide teach-back, teach goal would be probably the next step to do that.

So next question here is, "Any helpful strategies for adolescents with hearing loss who are resistant to using hearing aids?" So again, after cost, the refusal to use hearing aids is usually because of vanity and stigma. So keep in mind, this may not necessarily just be somebody who's vain, but may struggle with other peers maybe picking on this person just because of the stigma that's connected with hearing loss. So it's important to be patient, also to provide some support.

In this case, I would strongly recommend to connect this individual with a variety of social support or peer programs. So depending if it's a cochlear implant or hearing aids, there are a number of organizations that I would encourage you to check into. So the National Association of the Deaf often have a number of youth camps. The Hearing Loss Association of America also offers camps for youth as well. And so I would encourage them to get connected. It's nice to have other peers similar to yourself, and that will hopefully help make them more comfortable using these hearing aids.

And then the next question is, "Can hearing aids help when someone has hearing loss with tinnitus?" Now keep in mind that hearing aids may or may not help. This is also a tricky area in terms of the ringing in the ears. Some people may also have dizziness or even vertigo-like symptoms connected with this as well. There are some medical treatments for it. My suggestion if somebody is still struggling even after the usage of hearing aids, I would encourage them to follow up with their ear, nose, throat doctor to explore what other treatments that could be done. These are largely not going to be something that's going to be addressed primarily through medications. And with hearing aids, I've had mixed results. Most of the people usually have to follow up with the ear, nose, throat doctor to explore other types of treatments as well.

The next question is, "I was interested in the frequent comorbidities with hearing loss. And is there a cognitive information between things like dementia or hard to see to hearing loss?" So, it depends on the health condition. So for cognitive decline, we actually have pretty good information that hearing loss actually can result and cause increased risk for cognitive decline. The reason for that is that when you develop hearing loss, you automatically lose a lot of stimulation to your environment. You lose stimulation and the ability to communicate with your peers, your close loved ones. And what that does, it actually reduce the amount of information that you normally process.

At the same time, trying to navigate in a world, a hearing world with hearing loss, it's very difficult. And so that actually increases the level of stress, increases the level of demand on the brain. So instead of being able to focus on higher learning or other items, it's instead trying to cope and manage all the additional stress just to get basic information. That's why it's so critically important to make sure that we have an acceptable and effective communication in our healthcare environment. It helps to reduce the anxiety and stress and be able to manage these conditions better.

For heart disease and diabetes, we are less clear on the causality. Most likely for most of these people, though, is that there's going to be microvascular damage to the hearing apparatus. And so people with diabetes, cardiovascular disease over time, due to inflammatory mark changes and vascular changes, will end up destroying their hearing. So we expect that it's probably in some cases conditions leading to an elevated risk of hearing loss. So it can actually go both ways.

"What is being done from a political action perspective to get insurance, including Medicaid and Medicare, to cover hearing aids?" So, this has been a longstanding battle. So, many people are working hard on this. Unfortunately for Medicare, it does not cover hearing aids, and that's, again, why that's such a huge cost barrier. Medicaid, depending on the state, may actually cover hearing aids. So for example, in our state of Michigan, recently we did get coverage through Medicaid, and we're hopeful you can follow up and see how that is able to improve access to hearing health. But you're right; for Medicare and for many health insurance, we don't have coverage for hearing aids. And that's just continued to create an enormous gap, especially for those with lower income.

And so again, I encourage people to reach out to their government leaders to advocate for this because this simply I feel is a wrong -- it's a wrong thing to do. We need to ensure that all these individuals are able to get the appropriate hearing aid, cochlear implant or whatever hearing assistive technology they need. And I think that really does have an important role not only with healthcare use, but improving their health.

The other thing I want to just highlight is that there is an Over the Counter Hearing Aid Act that has been passed by Congress. It was passed in I think 2017, if I remember correctly. And that was partly a response due to the high cost of hearing aids. And the Over the Counter Hearing Aid Act, what it's trying to do is get more players to get involved and allow for the sales of hearing aids over the counter. And so we're hoping that we'll see more coming from Apple, Samsung, Nokia, big tech players, and they are going to be providing products very soon. Some of the -- there are some I know already available in places like Australia. And there are also some apps that can work with smartphones. And so it's another way to try to customize and use our available technology to improve the hearing.

So again, these are probably useful tools and strategies for those with mild to moderate hearing loss. But there needs to be a lot of advocacy to -- we need to be able to help these people. So I totally agree with that.

Rebecca Gleason: Dr. McKee, we have time for one more question before we conclude. Thank you.

Michael McKee: Sure. Let me just take a quick look here. I see here, CART, for example, is communication access real-time translation. So it's a way to caption? So that can actually be useful to provide captioning for people who need to be able to read the text instead of trying to listen to hear it.

And then briefly just recommend any personal sound amplification products? I have not

used them personally, but Pocket Talker is one that has been around. So I probably would start with that one as well. So, I'll stop there.

Rebecca Gleason: Thank you, Dr. McKee. That was an excellent presentation. I know there were other questions, but they were very good questions, and we appreciate you taking the time to answer them.