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Listening Intent Redefined: Artificial Intelligence in Hearing
Healthcare & Why it Matters
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- [Jodi] Hello and welcome to today's AudiologyOnline topic by Widex, Listening Intent Redefined: Artificial Intelligence in Hearing Healthcare and Why it Matters. I am a full-time employee of Widex USA and receive financial compensation, and I have no relevant non-financial relationships. Before we get started, a little bit about me. My name is Dr. Jodi Sasaki-Miraglia. I am a clinical audiologist. Part of the training team here at Widex USA based on the West Coast. Born and raised in Hawaii, and I never get tired of audiology. You can see with my past history, I used to work at Mayo Clinic in Scottsdale, also in private practice, and now on the industry side for over 18 years. So in our current profession, many of us have taken an oath under our state licensure to one, do no harm.

Two, to improve the quality of people's lives that we serve. Three, to have a patient-centered care approach. Four, to communicate clearly the reasons for moving forward in hearing healthcare. Five, making a strong recommendation as their medical professional. And six, to continue to learn and elevate our skills to practice at the top of our license. So if you think about person or patient-centered care, Shari Eberts, a hearing health advocate here in the United States, has some really great guidance about what that means. And she quotes, "The best audiologist will provide a roadmap and set of tools that patients can use to manage their hearing loss successfully. These will not be the same for every person, but must be tailored to each patient's priorities and communication challenges."

So today's agenda, we will focus on AI or artificial intelligence apps in hearing healthcare, and also the clinical applications of AI in hearing health. If you'd like to follow along more towards the end of the session, here is a QR code if you have an iPhone or if you have an Android, to download the free Widex Moment app to follow along. Currently in 2022, there is over 86 million health apps being used by consumers today. So our patients, our end users, are already using a lot of apps to help support their health. And so now when we move forward and we focus on hearing healthcare,

specifically on AI and apps, we know that this market is already using and very comfortable with much of this technology.

So knowing that over 86 million health apps are already being utilized by our patient population, when we switch gears into hearing health and amplification, why are we still trying to solve weekend problems on a Monday morning? Why are we still trying to solve communication problems that already happened in the past, in the present? So if you're like me, I dread that patient coming back after a week or two, and they're holding that hearing aid bag in their hand, why don't we break that cycle and utilize AI and apps to help sort of stop that cycle and move to a more productive and efficient type of hearing healthcare model? If we consider using AI and apps to support our hearing healthcare models, I do see that many of us will have more time to do things that we would like to do.

So I propose to you that AI or artificial intelligence can definitely be an extension of your professional why. Why you are the critical component in that hearing healthcare delivery model, specifically with dispensing hearing instruments, hearing aids, to either existing or new users in your clinic. So before we move forward with AI and apps, I wanted to take a moment to just address the unconscious bias in healthcare. If you look at some of the data and some of the information put out by Mayo Clinic, the director here of Mayo Clinic's research program on equity and inclusion states that, "All of us, despite the best of all possible intentions are affected by unconscious processes. It affects what we see, how we react, how we feel, how we behave.

If we're not aware of it and taking measures to counter it, it affects quality of care." I also wanted to talk about implicit bias, which can occur without conscious awareness, and its frequently at odds with one's personal beliefs. So if you look within the medical community, implicit bias may contribute to items on the left-hand side, which is healthcare disparities, influencing provider behaviors, differences in medical treatment,

and bias in clinical decision making. And so that might be a bias on race, on gender, ethnicity, culture, or stereotypes. So if we look at these two audiograms, and with this question post here about would you fit them the same way, of course we wouldn't. And so if we bring in the concept and understand the areas of unconscious or implicit biased, I have been guilty of this as a clinician, assuming that a patient's profile their age, maybe their utilization or what kind of smartphone they own currently may dictate what I share or what I recommend for them to utilize in their hearing healthcare plan.

And what I would caution us and think about moving forward is not assuming that people cannot use apps or that they're too old or they're not high tech enough. So that bias of assumption may be incorrect on our part. And in reality, all patients should be able to be educated on how these apps can help further help treat and look at their hearing loss beyond just the audiogram. Because you and I know that even beyond their QuickSIN scores and even beyond their hearing handicap inventory reports and their anatomy and their current phone solutions, there still needs to be an understanding that this hearing solution needs to help today, needs to help tomorrow, needs to help three months from now, three years from now, six years from now.

And really apps help meet that gap regardless of the patient's age or tech level. And so if we look at hearing healthcare today, we obviously are treating the hearing on the left. We also know that the ears and the brain are connected. We therefore are then measuring the hearing results, but we all know that we must look beyond the audiogram and look at that individual patient not only where they are today, but where they would like to go tomorrow and in the future if their hearing health did not hold them back. So when we look at treating the whole person or this patient-centered person-centered care, it really is about helping to first customize the solution alongside the patient to help that patient have the empowerment to personalize their system once they leave the office, help empower our patient to be able to take control of their hearing and communication environment and needs, and also provide some ongoing

education for the patient and their loved ones in order to really maximize the communication strategies for each individual involved.

So part of treating the whole person is obviously us being that professional and really truly being the difference for them. So if you look at professionally guided healthcare, and specifically person-centered care, and looking at where we spend our time each day, doing the QuickSIN, doing the COSI or the HHIA, doing Real-Ear, potentially even adding the repeat recall test, which is a Widex working memory and hearing and noise test. And then I would advocate for adding an extra couple of minutes to discuss app-based education, patient control, and how it can empower that individual once they leave their office, you're looking at a toll of 28 minutes. And if this needs to be split up into two appointments, then you're really looking at about 15 minutes to really continue to elevate and practice at the top of our license.

Okay, so we already talked about unconscious bias, we also talked about person-centered care plans, and then we also talked specifically clinically about what we can do subjectively and objectively in order to help create and really customize that person-centered care plan. So now let's dip back into the AI or artificial intelligence portion of today's topic. So if we look at the definition of AI here on the left, AI or artificial intelligence leverages computers and machines to mimic the problem solving and decision making capabilities of the human mind. When you look at machine learning here on the right, that's a little bit of a deeper branch of AI and computer sciences that focuses on the use of data and algorithms to imitate the way that humans learn gradually improving its accuracy over time.

So some examples of AI are Google Maps, auto correct, or maybe even Netflix that you use at home when it says you might like, or you might... Here's what we recommend. On the right side, that deeper level of machine learning, utilizing ride share apps like Uber or Lyft, our virtual personal assistance like Siri, Alexa, or Hey Google in your

home speaker system, or maybe social media like on TikTok where things show up on your For You page or maybe on Facebook or Instagram where it will generate suggestions based upon what you put into it as that human interface. Many hearing healthcare experts also love music. And if you look at the innovation of music and how it's really moved to using AI, it has to start somewhere similar to me like analog hearing devices.

So if you have been born and a product of a child in the '60s or '70s, you're familiar with the 8-track tape here on the left. The music industry move then to cassettes, then to CDs, and then to the famous iPod. And now where we sit is all the music can be at our vocal fingertips, if you will, by just asking what we want to play at that moment without having to wait all day for your favorite song to play. And so thankfully, hearing aids have innovated in a lot of ways. So if you were born or were around during the early '90s when Widex produced the the first a hundred percent digital line of hearing instruments, the Widex Senso came out and was really a groundbreaking innovation where you had to put away your screwdriver and you put away your wool that you used to shove into a tone hook and you could finally control sound with a awesome programmer box in the lows, mids or highs.

And thankfully, we fast forward to 2022 where we have a very, very robust software interface as well as the hearing device being able to use the computation and power consumption of a smartphone to really help execute the AI and the innovations that we have at our fingertips today. So if we remove our professional healthcare bias and focus on what consumers are telling us they need and what they rank as as an extremely important feature in hearing aids today, JAAA produced a really wonderful document that just came out last year looking at almost 15,000 people who shared that their number one most extremely important feature was hearing in noise, second was reliability, third was hearing in quiet, fourth was physical comfort, and five was hearing on mobile phones.

And so if we focus on those top five elements, and number one was hearing and noise, that is something that Widex has continued to address and provide some interfaces so that we could finally help intersect between the provider and the patient and really tap into this third dimension of patient listening intent. So if you think about our patients, they are in a lot of different hearing and noise situations, and some of these, and many of these might have different amplification goals. Some might be more comfort, some might be more audibility, some might be a mix of both. And so depending upon where our patient wants to go and what they want to listen to, no computer chip is ever going to know with a hundred percent accuracy what our patients want and need to listen to at any given moment.

And so this is a great reason why AI and apps and machine learning can really help bridge that gap between what we need to hear, what we assume needs to be executed, and then taken into account that patient's real time listening intent and have that patient further customize and personalize their listening solutions. So if you think about the areas and aspects of what annoys a lot of patients today in terms of their experience with amplification and a professionally fit model, many of them don't want to come back and forth for visits or sessions. They find coming back and forth potentially frustrating and time consuming, maybe even annoying, and not only on the patient end but really even on the provider end.

And if you think about it, AI can help address and support your needs as well as the patient's needs today. So let's shift now into clinical applications about AI. So specifically here, we're gonna talk about two areas of AI. One is in that top box is, the specific automatics of the hearing aid or the hearing instrument. How has it been trained in the real world? What are the rules that it has been trained about to actually recognize different soundscape speech and noise and make decisions to activate or deactivate or overlay things like directionality compression, noise reduction, and a

whole host of other things that we know now that digital instruments can do. The other thing that we want to take a look at on the AI spectrum is, how do we tap into real time intent so that the patient can make some personalized changes once they leave the office?

And this is where specifically, at least for Widex, our hearing aid AI app can come into play. So let's focus now specifically on the AI or hearing aid automatics that are being programmed in modern digital devices today. An example here in front of us is the Widex Moment family of products. And as you look from bottom up, from 220 to the 330 to the 440, there's different amounts of AI or chip training that has been done to the system. So if you think about the AI or automatics in a hearing aid, depending upon the patient's level of performance that they are in, will really help determine how much help that hearing device level can provide for that individual. So by doing a cozy, by doing a quick send, by doing a hearing handicap inventory, that potentially can help you as the clinician figure out what level of technology is best to support that specific patient's communication plan and person-centered care needs.

So the wonderful thing about AI chip training type of technology is, if you look at our software, which is the picture here in front of you, and specifically look at the fine tuning capabilities that you have as they're hearing healthcare professional, you can either pre-fitting or during the fitting or during the follow up fitting, further customize the actions of that specific hearing aid to support that patient's listening needs, their expectations, and/or matching where that patient needs to be within that communication plan that you are working on at that moment. So if you look at example of app-based AI, Widex has an area to really improve your patient's experience. They can either have a Made for You option, they're on the left, or they can have a Made by You option here on the right that really activates the realtime machine learning capabilities of the Widex Moment system.

Widex embarked on this AI journey since 2018, being able to tap into your patient's listening intent, removing the guesswork, utilizing a smartphone to be able to make real time and fast calculations to provide real time benefits on the fly so that you could be there even if you were physically unable to be there for your patient. So in 2018, Widex launched the industry's first real time machine learning algorithm in our app. And what that allowed us to look at and what your patients were graciously enough to share with us as they opt in share their generic data was we realize, and that's the picture here in the middle, every single purple dot in that cube was a personal program that your patient created after they left your office.

And so if you look at all those thousands and thousands of dots is that, every patient was very unique in creating a program to help them hear better in that moment. And when we further sort of ask the system, well, what about how patients named programs? And when we specifically look at patients who created, quote, unquote "a work program," and you look at that picture on the far right, you look at all those purple dots, and none of them are overlapping. And so what we saw and really found and confirmed was that there isn't really one solution that's going to be able to meet the needs of so many dynamic listening situations. And even for, quote, unquote, "work program," there's still many solutions that patients found useful if they were given some of that control and be able to tap into their listening intent to be able to solve their listening needs at work in the moment.

If you look at the evidence, you're thinking, "Hmm, I don't know. There's a little bit of clinician bias here. I don't know if my patient is with it enough to use it." If you are looking at some of our studies that we looked at usability, we know that once patients are educated and use the app specifically for the Widex Moment, we know that 82% of users actually recommend using the machine learning within the Widex Moment hearing system. So if you look at the technology today, the made for you option here on the far right is very easy to launch. You just launch the app, you indicate where you

are having some problems, the system immediately recommends an option one or an option two for your patient to listen to.

They can save it and they can go on with their merry life. So here's where the magic really happens. When you have the computer or the AI, and that finally meets input from human intelligence, the AI capabilities, specifically with the Widex systems, allows patients to be able to provide preferences that we can now harness and recommend to other patients. So if a patient created a restaurant program sitting in Honolulu, Hawaii, a patient all the way across in Buffalo, New York could actually be using some of those recommendations in real time and be able to solve their listening needs similar to somebody in a totally different area with those same types of listening intents. So you may be wondering, where on earth these recommendations come from?

And so what we do at Widex is we take into account the information and the programs that your patients opt in to share. We then apply some very sophisticated modeling algorithms and look for clustering of data. And when you look specifically here on the example on the right where there's clusters of blue and clusters of let's say orange, the top two clusters are then what we recommend or what is given within that interface on your patient's app. So depending upon what the patient indicates where they are and what their listening activity or their goals that they're looking for in terms of listening intent, then these modelers are... The modeling is applied and then the recommendations are there within your patient's hands within seconds.

Looking at the Widex Moment AI app interface specifically called My Sound 2.0, when your patient first launches the app, it's going to say and ask your patient, what is your current activity? What do you wanna optimize? They can pick up to one, two, or three things. Then immediately the system actually connects to the Widex cloud, and then there's a Made for You option that immediately will show up and your patient can start to listen to either recommendation one or recommendation two. And if they like one of

those, they can save it and they are off on their merry way. If that's not enough and the patient will like to create their own, then they can launch our real time machine learning capabilities called SoundSense Learn.

Now let's do a live AI demo. So you're gonna launch the Widex Moment app. You can actually put in this demo mode, which you indicate here. Once you're in the demo mode, you'll see the programs that you might have loaded for the patient. You're gonna hit My Sound there at the bottom, you're gonna hit Get Started, and then your patient would enter where they are. What's their current activity? What do you wanna optimize for? You can pick a couple of things, and then hit next. Then it connects to the Widex cloud and starts downloading live recommendations. I can listen to recommendation one, I can listen to recommendation two, decide which one I like. I then hit save as, I type where I am, so I know what program it was for.

So here I was at a meeting. I indicate an icon, I hit create, and now I have that settings. What it did do on the back end? You can open up the EQ area, and it'll show you on the EQ what that machine learning did in order to that patient to meet their listening needs. If the Made for You wasn't enough and the patient wants to launch the Made by You, which we call SoundSense Learn, then they would launch into a Made by You area. It would give them an AB comparison, which then would take 2 million combinations and crunch it down to a meaningful set of A and B comparisons. Your patients can listen in real time to A or B and decide in that middle picture there in that slider ball how much or how little they like one or the other and hit next.

They can do that a couple of times. And typically within four, five, six trials, that patient is typically in their listening sweet spot, they can save it as a setting, and then that setting is now saved on their hearing aid app. The wonderful thing about the evolution of AI is currently in our Widex Moment sheer product line, My Sound 2.0 with that Made by You option now adds compression as a parameter to be able to help your

patients listening needs, focus on nearer or louder inputs as they are comparing their A and B listening experience. So why is adding compression useful in terms of helping that patient and their listening needs? There's a number of data out there that shows how compression impacts cognition and working memory.

So depending upon how fast or how slow that instrument is in terms of gain and compression, there's some pros and cons depending upon if you're working with a hearing aid system that only has fast compression or if you're working with a hearing aid system that only has slow compression. Within the Widex technology, we actually have both called variable speed compression. So the nice thing is, regardless if you are, in a Widex product. It is slow most of the time, and will trigger to fast when we need to for comfort. And the awesome thing is that, in terms of good working memory or poor working memory, a combination of compression has shown birth both in preference for sound quality as well as a literature down here below about supporting working memory needs of different patient population.

And so for a diagram of how we do activate that dual speed compression within the Widex processor, we are a time-based filter bank, that sound then gets processed either by the slow and or fast compressors depending upon what needs to happen, and then activates that slower or fast gain in order to help produce the right amount of compression and the right amount of sound for that balance of performance, comfort, and audibility. So if your patient is finding themselves maybe struggling with going to a lecture or maybe a cooking class, or maybe they're a teacher and they're having to shift their listening focus near or far knowing that they can launch our AI and launch specifically the My Sound 2.0 feature for Made by You, which is the SoundSense Learn, now the compression will kick in and your patients will be able to hear that change in real time in their environment to really help sort of bridge that gap of that listening need and comparison when and wherever they are at.

So remember, if you take out the Widex Moment app and you want to launch My Sound, specifically My Sound 2.0, that's available as of September of 2022. And launching the Made by You option, you would still indicate what activity you are in, what would you like to optimize for. And then there at the bottom, go ahead and launch the Create Your Own, which will then launch that very easy user interface of that A and B comparison, that slider to say how much or how little you like it and be able to hit next to go onto the next set of comparisons.

That in total might take maybe about a minute to a minute and a half. To me it's a minute and a minute and a half well spent versus coming to see you for a 30 or 45-minute appointment and driving across town to be able to again solve things that maybe happened in the past instead of empowering your patient to help fix it in that moment with this app based control. So, again, just to recap in terms of real time AI and app specifically in hearing aids, your patient can either launch a Made for You, which is here on the picture on the left in the yellow box, or if they want a little bit more control and real time machine learning elements, they can always launch and activate the Made by You feature by launching the Sound Sense Learn, doing the AV comparisons, and doing the little slider bar and remember activating components of compression to help support their working memory and listening needs.

So I'd like to pose the question again. Do we really need to solve weekend problems on a Monday morning or should we let the patient be in the driver's seat and be able to utilize a hearing aid app like the Widex Moment app to be able to help them solve those listening needs and activate their listening intent right there in the moment? So I'd like to end with a clinical case that I helped support. This was a first time user. A female with mild to moderate sensorineural hearing loss. She works in the movie industry in Los Angeles and mixes soundtracks for a couple of different movie studios. And so she had obviously goals of communication, but also to be able to continue to work at the high level.

She always end up fit with a Rick rechargeable and she had an Apple iPhone. So the clinician spent time teaching her within maybe three or four minutes about how to use the app, when to use the app, when to use a combination of the machine learning or the EQ sliders that were in the Widex Moment app. And when the patient came back, it was really cool, she was able to create three different programs for three different unique studio listening experiences that she had to mix her movies and music in. So one, it reduced frustration both for the ACP and for the patient.

Your patient, the patient had had solutions in real time right then and there, the shared goals were met, the control... There's sort of this even sort of sharing of control both on the HCP side, sort of creating a really nice space, and then giving some control back to the patient. There's some ownership backed on the patient side. And ultimately, there's a really, really positive empowerment that came out of this. Thank you for your attention, and have a great day. Here you will find additional resources cited in the PowerPoint presentation today.