21st Century Audiology: Uncharted Territories in Science, Policy, and Professional Practice,
presented in partnership with Salus University
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- [Christy] At this time, it is my pleasure to introduce Dr. Kelly Tremblay, who will be presenting Uncharted Territories in Science, Policy, and Professional Practice, a part of our 21st Century Audiology series, in partnership with Salus University. Dr. Tremblay's research is aimed at improving hearing and communication for people as they age. Dr. Tremblay, a neuroscientists and clinician, uses her knowledge about the aging brain to inform and improve auditory rehabilitation services for older adults. She uses a combination of laboratory and community-based research to address the hearing health of aging individuals in society. She disseminates this knowledge in many ways, including serving on public and policy advisory boards such as the World Health Organization and the Hearing Loss Association of America among others. The National Institutes of Health has consistently funded her work for almost 20 years, and she has published approximately 100 manuscripts. She is a newly retired professor with tenure from the University of Washington in Seattle. Thank you so much Dr. Tremblay, and at this time, I will hand the mic over to you.

- Thank you Christy, thank you Kimberly for your help this morning, and I see the roster is increasing. We've about 68 people online and I'm sure more people will be joining us as we start. But first, I just wanna say thank you, thank you for joining me and asking me to speak on this topic. It is uncharted territory, literally, and I think the presentation will be as much me providing information that can provoke thought and can provoke action by the people who are listening this morning or this afternoon. I also wanna encourage people to listen to the next session on the 21st Century Audiology where Brenda Ryals will be speaking about hair loss, new breakthroughs and research in terms of hair cell research, whether it be generate, regeneration, or prevention, because that's gonna be a really exciting area to watch in the next 20 years. So let's get started about what we know now, and until we can prevent or cure, eliminate hearing loss, we're stuck in a position here about how to navigate what we have, and what, and just asking ourselves, what do we have? What is the challenge ahead of us? I think the first thing that would come to all of our minds is these deregulation, re-regulation of amplification devices, and how is that gonna affect us in the clinic, in our

practice, and how is it gonna affect public health? So let's start by a few disclosures that I need to make. Some of them have already been made, and that is that I serve on many of these boards, and I'm gonna use this opportunity to share some of the things that I've been a part of behind the scenes with some of these boards, which have, is contributing to some of the change we're observing now and that we'll see in the future. So I hope that excites you to get this straight from the source so that you can go out there and share it with the, your colleagues in your clinic, and your communities and your state. If I do make any reference to products, not, just sometimes I'll just bring out some examples, it's not intended to, as an endorsement. I don't get paid by anybody to say their product. I don't have any conflicts of interest with any manufacturers or anything like that. So if it slips out of my mouth, it's meant to be a teaching aid and not an endorsement.

Okay, so where are we, where are we? It's uncharted territory, and depending on who you are, from your perspective, you might say we're at a fork in the road. It may be that, oh, do we stay, go to the left and stick with the medical model? Oh, do we go to the right, do we just embrace all that's out there in terms of assistive technology out there and make it a free, open market with, that is deregulated as a whole, so that older people can get the needs that they meet, that need to be met, and we're good. Some people describe it as more of an organized mess. In this case, I wouldn't call a rubber band an organized mess. Each band has a purpose, and I would say that in our practice, we have things that work very, very nicely. So maybe we just bring all of these tools and processes that we have already in existence, put them altogether, collect them all, and then figure out how best to connect these paths, or connect these bands in a way that will hold us together. So I think that depends on whether you're an glass half empty or a glass half full person, but hopefully, I can give you a bit of background about what led us to this point, and put some organization and perspective that helps us to understand the components of this, of where we are, and in a way that maybe will shift your perspective a little bit, and help you contribute your own ideas about what solutions we have in the future. So in, by doing that, I hope to accomplish these

three learning objectives, and tell you a bit about why public health initiatives are provoking and promoting changes in policy and practice in relation to older adults who have hearing loss. I want to hint at what I think, if I had a crystal ball, will be a new culture of emerging interdisciplinary areas of research, and in turn, how they will affect policy and practice. So I think, given the focus on the whole patient and patient and person-centric care, it may be that we end up, by the end of this talk convincing ourselves that our practice may not be best served or best applied as a singular auditory-type practice, perhaps integrating vision and other types of sensory comorbidities that occur in older adults. It may be worth revisiting. Then let's talk about the many potential ways to make change in our practice. So, you know, how is this, some of theses things can change your practice tomorrow, and some of them may be a decade away.

So with that, let's talk about this, these objectives, starting from the first one, and emphasize why I'm focusing on older adults for this talk. Well, we all know these statistics, that hearing loss is the most prevalent sensory loss in older adults. We're looking at one in three adults over 65, one in two over 75. So we've got a large population who has needs to be met. I also want to emphasize older adults in that that's the focus of the uncharted territory. But when looking to the future, it's always good to look to the past and remind ourselves where we've been. If you have a chance while I'm talking, if you could just text in, I'm curious to know, what year did you get your audiology degree from? So if you can put that in a chatroom or something, and that'll get relayed to me, that will be interesting to see, because as much as we're, feel like we're in a hornet's nest right now about how to get and when did we get, how do we get through this pathway of better meeting the needs of our older adults, this is not unlike what we've experienced decades before. So I'm looking at the dates that are coming up. 2013, 2017, 2005, Jennifer, yours was in 1997 that you got your degree. So most of you are recent, are practice, have been practicing in a, a decade, or practicing in a culture where newborn hearing screening is just automatic, and you may not know how we got here, and how in some ways, there are similarities to what we're going

through now, and the struggles we went through in the '80s while trying to institute newborn hearing screening. So there are some parallels that we've written about. There's two papers that you can look at. One is Brian Taylor's and my comment in Hearing Health Matters, and then there's a paper in Ear and Hearing that Kelly Reavis and and Gaby Saunders and I spoke about. So I see a few of you are from the '80s, and that's where I graduated, in 1987 with my degree in audiology and practiced for a number of years. We went through a lot of growing pains in the '80s, because we had a problem that's not unlike what we're experiencing today. So in the sense that we need, we have an unmet need. We have a population that needs to be identified earlier. In this case, it's, well today, we're talking about older adults, but back in the '80s, we were talking about newborn babies, infants. So back in the '80s, there was a need to identify hearing loss earlier because untreated hearing loss led to developmental delays and missed opportunities for intervention. The problem was part, well, do we educate all parents to looks for signs of hearing loss?

But if we took that approach, it's almost too late, because the average age of identification of hearing loss was two years of age. Even if we could educate all parents or educate all physicians, some of the behavioral manifestations we needed to be able to recognize hearing loss, like lack of awareness to sound in babies and things like that, again, was not evident as a newborn. So the problem was further enhanced by the fact that we had insufficient number of audiologists to provide testing at birth. There just weren't enough audiologists to go around, and even if we did have enough audiologists, would we screen every baby, who would do the screening, and what tools would we use? Back in the '80s, we had this little loud speaker that we would put by the baby's head and make a loud noise, which is now, from our perspective of noise-induced hearing loss, it was terrible. But we just looked to see if the baby was startled, and responded to that loud sound. So we had a lot of obstacles to go through and we had a lot of growing pains. Today, it's taken us to the point that we needed to solve some of the problems that we could, and some of them included the fact that we moved from just using a noise box in a nursery carriage to using the high risk register.

Well, maybe we only test babies who are, fall, hit into one of these high risk criteria for hearing loss, and we emerged and improved our tools. So instead of having that loud speaker, we also had a crib-o-gram, which you may or may not be familiar with, but we moved along to ABRs and OAEs. Other problem that we have found some solutions around is, you know, we've been able to work with trained volunteers in some cases, and we have deployment of audiologists because we have now time efficient tools and a market that is able to be reached by constraining the number of babies that are being tested. So we've worked through some of these problems, and today, we are at 95% according to CDC. 95% of all newborns born in the USA are screened for hearing loss shortly after birth. Whether that's prior to discharge or not, those definitions can change, but it's exciting to think that 77% of the children confirmed to have a permanent hearing loss were enrolled in intervention programs by six months of age. This means that we can capitalize on that early brain developing by getting sound to the brain earlier than ever.

So this is a success. This happens now. If you were just trained and working in the last decade, you may not know all the growing pains and the decades of research and careers dedicated to this movement. It took a lot of compromise on the part of audiologists, because back then, in the '80s and '90s, the idea that we would have a non-audiologist, a volunteer, replace us in the newborn nursery to do this job was very, very heated, and very political. It took a lot of change in perspective. As opposed to it being a turf war, where, this is an audiologist's job that should be doing the test, not a pediatric neurologist, which, in often the case, newborn hearing screening programs are sometimes under a neurology. So it took a lot of effort and a lot of perspective changes for us as a profession to view this, if we viewed it as a public health problem where we didn't want babies to go undiagnosed, and if the most effective methods of research would suggest would be to instill newborn hearing screening programs, and the risk was low to harming our patients, then perhaps we could step away from our gold standard practice of pediatric testing and embrace, in a way that was efficient and could meet the needs of a larger population. So that perspective and those challenges

are not unlike what we're experiencing today. Today, we have unmet needs of a growing population of older adults with hearing loss. We know that untreated hearing loss has many social, financial, and health consequences. Our approach, how do we approach this problem? Do we educate all adults about signs of hearing loss? Well, that's being done very well by the National Institutes of Health, The American Speech and Hearing Association, the American Academy of Audiology. There are a lot of campaigns, public health campaigns, that are out there, and public service announcements that are out there to educate people. But that doesn't necessarily mean that they're motivated to seek help. Even if they do seek help, what do, can we provide them? Are our solutions accessible? Are they affordable? These are still problems that we wrestle with. What we do also know is that there is insufficient number of audiologists to meet the need.

Then let's just get philosophical here in many respects. Should we ask ourselves the hard question, and that is, does presbycusis need to be managed within a medical model of auditory? If you think about it, there is nobody that can replace us, if you can think about how to assess pediatric hearing, pediatric audiologists, that cannot be replaced by anybody else when we look at the assessment and the fitting and the management, the counseling that goes with all that. What about otitis media, 18ARF tumors, Meniere's disease? All of these medical problems belong within, the treatment belongs within a team approach, which falls nicely within a medical model. But when we get to presbycusis, where there's no medical intervention available, and it's not a pathology that can be treated surgically or pharmaceutically, it begs the conversation, as challenging as it may be, is to say, well, is it really a medical problem, and does it need to be addressed with the gold standard of audiology that we're trained to provide? Well, on the one hand, I'd say yes, as an audiologist, because we want to make sure that that presbycusis-looking audiogram doesn't have something else behind the audiogram that goes left untreated. How do we know it's just presbycusis? I also don't want to provide any risk by having that person suddenly buy something over-the-counter that may be louder than what they need, or not have the compression

activations to help protect them from further damage that will jeopardize what they do have. So that's my audiologist's hat on. The public health hat on says, well, that if we don't expand our medical model and our, the number of audiologists we have to treat people, then people's needs are gonna be left unmet, and they're gonna go somewhere else to find help if they want it. So we're kind of in a damned and a do and damned if you don't situation, and how we reconcile that is part of our uncharted territory for the 21st century. So these are debatable questions. We don't have all the answers yet, and it's gonna take time. I don't think this is gonna change tomorrow. It's gonna take time to find out and find evidence of what's working and what's not. So if we can be patient and we can try to shift our perspectives and open our perspectives to what hearing health care might look like in the future, you might be surprised at how malleable our perspectives can be.

So let's just do a little exercise here. If you look at this picture, a few of you just put in the chatroom, what comes to mind? What is your first impression of this scenario? Tell me what you think this scenario represents. Just no wrong answer, just put an idea out there, and I'll listen, I'll wait. Okay, man helping his wife, husband helping wife, son putting on the device, okay. Carolina says self-prescription, self-prescribing. Okay, so what's your first impression of this scenario? I think that depends whether you were trained in the '80s, the '90s, or in the last decade. Again, I was trained in the '80s when most audiologists were older adults, older males specifically, less females, and so this being a, an example of a senior audiologist adjusting things in his waiting room with his client, his patient, would be very reasonable. Some of you mention that it's probably, maybe somebody helping his wife, and so perhaps they, and then if you were trained in the '90s or millennials, this may very reasonably be an example of someone who purchased a hearing aid at a clinic but then came home and the husband or brother or someone is helping them put them in. But nowadays, I think the first thing that comes to mind, depending if you were schooled in the last five years, is maybe this is a direct to consumer purchase. Maybe this couple just got their hearing aid in the mail, and they're trying to make, have it fit. So I think if you think about the perspective on this, if

this, if my perspective has changed from the '80s to how I envision this scenario now, just think about how it might change in the next 10, 20 years. So let's fast forward a little bit to say that for this reason, we need to have an open mind about what the future of hearing health care delivers, or looks like, and we can talk about what science is telling us now, and what policy changes are being promoted now so it can help us understand how that might impact our professional practice. So let's start with the science. Where are we? Well again, looking from the past to the future, back in the '80s and '90s, science of the past was mostly ear-centric, the idea that if we just make sounds louder, our patient should be fine. If we just make in the ear, the sounds, the, improve aided thresholds in areas to improve audibility, we should be fine. It was all about audibility. This was still the case, even in the '90s when I did my PhD, and I did my PhD in neuroscience. At that point, professors, and professors who are still alive today, at, in the hallways at our conventions, would tease me and say, "Oh Kelly, why are you studying the brain? "We all know it's just stuffing "that holds the ears together."

So this was the mid '90s, this was not long ago, where people still didn't necessarily understand the contribution of the brain to hearing. Well, we know that the brain is an integral part to our profession, and our tools and our approaches now gladly include counseling and evaluations of the central auditory system, and rehabilitation is now done with the brain in mind. We now have new scopes of practice that involve cognition and information and counseling about cognition. So we've come a long way. But where are we going? Well, let's say we are looking at what the science says, and just break it down into a couple of key points that I think are relatable to how you practice on, tomorrow. The science says about older adults that they are at a double disadvantage when it comes to the brain. What do I mean by that? You can look this up in a publication for Ear and Hearing. It means that as we age as an older adult, we first start to find that we have central effects of brain aging. It's sometimes referred to as CEBA. If we were to look at the brain as a living organism like we are with the tree on the left here, and if this were young age, moving to old, old age. This is

metaphorical, but we know that the brain shrinks, we know that the networks and the neurons' connections prune. If we don't use them, we lose them so to speak. We know that white matter and gray matter and the connections change as a function of age, all setting us up for a less than optimal scenario structurally and physically to be able to make use of sound, and use not just sound but music. Not just sound, not just speech, but speech, music, making sense of emotional communication through our face, integrating lip cues for speech reading. Putting all this information together involves multiple aspects of neural processing in putting those signals together.

So let me give you an example as it relates to hearing loss specifically, and how it relates to auditory rehabilitation, specifically hearing aid amplification. So if we take EEG for example, and we use the following feature frequency following response that you learned in class during your training, we can describe it as a frequency-following response in that the brain stem is able to lock on to the different periodicity of a signal so that if this signal is stimulus coming in, let's say a 500 hertz or a 500 hertz signal, that the brain stem will lock on to the condensation and refraction aspects of the signal, and be able to mimic it in a way that contains the same periodicity as the stimulus through these neural firing patterns. When doing that, that signal then is relayed up to the brain to say that I heard a 500 hertz tone. If the stimulus was 1,000 hertz tone, the brain stem encodes it, and we're able to perceive it as 1,000 hertz tone. Not that we describe it as 1,000 hertz tone, but it's in that frequency range. Well, older adults and the human brain are at a disadvantage of encoding simple sounds like a pure tone or complex sounds like a speech signal in the human brain stem. So let me give you an example. Let's take a 1,000 hertz tone, and let's present it through the insert earphone, and then through the EEG recording using the frequency following response. We can see how well that 1,000 hertz tone is.

So look here, we see a strong representation. We see a lot of neural activity nicely tuned at that 1,000 hertz for that 22-year-old. If we bring in a 43-year-old, we can see the ability of the brain stem to relay through the brain stem through the cortex, the

strength of a 1,000 hertz tone that's much more reduced in amplitude. It's not a very strong signal compared to the background noise. Then the 77-year old, you can see that the signal is not much greater than neural noise that's going on in the older brain circuit. So what does this mean? What does this have to do with the science of today, how it impacts policy, and how it affects your practice? Well, what if I told you that all of these adults had the same audiograms? The audiometric configuration was 20 dB or above or better, all the way up to 8,000 hertz? So it suggests that even if you have a normal audiogram, sending sound from this guy's ear to the brain is not as clear or as strong a signal as this 22-year-old, and you can start to see this as early as middle age. So why is that? Well, if the ear appears to be working well, if, as judged by the audiogram for these people, it suggests that how that sound goes from the ear through the brain stem up to the cortex is degraded in some way as a function of aging. Because this person doesn't have significant hearing loss, we're only left to think that this is an example of the central effects of the brain of aging. This is just something that happens, that our circuits slow down, our wiring that connects the ear to the brain slows down.

So how does this relate to hearing loss? Well, what happens now if we do have some significant hearing loss? This is very typical, as you know, the older adult's audiogram. Well, if hearing, if sound is not loud enough in these frequency regions to get past the cochlea and to stimulate the brain stem and the cortex, then this is gonna have consequences that we call central auditory peripheral functions. Let's look at that. Central effects of peripheral pathology, meaning if we get the sound, if we can't get certain frequencies here, certain neural networks that are responsible for encoding that sound aren't gonna be activated, 'cause the sound wasn't loud enough to get there. Again, just like the slide we showed before with the trees, if you don't use those areas, we're gonna lose those areas. So again, relating this to hearing loss, if this gentleman here is about 65 or 70 years of age, his brain has already suffered from the central effects of biological aging that has slowed down the ability for that sound to get to, from the ear to the brain. But now, if he has decreased in audibility and we provide a

hearing aid, the idea that we are provide, expecting, is that if we make these sounds louder by providing amplification in these frequency ranges, then our job is done. That audible sound should be able to go from the ear to the brain just fine. But what I'm saying to you is that this guy is at a double disadvantage, because even if we do our best to provide a well-fit hearing aid, the clarity and the strength of sound as it reaches the brain for, that we can make use of that sound and interpret that sound is gonna be distorted. So it's no wonder that people describe you as making, having made sound louder and they're very grateful and they're thankful for it, but they may not understand, why do things still sound mumbled or distorted? I would argue that that's more of a brain problem than a hearing aid problem, and I think incorporating that into your counseling is very, very important so that people can have realistic expectations of what this device can contribute to.

So how am I focusing on hearing aids when I'm talking about policy and practice? Well, I think the reason we need to take home is recognizing that this hearing aid is not gonna be the solution in and of itself. Looking to technology is not gonna be the only answer. We need to think about the whole person, including their biology, and what would science say about that? Well, if we have, say an estimated 38 million adults in the United States experiencing hearing loss and fewer than 20% report using hearing aids for many, many reasons, some people say affordability, some of them say accessibility, some of them say stigma, all of those things, and now I've hopefully convinced you part of it, I think, is the brain, that they try a hearing aid, it's not any clearer, so they reject it, and they're not using hearing aids. We have a real problem, because if we think about what that science is telling us is that if we have someone who could use a hearing aid that is not using it, their brain is aging, and now they're experiencing depravation in the auditory system of the brain, and over, that over decades of listening to sound, it's gonna have a large problem from a science standpoint. When you look at policy, how this can be linked to policy, we can say this is a problem because not only is the, not wearing hearing aids or not having your hearing needs met, it not just impacts you, but as you, everyone knows in this

chatroom that there are consequences that affect the circle of friends and family, it affects your ability to be independent financially, often early retirement, it makes it difficult to navigate public and private health systems, like health care or transit. It makes it difficult to even hear your voice being addressed in a waiting room when a physician calls your name. It introduces relationship stress, and this is the big one: it increases the risk of cognitive decline and dementia. So we have known many, many of these consequences a long time. There's been research back in the '70s and '80s on these topics. But the increased risk of cognitive decline and dementia is a relatively new one, and it's been a game-changer for our profession, because it pushed us up further into the public health and policy domain, and why is that? Well, if you look at the World Health Organization statistics, and you look at where we are on the map, we are here in the United States, we are a blue region, which says approximately 10 to less than 30% of our population right now are aged 60 years and aged older. So if you look at most of North America, we're in that range. You've got some areas of Japan here that their population is 30% or more are 60 and over. But looks what's gonna happen by the time we reach 2035. We've got a lot of Western Europe here, we've got North America partially, and if you focus this out to 2040, United States is right here.

So we have a large portion of our population getting older, which means that we have a large portion of people having hearing loss and needing help. So given the current statistics, if at this point we have 38 million adults in the United States, and you know how prevalent hearing loss is across adults, and fewer than 20% report using hearing aids, we are not prepared for the future. This is uncharted territory in the making. So this was, is not new to you or me today. We've been thinking about this as a profession since back in 2008 and nine and 10, where we had a wonderful kind of call to action paper by Amy Donohue And Judy Dubno and Ms. Beck, who really challenged our profession to say, are we ready for this? What are we're gonna look like? What is our hearing health care gonna look like by the time we get to 2030, 2035, 2040? Heck, what's it gonna look like tomorrow? We also had a really important paper published by Ian Windmill, that really documented that there's a low audiologist population ratio

currently nationwide, meaning depending on where you live, it may be hard to access audiology services, and when you look at the 30 year forecast, it's dismal. It's going in the opposite direction as our increased need for audiology increases over the years, the amount of audiologists forecasted to be available is declining. So all of this led to the seminal National Academy of Science and Engineering and Medicine's report that says we need to find ways to improve accessibility and affordability for health care for adults. This is a working group. How are we're gonna accomplish this? This is 2016. Well, fast forward, I don't think we need to spend a lot of time talking about the current decisions that were made that are gonna make, result in many changes as of 2020, where we see the definition of a hearing aid changing, the re-regulation of it so that you can introduce multiple types of amplification devices that do not fall under the definition of a hearing aid.

So we have to acknowledge that today, we have this unmet need of growing population, shortage of audiologists, we have a cost to society, and how it affects the brain are some of these two points of new aspects of science that are saying it's not just social isolation and all of that. We now have proof that depriving yourself of hearing loss has consequences of the brain, and the cost to society is great. So how do we approach this? This is kind of like back to newborn hearing screening. Do we educate all the adults? How do we motivate them to seek help, and what are those accessible and affordable solutions? What does the public want? Knowing that we don't have sufficient numbers to meet the needs, and this is where we start think, if they don't, then maybe we need to re-evaluate whether presbycusis should be treated with, as a medical problem within our gold standard of audiology. So today, we say that we have the cost to society. This is a big deal, and this was a game-changer as well, in addition to knowing that the neuroscience. Recent research as late as just a few months ago looked at the cost of untreated hearing loss associated with various aspects of health and found that there was an increased stay, amount of hospitalizations, there's an increased risk of a 30 day hospital readmission, an increased risk of emergency department visits and longer hospital stays, and an

average of $22,000 or more in health care costs than people without hearing loss. So this part, type of research serves multiple purpose when charting out the future. On the one hand, you can argue this in the audiologist's way to say, hey look, health insurance companies, there is an incentive for you to provide hearing health care. Let's fund hearing aids, let's provide funding for hearing aids through your health insurance policies, because it'll reduce the cost of your output to the patient over the long term, because you're gonna save money in the long run because you're less likely to be hospitalized, less likely to have more health care costs than people without hearing loss. So that's one way to spin it. Another way to spin it is, okay, if we look at the cost to society in health care, it's even a bigger problem than we thought, because if it affects society or friends and family, that's one thing, if it affects your brain, that's another thing. But until it affects money, then, until it affects a way to institute health care, it may not, it may have fallen off the radar of policy makers. So these types of studies now raise awareness to the people who are running our governments and trying to find efficient, find fiscally efficient ways to provide services to a large number of people that audiologists are not able to address as plentiful as needed, and there are solutions that we have traditionally are not affordable in the way that we needed to meet this large population.

I'm gonna give you a few examples of how we've made changes using information like this. Here's an example. One way that has just been recently published is to tell countries not to do the statistics, so not only countries in the United States, but countries around the world now will recognize what's called a human capital, and that is, untreated hearing loss also negatively affects a country's human capital. This, what I mean by this is that if you leave hearing loss, and let's think in the younger populations, untreated, or we don't have systems to say, in middle age, where we're starting to see the decline in the brain conduction of sound already and we've got people with noise-induced hearing loss in addition to presbycusis. If we can't keep people employed, if we can't keep them functioning at a level of education and health in a population, then it's gonna affect your gross economy as well, and this starts to scare people who are in

the public health domain, and now the economic aspects of government that are keeping a country productive and healthy economically. So if you put all about this together, whether it's our audiology perspective that says, you know, we wanna help people hear, we want grandparents to hear their children, we want older people to stay employed, that was all fine, that was not new. But nobody was listening to us. But as soon as you start to say that hearing loss is related, we don't have a cause and effect yet, but hearing loss is related to cognitive decline, and that could lead to Alzheimer's or dementia, that sends bells ringing. That creates a lot of alarm for many reasons. One, from a medical perspective, trying to minimize the incidence of that disease, but also, all that goes into carrying the expenses and caring, and the, of those populations, and then if we just say with older adults overall, the cost to society is something that we can no longer ignore because of the capital, human capital trade-off as well as the public health trade-off, that, we have to do something about it. The important thing to remember, and this is nicely put in Amy Donohue and Judy Dubno's paper, this is not just about selling more hearing aids, because as I mentioned, just 'cause we get, put a hearing aid on someone who's older doesn't gonna make the sound clearer.

So we've got a double problem with this population. We've got a problem with older adults having an older brains with lots of comorbidities that need to be addressed, and we know that just providing a hearing aid in and of itself is not gonna change the biology, so it's not about just selling more hearing aids. So what can we do about it? Well, this is really exciting progress. If we start from the top and we think about who legislates and who recommends, makes recommendations and guidelines, if we start with the World Health Organization, that's a great thing, because the trickle-down effect to multiple countries can be on the same page and can have at least a common plan to work with. So the World Report on Aging and Health has existed for years, and what was really a sign of the times which is good for us audiologists is that for the first time, and this was published in 2016, I, and we were asked to, invited, so you'll see a number of people from different countries, from Africa, from Australia, from England, from Geneva, Switzerland, and Canada, we were invited for the first time to

acknowledge and include hearing loss as being a major contributor to aging and health. Up until now, it had been mostly blood pressure, cardiovascular disease, things that kill you. So now recognizing that, you know what, hearing loss may be important to aging well and aging healthy. What do we, what should recommend? So I encourage you to look at this publication. This is free down on the WHL website, and if you can see what we recommended, we recommended looking at aging in the same way we look at newborn hearing health. If you don't address it early, then the brain's ability to process sound declines over decades, and if you don't look at it across a lifespan, then slowly withdrawing in middle age has consequences in old age. If you look at it earlier and provide opportunities to intervene earlier, then you can help and maintain the capacity of somebody's quality of life before you start to get, to decline. So that means, in a simple way, getting your hearing tested earlier, in middle age, and for health care professionals to look as more of an integrated approach to intervention. Not just hearing aid dispensing, but maybe we should be looking and working with optometrists and working with partnering with other allied fields where we know, people as we age, have a number of different things going on. Maybe there can be more of a collective approach to educating older adults about their health, and that includes their hearing, that may make them more engaged in their health.

So another way to look at this is this book, again, was the Handbook Life Course of Health Development. Hearing loss was never included and thought to be a critical component of this type of health management, and instead, we were able to do a whole chapter just on hearing loss alone, and really make the argument that hearing loss should be embedded in a life course model, because it embeds the philosophy that if the earlier we can work with someone's hearing for example, and the biology, the brain that's tied to it, then we can embed that philosophy into emerging biological systems that alters the trajectory of health and wellbeing later in life. So let's get to that early intervention. In this case, it's not newborn hearing screening, but it's middle aged of adults. Because we believe that there are critical timing decisions throughout the lifespan, and the life course perspective can influence how we understand and

approach hearing health. If we see it as a life course and we are about to engage middle aged adults, then maybe the tools that we use, things like this, may be more relevant to someone who is now getting hearing health for the first time in their 70s and 80s, and may not be comfortable with tablets or other types of digital technology. So there's a number of different ways we can approach this. So all of this came together in Geneva at the World Health Organization, where we had people like myself and others sitting around the table, working hard, I'm just seeing my, my little cursor won't come down. We have people next to me with someone from Pakistan, someone from Nigeria, from Denmark, from Germany. We sat around and we tried to figure out how can we make better use of our collective management and create an integrated care proposal for older people? Now, I was representing hearing loss. I can tell you, where's Negeer? She was representing vision, and other people were representing urinary health, cardiac health. So we were just hearing loss. We were only one small seat at the table.

But we recognized that even in India, even in Egypt, there are certain ways that are common across older people as we age, and if we try to integrate the care in a one-stop model where multiple things can get addressed, our likelihood of capturing people and keeping people in a health model is likely gonna be more successful than suddenly just sending them off to say, "Oh, go get your hearing test, "go get a hearing aid hear. "Oh, go get your vision tested, "go and get your vision care there." Maybe integrating these and coming up with a universal approach might helpful. We published something that you can get online for free called The Integrated Care for Older People. Now as much as this meeting was in 2015, it's taken 'til this week, and I don't know if you got the, were on social media, but we just launched the Integrated Care for Older People Care Kit this week in Geneva. We had representatives from the United Nations there to argue that policy, we're making some guideline policies that suggest that we should be starting with people and recognizing that they're complex people with chronic ailments, and if you go to number two, that we should be intervening at an early stage so that we can be in the point of prevention and preventing delays. When we look at

three, what are these priority areas, and no surprise, there is malnutrition and cognitive decline, but look at, we got hearing loss and vision loss on the priority list, including mobility. When you look at the sector, that's quite impressive, 'cause audiologists are involved, both, if you think about human communication and access and mobility and vestibular imbalance, we are involved in three out of these five priorities. We talk about dual loss, dual sensory loss with, people who are older also lose their vision. How are we're gonna incorporate AR strategies that can compensate for low vision as well as hearing loss? And then balance and falls, that's also our domain. There's a new app that's available to all of us and a handbook that we can use that can have some tools that you can use in your front clinic, that you can use with your primary care physicians to try and educate how we should all be working together to be able to help improve healthy aging.

So where am I going with this? How does this relate to the 21st century of audiology practice? I think we're gonna see a more integrated approach that we are, that we have vision people helping promote hearing, where we have mobility people recognizing the need for audiology. I see, I hope this results in more referrals to audiology. Let's look at it another way. Another way is that we can see how we have to deliver care using products that make things accessible, information accessible to older adults. So if we can see that in the medical health care system, if we can make sure that hearing aids and spectacles are available when physicians are providing information about their pharmaceutical regimen that they should be taking, or telling them test results of their heart test, maybe we can succeed in achieving this by making sure that there are assisted of products are available when needed when targeting and improving the functional ability of older adults. So maybe we can get some of these devices and help in that community level, not only just in the physician's office, but in senior homes and things like this. So this is a call to action that just came out this week that is now being marketed to people from all aspects of health care, not just audiology. So on a more national level, I'm sorry, this is aligned, we've seen this National Academies of Science has come out that there's gonna, also making

recommendations, priorities for improving accessibility and trade. So it's not just the WHO that's recommending these recommendations. Within our own country, we're seeing a shift in perspective that is taking a life course model, saying, we have to do something to meet the unmet needs of our current seniors, but we also need to put things in place that we can approach this earlier in life, say in the midlife and middle ages. At a local level, I'll give you an example, of how, and this is, I'm putting this up as an example for you, 15, 20 minutes at my state, testifying in front of the Washington State why it's important to be able to make hearing aids more affordable and accessible, resulted in a new law that's being paced, that's in place, that is now gonna provide hearing aids free of charge for people who people who qualify for Medicaid who are, but who are over 60 and have moderate to severe hearing loss. So this isn't Medicare, this isn't mild to moderate. The idea is if there is a future, if alternative care for people who are, have mild to moderate hearing loss that might evolve out of here, then maybe governments can entertain the idea of not having to provide free amplification of hearing aids to everybody over 60, 'cause that might be cost-prohibitive, but maybe it now becomes financially feasible to say, hey, okay, it may not be in the budget to cover everybody over 60, but what if you cover people who are 60, have moderate to severe hearing loss, who these over-the-counter devices are not designed for.

Let's start there, let's get free coverage for that population, and we'll see, with time, and adjust as time, how the mild to moderate group gets addressed through the various initiatives that are taking place out of policy. So I would encourage you at a local level to get involved and be present and be a voice and share the science that could argue to get more coverage for our patients who are seniors. So those are examples of how science, understanding the brain contributions, how hearing loss not only is a ear problem, it's a brain problem, and that brain problem becomes a health problem because of cognitive decline, dementia, because of, it becomes an economics problem because of the expense it has to the productivity and the fiscal aspect of running a government. It becomes a major problem for health insurance companies.

This is, the science is driven, the policy, and you can see the policy now is suggesting that we can't ignore this anymore, and we need to meet the needs of a larger number of people, and how we're gonna do that, we don't know yet, but we do know we have a problem that there are a insufficient number of audiologists available to meet the needs of seniors. We know that maybe it need not all be done in an audiology office. Maybe the health care should be coupled with other types of health care that's designed for seniors. Maybe audiology should be paired with optometry, maybe it should be, hearing screening should be part of the well, well baby visit, maybe it's a 60-year-old well, health and wellness visit that includes blood pressure and hearing tests be mandated. Right now sometimes it takes place but it's not necessarily dictated.

So this is where we're at right now, and it's hard because we wanna know, well, what do we do tomorrow? How is this gonna impact our practice? And we want a voice at the table. We don't want just policy makers telling us audiologists what our professional practice is gonna look like. So let's spend the last section of time here in where we are today in terms of practice. Well again, going back to the newborn model, we still have the problem of unmet needs of a growing population for older adults. We know there's a shortage of audiologists and we know we have a cost to society. Again, we're still have not solved this problem of well, do we educate all adults? Do we motivate them to seek help? Do we have accessible and affordable solutions? Well, we know if there's a seven to 10 year gap between educating them and having them follow up with a solution, we know that doing more of the same, just in educating and motivating, may not come with a different outcome. We now have some more accessible and affordable solutions now that we're getting other technology being, becoming available, whether it's your iPhone that serves as an amplification device, a hearable or wearable, that whole new industry is emerging that makes them more accessible and affordable, but do they work, we don't know. We don't know that, how they contribute to the whole person, whole patient perspective that we're trying to address. Again, the aging brain has a biology that distorts signals, so even if we get a

more affordable piece of technology on their ear, it doesn't mean this their hearing needs will be meet. It doesn't necessarily guarantee that they're gonna be able to function on the job using their hearing, it doesn't mean that their relationships and the psychosocial aspects of hearing loss are gonna be met. So we still have the problem of an insufficient need, the capacity to meet the need, and that's a problem because not only are we the people who are tied to the devices, we are the, really the only profession that is adequately trained to meet the needs of the whole person, not just the ear. So for this reason, we need to challenge ourselves. We need to step aside and say, well, if it depends on everybody coming through my door and getting a full workup in terms of pure-tone and air, bone and speech and middle ears and rolling everything out, that's what we want, but if we can't deliver that, do we want someone just to be going to a drugstore, picking something off the shelf next to the reading glasses knowing that that isn't gonna necessarily solve the problem on a holistic level either. Centric, and we know that providing we know that providing amplification isn't gonna solve all these problems. We are focused on the whole person.

We want to look at how hearing can improve socialization, and maybe there are some other aspects, that we can, approaches we can take. Other health professions are going through as well, so looking at vision as being one of many of other comorbidities, and thinking about, what are they doing? What are people in PT, physical therapy, and looking at mobility, how are they approaching this? Because we're all dealing with the same problem. We're gonna have more people with more comorbidities requiring our help. Okay, let me see. Do you need me to turn on the webcam again? Okay, so if we look at this perspective again, what is it gonna look like in 2010 or 2020? Well, let's look to other places that are functioning. So if you've been to Europe, you'll see that in many cases, you've got audiologists and opticians working in the same storefronts. So you can get your hearing and vision tested and treated by different people with different credentials, but it's a one stop shop. I'm curious, if you can provide a chat, do you think this is a good idea? Do you see this happening in the U.S. emerging? There's nothing to say that you as a private practice audiologist can't partner with an

optometrist now and start doing this. Is this something that you feel would be beneficial? It certainly helps me, the ICOPE and the WHO initiatives by providing integrative care to people. Do you think this would be beneficial? If so, add to the chat as I go along, and we can talk about other examples. Here's another example in optometry change in practice and policy that was introduced within a California Senate bill. Did you know that now optometrists take vital signs? When I went to the optometrist in Seattle not long ago, they took my blood pressure, and I was surprised by this, I asked why. It's, this is the language that's given is that, well, hypertension is related to diabetes and medicines, and they are, often symptoms appear in the retinal blood vessels, and so optometrists can look for very early signs of hypertensive changes.

So in that way, having people do blood pressure and adding that to your records can help with shared and digital records, maybe flag somebody in a profession where you get referred on to a physician that can manage that hypertension or look for it. So that might something that we see. We also now see a whole new flood of, flood of assistive devices becoming available. We see Googles, we see Alexas, we see a number of different things, and so are we're gonna exclude those from being, becoming a part of our practice, if there's a way to have Alexa set up to remind that person to take a pill, but your client doesn't necessarily know how to make Alexis compatible with their hearing tools to be able to hear that recommendation. If we're involved in whole health, whole person health, why not work with some of these other allied professions so that we can learn how to make Alexis a tool for them, so we can get sound to the brain and get their, keep their brain active and be part of that whole person maturity. So, why not, I'm gonna skip ahead a little bit just because of time, so why not become familiar with the accessibility features for Alexa for example, and see how that or iPhone or something can be compatible with what our patients have now, and build relationships with the local stores or technology partners so that we can bring that into our practice. It doesn't necessary replace the need for you or the device, but it's creating an ecosystem now that we can use multiple approaches and multiple specialties to be

able to serve the greater needs of the aging population the integrated way. I see Nancy is saying that, you know, her dental hygienist does some questions, Stewart is saying it's a good pairing to maybe think about, just as optometry and audiology as a start. It happens in other countries. We don't know, from a science standpoint, if the uptake is any greater or the compliance is any greater between delivering spectacles and eye glasses together at the same place, but it's something worth exploring. So we know that there are pros and cons of emerging hearing alternatives, we know that there's personal sound amplifiers, out-based amplifiers, direct to consumer. We've got individual studies that are, some of them are saying that, you know, some of them aren't that bad. We have systematic reviews to come so that we're not, we don't, one study can say one thing, another study can say another thing, so we really need these systematic reviews to come up with some cohesive evidence to say, you know, what is working well, and maybe what do I want to include in my toolbox as an audiologist. So anyway, if we can turn ear health, use science from brain health and whole person health, and turn it into whole health, I think that's where we're gonna see a very successful profession evolve, but it takes a change in perspective, a change, it means being open.

But we do have these guidelines now that we can follow, and if hearing and vision, if we can take this approach and educate our communities to show that we fall within these communities, if we can build our practices that are more in, part of the integrative care approach, and if you can use all these tools, they're free, promotion pamphlets, signs, things like that that you can put up in your practice, you can use the inservices in your hospital, if we can take to this integrative care for a path for older people, then I think we are going to see a very rich profession that isn't threatened by OTCs, because our mission is to get sound to the brain and improve people's quality of life, and there will always be a room for gold standard audiology and well-fit hearing aids. I think we have to think of this as a process, I think we have to think about this as a, an integrated approach, a brain health approach, and present ourselves in this way, in the same way that people did in the '80s when they had the same problems. You

can see these questions are the same, instead of being development, now we're talking about aging. Instead of talking about babies, we're talking about older adults. So if we fast forward to today, we can say that we have approached it differently now that if we are recognizing that we need to treat it as a public health problem, now we have more help from others. We have more, we're able to educate a broader audience, not just ourselves, and we can start to address this issue of accessible and affordable solutions. We can embrace it rather than fight it, which would be my perspective. So it's not like a, you know, get on, get out, get in or get out. It's not a fork in the road. It is a bit of an organized mess, but I think there are threads here that lead, that we have to have tried and true in our profession that serve a very good job. There's a beginning and there's an end that is looped together in our profession in what we do well. I think we just need to crisscross them with other rubber bands that hold health together from other professions and put them together. I think we have, I think I'm back, way back, I think we, we have to look at the newborn hearing screening model to say that it took some compromise by audiologists to allow trained volunteers to be in the nurseries.

Well, it's gonna require some compromise on us, our part, to maybe embrace techs in the communities or social workers or nursing staff to become more better trained in screening methods that we may or may not like. I think it takes a change in perspective to think that it's not gonna be a threat to have other people sharing our mission. I think it's gonna require a change in policy and practice for us to change how we deliver our care, and I would argue that I think that is repositioning yourselves within the allied health professions. Instead of being in silo, we can be more integrated. I think it means bringing more tools into our toolbox, maybe having, offering PSAPs at a low cost entry point, maybe bundling care with technology and followup and AR. Start charging for followup. If people are paying less for a low cost PSAP, then maybe they're more likely to pay out of pocket for all the personal training that you've had that can help them make better use of their technology, because we know, from the brain, that it's not going to solve the problem, just the technology on its own. So I'll thank you there, and I apologize for why we kept getting disconnected, and I'll open it to questions for a few

minutes, but hopefully, this helps to explain, and hopefully provided the background to help explain why public health initiatives are promoting changes in policy and practice that we may not like, we may not understand based on our training, but we see this as a necessary good, you know, the greater good offsets the costs and the fears of autonomy and of our profession. I hope this explains why we're gonna see more emerging interdisciplinary research as well as policy and practice, and I think we are gonna see massive changes in audiology as they pertain to our senior population. I think there's nothing going away about pediatrics, ototoxicity, balance and falls, the assessment and diagnostic procedures and treatments, that's not going anywhere. It's really focusing on the 60s and over market and how that is gonna change. I would say get engaged, because the future is up to us, and rather than running away from it or taking the other fork in the road, go lobby for what you believe in, or reach out to your professional licensure boards or your communities and be part of the change. So I'll end there. Any questions?

Okay, I see a few comments. So the, one of the, Sally asks, is the cost for untreated hearing loss 22,000 that's associated with health care costs, is that annual or over a span of years? I should estimate that was over a span of 10 years in that study that was done. So it's not per year, but over 20, over 10 years. Even if you figure, $2,200 over the span of, per year, I would think is enough incentive for, if, audiologists, if, I'm thinking of Regence Health Care or Blue Cross provided $2,000 towards amplification devices or audiology rehab, AR, then that would offset itself there and they could save money there. I'm getting some thank yous, thank you. So the other comment is Pierre. People usually value their vision and hearing over other senses. Which would you give up if I had to? Oh, I'm a mom, and so I would hope that I can always hear the voice and the emotions of my kids and my parents. So if it were me, I would give up vision if I had to. I would hope not to have to. If ever you are interested in getting other people to know what it's like to lose a sensory system, try going to the restaurants, you know there are restaurants that, for example, under my city it's called The Dark Table, and you walk into a dark room and you dine and you are served by waiters and waitresses

and hosts and chefs that are all blind. It is such a odd feeling to not be able to see your food. When I went to pick up my potato, I ended up with a fork in my nose because I couldn't see where my mouth was. But we had a lovely conversation and it made it a great experience. So look for those restaurants. There's restaurants, as you know, that are, that require only signing and no talking. Okay, I think we're it. Okay, I'm getting one more question. Even if the insurances were to provide a hearing aid benefit, hasn't it been shown in countries that where hearing aids are provided at no cost, it does not lead it to any higher rate of hearing aid use? Yes, absolutely, which is why, I would argue, that it's not just dedicating cost, it's not necessarily the cost of device, and that why, let me back up. One of the reasons why we could argue adding cost or bundled cost through health insurance is not just for the device, but for the AR as well. So that's part of the dilemma is that, yes, we know, this is why we know OTCs just providing the devices at a lower price point are not likely to change thing. It's working with the human that's wearing the device. So hopefully, lower cost options might free up money to actually pay for some of the audiologist's time in the AR. So, does that answer your question? Okay, yes, I'm hearing things. Okay, I think we'll sign off now unless there's other questions. I'm getting lots of thank yous, thank you. I think we're very lucky to be in this profession and get the word out. Please go to that website, the Integrated Care of Older People for some fabulous things that you can put in your office waiting room, that you can share with your allied professionals in the various forms of health, and there's an app, a free app that can be downloaded that you can use for your practice as well, okay, thank you.

- [Christy] We wanna thank you, too, Dr. Tremblay, for being on with us today. We appreciate your expertise in taking us into this uncharted territory. Thank you so much everyone and have a great day.