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Beyond the First Fit: A Strategic Approach to Patient Experience, Tech, and Tinnitus Management

Presenters: Dave Fabry, PhD, Alexandra Tarvin, AuD, Blaise M. Delfino, MS, HIS

Welcome to today's CEU event titled beyond the First A Strategic Approach to Patient Experience, Tech and Tinnitus Management. I'm Blaise Delfino, host of the Hearing Matters podcast. And joining me today is Dr. Alex Tarvin of Elevate Audiology in South Carolina and Dr. Dave Fabry, chief Hearing Health Officer at Starkey. How are you all doing? Well, Doctor, Doctor, doctor.

To borrow from spies like us, yes.

This is a course that I think all of us were very excited to record because we're going to be talking about modern day hearing aid fittings and when we talk about the evolution as it relates to hearing technology. But even in today's AI driven world, there are a lot of, shall I say, changes going on. And let's start with setting the stage evolution of hearing aid fittings. Dave, you've been an audiologist through incredible periods of change because I think you've only been doing this about five or 10 years, right? Yeah.

Plus 40. Yeah. I want to start with tele-audiology because a couple of months ago I saw a really cool video of you actually walking through how tele-audiology works. What was tele-audiology like in the 90's and how did clinicians sort of react to it then compared to how we use it today? Sure.

Well, thanks for bringing that up. And I believe that I was the first within our discipline anyway to use and demonstrate telehealth. I did it on a live broadcast of Mayo while I was at Mayo clinic in the 90's. One of my mentors, Darrell Rose, Dr. Darrell Rose, had noticed that Mayo, when they built satellite clinics to Rochester, Minnesota, which we always affectionately referred to as Mother Mayo, they in the, in the 80s built a clinic in Jacksonville, in Scottsdale. But Mayo has always benefited from an integrated practice model.

And when they added those two facilities, they wanted to continue and enable the healthcare professionals in all three locations to communicate in a confidential manner to preserve patient

confidentiality. And they started to use telehealth. There was a telehealth room on the 11th floor of the Mayo building when I first was there in the 80s and continuing into the 90's that was used to work with challenging patients between the different facilities. Dr. Rose started a Mayo video conference in the 1980s. And every year we would have up to 100 locations from around the country, even internationally.

Sometimes that would gather on a Saturday morning all day and we would do a live video conference like we're doing now. But this would be, I think the first one was around in 1983. And so when I returned to Mayo after I got my PhD in 1990, was right about the time that we were transitioning from analog to digitally programmable hearing aids. And it occurred to me that we had the capability of leveraging that video conferencing capability for simultaneous telehealth applications. Minnesota, as you know, is very snowy in the winter, and even a distance of 40 or 50 miles can take a long time if there's a blizzard going on, which could occur anytime from September until May.

And so the original there was a movie from the 80s called Grumpy Old Men that was filmed in Wabasha, Minnesota. Many of my patients live there, and they were all grumpy old men. And it was about 40 miles from Rochester. So on a Mayo video conference in 1994, we did a live demonstration on that video conference of a remote programming of a patient who was with a nurse in Wabasha at our mail facility there. And then we used a modem.

Do you know what a modem is, either of you? Yes. Okay, good. All right, all right. So we connected to a modem and we had a computer that had the programming software and the cabling necessary to connect to a digitally programmable analog device, because digital hearing aids were not introduced in widespread fashion until 1996.

So this was prior to that. But it was a hearing aid that we plugged into a programmer, and the nurse and the patient were remote to me in Rochester. And I was doing the conference and I adjusted the

attributes of the hearing aid in a synchronous telehealth fashion. I thought that this was going to take our discipline and industry by storm. And I like to say only half kiddingly, that telehealth hid in plain sight for 30 years almost until the COVID pandemic really started to awaken people's idea to this technology that had existed and the capacity and the capability had existed for a long time.

But really in 2014, when made for iPhone hearing aids and made for Android hearing aids started becoming possible. Now the patient didn't need a computer at their location. All they needed was their smartphone. And we had at the time that the pandemic Starkey had an asynchronous telehealth programming system which enabled clinicians to use more efficient practices to last minute cancellation in between patients, lunch hours, evenings. But synchronous we didn't have at that time.

But then all of a sudden, credit to our engineering department when the pandemic hit in earnest in 2020, people started saying, we need a synchronous Telehealth approach too, and we rapidly developed one. And then utilization rate for telehealth went up very rapidly. But then after the pandemic died back down. I like to say we went back to business as unusual. Now, face to face interaction is important and I don't believe that in my experience, telehealth doesn't help me establish that relationship with the patient and help me do the things that I need to do to understand about them, show them about the care and feeding of the devices.

Some things can't be replaced via telehealth, in my opinion, but I can establish that relationship face to face. I use telehealth all the time. I travel a lot for my job. I have patients that travel a lot and we can't always be in the same physical location. But I use telehealth all the time.

And I still think it's a very powerful tool that many clinicians leave outside of their toolbox. And I'm not saying it's for everyone, I'm not saying it's for all the time, but I think it is. And I'd be interested in, Dr. Tarvin, your perspective of the role of telehealth. But I think it's a very important tool to serve the needs of the patient. Yeah, absolutely.

I would say to that. I actually used Starkey's remote programming Telehair this morning for a patient and luckily I didn't really actually need to make adjustments, but it was nice to have that face to face and be able to look at logging and such. As a tinnitus specialist, I have used more and more telehealth than ever before because as a specialist, and I'm on the real far side of South Carolina, I'm on the more western upper side. And so patients from all over the state into North Carolina as well are needing care and wanting to meet with a specialist. And we don't need to be in person just to meet.

Right. I agree with you, though. I prefer in person. There's a different level of rapport, body language that you just, just don't get. Telehealth like you, it's irreplaceable to in person, but for efficiency, for costs for patients, obviously it's something that we've adopted because it just makes sense.

But absolutely. If given the option, I would prefer in person for sure. Yeah. Well, and I love to hear these advancements because we're talking about going beyond that first fit. And as a former private practice owner, when telehealth started to be implemented, into our practice it was always, you know, first follow up, second follow up, and then that third follow up.

That's when we would introduce the telehealth feature. Because you already had that rapport built with the patient, you already had the app connected to their phone, you've already done real ear measurement. So we wanted to start with like, you know, Dr. Faber and Dr. Tarvin, what did that tele-audiology look like in the early to mid-90's to where we are today? Because if we fast forward to today with deep neural networks, inertial sensors for fall detection, you know, adaptive directionality powered by artificial intelligence. Dr. Tarvin, I want you to kick this off first and then we'll pass it over to Dr. Fabry.

But how has the aforementioned essentially fundamentally changed the fitting process and patient expectations? Yeah, I would say I entered the profession in 2010. That's when I started grad school. So

that's when I learned a lot. And in the past 15 years of seeing changes, it's been much more enjoyable on one perspective, right?

Not having to have like 97 cords hanging on your wall, fishing through them to program a given hearing, a wireless capabilities have been really helpful in office. Right. And then the telehealth and the AI have given us some opportunities to learn about information out from what happens outside of our office, just even from data logging perspectives. Right. And things that we can gather that we couldn't gather before, that's been a real really or can be really helpful in some situations.

And then with remote programming, telehealth features, everything like that, whether it's through an EMR system, whether it's through a hearing aid app, that's allowed us to take it to a different, different level when appropriate. For perfect example, right. This morning I had a telehealth appointment, but this was the first follow up. And the reason why we opted to do a first fitting follow up remotely was because he's been a long term user and he's been a long term user with the same manufacturer. So it felt very easy.

And unfortunately he's having some fit issues and we can't handle fit issues remotely. Right. So he's going to have to come in and we'll be able to do as much as we can in the office. So it's definitely one of those things, right, where you can change stuff, but at the end of the day some stuff just goes back to status quo. Dr. Fabry and Dr. Tarvin, I love how you implemented the bringing us back to all the cables because oh my gosh I just, I remember growing up in a hearing home and there were just cables everywhere.

And, and then the manufacturer would say, do you need more cables? And you're like, no, I think we're okay. But Dr. Fabry, it's really interesting, you know, myself and Dr. Tarvin, former private practice owner, she of course, current private practice owner, to leverage the current innovations. With that patient interface, you are essentially behind the curtain working with patients on newer innovations,

especially with DNN and inertial sensors. But also you've worked with, you know, the analog hearing aids.

How has today technology changed the fitting process going beyond that first fit? Well, as you said, and Dr. Tarvdan, you know, 2010 seems like a long time ago, but, you know, I've been fitting. This was in fact the first hearing aid that I fitted and it did have directional capabilities. And, and so this, you know, really, I found people never complained about battery life when I fitted those. And then my first experience with digital hearing aids, this one was a five digit digital hearing aid.

Also didn't have issues with regards to battery life. And then now, in all seriousness, I talked about digitally programmable analog devices. As you alluded to where I fit hearing aids when there were potentiometers and the most potentiometers you could fit on a bte, I think there was one that had five maybe potentiometers, low mid range, high overall. And then I can't remember what the, the fifth one would have been for four or five was pretty common on a bte. On customs you could maybe fit two or three potentiometers, really limiting the flexibility.

Can we, can we back up a second? For any newer clinicians tuned in to today's CEU course, can you just briefly define what a potentiometer is? Sure, sure. It would be. It's also referred to as a trim pot and it would be a tiny little.

You, you. Every audiologist in the 80s and 90's had screwdrivers in their clinic, tiny little jeweler screwdrivers that would actually be used to, to adjust a trim pot or a potentiometer to adjust something like a low frequency response or a low frequency and a high cut. Usually the feedback canceller. In the 1980s vintage hearing aids was the high cut potentiometer. If the device was whistling, you either tried to make a tighter ear mold or tighter custom fit device.

Or if that didn't do the trick and you were dealing with a pretty powerful device and you would use that potentiometer to cut the highs for an MPO in the same way that now we have what looks like a slider in the hearing aid to do frequency specific we would just adjust the overall MPO which would reduce the output in the 2-3000 Hz range where the primary peak was very primitive by today's standards and limited adjustments for fine tuning. What what we're accustomed to doing now. And Dr. Tarvin, you mentioned really with the advent of the very first digitally programmable instruments which were now devices as you said, that instead of having those trim pots or potentiometers that were limited to three, four, you know, or less adjustments that the professional could make once they ordered the circuit power and gain, now we had devices that could be plugged into a computer or a programmer that then a standalone programmer. And that brings to one of the first limitations with that analog to digital conversion was all of the manufacturers, the early manufacturers of digitally programmable analog devices, all of them had dedicated programmers that took up desk space in the clinician's office. The advent of the hypro box was a direct descendant of these dedicated programmers that we had at first that now put it all like Noah the arc for all of those cables.

And the cables all hung on the walls like both of you mentioned for many years. And now digital didn't come along until 1996. This was introduced in 1987. Body aid and a very cosmetically appealing BTE component that required a string. Very discreet, Dave, very discreet.

Sometimes you'll see even devices. This time it's a pet peeve of mine on the media coverage for hearing aids will whip out body aids or these large behind the ear devices that none of us have fitted. But the digital era began really when Nicolet introduced this first product in 87. Really it was the early aughts that brought the era of automatic monitoring of the acoustic environment that the patient was wearing their devices before then. And even on this early digital hearing aid, this button was used to switch from a quiet to a noisy environment.

When the patient went into a noisy environment, it enabled the directional microphones. Otherwise they use omnidirectional. Believe it or not, I used to fit hearing aids on people that had multiple programs that had a switch on the hearing aid to go to the quiet noisy music environment. And music wasn't really considered often. But it was in the early 2000s that acoustic environmental classification I would argue was our first experiment with AI in hearing aids.

And all of the manufacturers had variations of this, but we didn't really call it AI at the time. It was a machine learning process that would monitor the environment where the patient was wearing their devices to determine whether there was noise present or whether it was a low ambient noise environment. And in the noisy environments, it would automatically engage noise management directionality. And now we even expect that on the lower tier and higher tier products that all of them are equipped with this automatic capability to monitor whether it's quiet, noisy, windy, musical, and then engage only those features changing compression, noise management directionality, wind noise suppression that are necessary for that given environment. That is classified.

But those really gained in earnest in the early 2000s. And now we're at a point where, as you said, Blaze, we're using beyond machine learning. We're actually using DNN models. And we can get into a deeper dive, if you wish, on that, for optimizing personalizing to the individual patient, not only to their audiometric considerations, but, but to their lifestyle. With the hearing technology, of course, the three of us believe it's focusing on the benefits first and the features second.

But so much to unpack there, Dr. Fabry, because as you're showing us, the evolution of hearing technology, which absolutely loops back to that patient experience and the patient expectation, hearing aids, hearing technology, there absolutely was a stigma back then and there still is today with today's marketing efforts. Of course, we are the most socially connected demographic to ever exist. I mean, no one essentially can deny that. Right. With the evolution of all of this technology and the increase in

information that we have today.

Dr. Tarvin, I'd love to hear your insight on this. Are patients coming in today asking you about AI and dnn and of course, going beyond the first fitness, what does strategic hearing aid fittings look like today in the modern age? I think some are, you know, some patients are more tech forward. They're more likely to read about hearing aid technology before they even enter a door or they've entered multiple doors. Right.

Trying to find the right fit.

I would still argue the majority are not, you know, the majority are not asking those tech-forward questions. And so it really boils down to us as providers of our knowledge base to kind of that patient-centered focus of like, what does this patient want or know? If a patient is coming in and they're asking a lot of questions about technology and features, then I'll speak the language that they want me to speak. But if somebody is not very interested in that, and I will point blank asking people if I can't get that read from them, if I can't figure it out, I'll say, are you detailed? Do you like graphs and charts?

Do you like More summary explanations like, how do you want me to talk about this? What makes sense to you? And then they'll answer the question that I'll modify my approach. So I would say it's definitely not one size fits all from the expectation of the patient as well as the provider ourselves. Right.

I do not speak unless somebody is asking me to. I do not spend too much time speaking on the technology part of it. I don't want them to be overwhelmed by things that they simply don't care to learn or grasp. It's coming down to me learning those things and then figuring out, how does that work, what types of hearing losses, personalities, lifestyles would indicate, what features that I need to have in order to provide the benefit to the patient. I think you're absolutely correct that most patients.

Most patients, I seem to have an inordinate concentration of patients who are either engineers, musicians, or both, which is the. The. The. The nightmare, you know, you know, you're gonna hear blood pressure so high. Dr. Fabian, my blood pressure is just fine, thank you very much.

But, but, yeah, it is indeed. You know, the. The engineer mindset figures. Well, I can. I can do this better than you.

And the musician understands what they. What it is that they want to hear. The musical engineer is a double whammy because they think they. They know what they want to hear aesthetically. They know how to do this from an engineering standpoint, and they have to come to a realization that their hearing loss, unlike visual impairment, at least younger in life, for many, vision correction for nearsightedness enables you to correct to 2020.

We, of course, and I know I'm preaching to the converted here, but we know that with sensorineural hearing loss, we still can only go as far as what the patient's residual auditory area and distortion allows us to. But the issue is, for that it's rare for a patient to want to get under the hood and know and explore and interact with their hearing aids to a degree that we sometimes think that they will. And I think that I've said for years, you don't know your patient until you actually know your patient. And I hate when professionals complain about patients asking them about connectivity to Bluetooth or this or that or the other thing. We should be celebrating that because that's part of our role, is really helping to meet the patient where they are, understand what are their fears, what are their concerns about their hearing loss and.

Or technology. How do they want to interface? I've got one patient who is a true polymath in that he's excelled in multiple areas of his life. I made the wrong assumption that he would want to be looking under the hood and interacting with his devices and the user app and the phone. And he's certainly capable, but he's one of these patients who just wants to put devices in his ears, set them and forget

them.

The best technologies are those that become seamless in our life. And it doesn't matter where you are educationally wise or technology wise, Some patients still, they want to set them and forget them. And our job is to recognize and sort out those patients who want to go under the hood want that technical explanation. But I would agree with you, Dr. Tarvin. The vast majority of patients don't want to hear or see how the sausage is made.

They just want to know that these devices are going to work for them in the environments where they want to wear their hearing aids. And I think as hearing healthcare professionals, we can sometimes get in our way of just wanting to. Because we're so excited about the technology and this is how it works. But Dr. Tarvin, I remember you and I had a conversation a couple of weeks ago, and we were talking about motivational interviewing. And what I loved about being in private practice is when new patients would come in and we would sit down and this is all about patient experience.

Beyond that first fit of Mrs. Smith, what would you like to accomplish today? And they would tell you what they wanted to accomplish. And this is why having a third party come with them, whether it be their husband, wife, spouse, whoever. And then turning to, if it were her husband, Mr. Smith, what would you like to accomplish today? And it wasn't so much of that tech talk.

It was more of, I need to get to know you on that level as a person. Because as humans, we communicate. Communication is exchange of ideas, and hearing technology bridges that gap. Now we're talking about all of these smart features. I remember years ago watching my mother program hearing aids, and it seemed, especially in the mid-2000s, there was a lot of clicking going on.

Right. Do you think, though, that there's a risk of clinicians relying too heavily on first fit algorithms instead of fine tuning for individual patients? Yeah, the data supports it. Right. Not enough practitioners

are using validation and verification measurements.

And that is not just real ear, although real ears. I think the most discussed, that's electroacoustic analysis, it's questionnaires, it's motivational interviewing. Right. All of that is actively a part of best practices. And so we know that.

I think, I think the, the percentage that we use is like 30% of providers are doing really measurements at fitting. And then some states it's required at fitting, some states it's required by first fit. In most states it's not required at all. Which is disturbing given the data, you know, so do I think people are relying on it? I think 70% of providers are 100% relying on that.

And then they're using the what they look as their expertise or their clinical experience to make modifications. Now we all have, we all build up experience, right? And we all have to use our knowledge and work with our patients to change. We're not robots nor should we only be using real ear measurements. Right.

That in my opinion is the starting point. I need to know your ear canal residents. I need to know how much wiggle room we have before we get to your UCLs. How much wiggle room do we have for MCL? How is this ear mold fitting?

Are we having a lot of high frequency roll off? Are we not getting the lows because we're way too unincluded? Right. We need that data. So then when we need to make changes, we know where the wiggle room is.

We know what might not be going as well at their first fitting follow up. Based on what happened at the fitting, I thought we could get away with domes. We can't get away with domes. We need air molds. Right.

And this is not stuff anybody should be guessing. This is stuff you should be measuring and collecting data on and using experience to modify that. So it's very relied upon and obviously I'm not okay with that. Well, I'd agree number one, that oftentimes on the other hand, people are too quick to start adjusting, making adjustments, a lot of clicking at the start. When you consider, particularly for a first time hearing aid user, for an experienced user, they know what they like and they like what they know.

And sometimes we have to liberate them from past habits with new processing techniques. But too often I see people going to fine tuning before the patient has really had an upper. You don't hear with your ears, you hear with your brain that it's going to take a relearning for those first time users for sure. And too often we start fine tuning before the patient has had a chance to feed their brain with acoustic information. And then for those, and I'll double down on your comment Dr. Tarvin of you know, the 30% and that may even be high that use real ear measurements.

And I want to be very clear, I do not see real ear measurements as the end all be all gold standard, but they're a starting point. And I think a lot of people, even if they're forced to use real ear measurements, don't understand the why, the why beneath it, why are they using it? And I, I, we could get into arguments about proprietary and non proprietary formula and which formula is the best. My fundamental goal with any real ear measurement system is to acoustically match, as you said, the device to the patient's ears to the type of acoustic coupling that they're using. Are they using vented or unvented domes or custom molds or custom case receivers?

And if you're starting to fiddle with the adjustments and you haven't even made real ear measurements to know you know what the technical document says about the coupler measurements, but you don't know anything about how that patient's ear and the acoustic coupling has adapted uniquely to their ear. I like to say, and I've said for a long time, it's like practicing by astrology versus astronomy. With astrology, you know, you're using the first fit and you're just sort of hoping and reading and looking for

the moon and the planets and the stars to align in some way. At least with astronomy, with real ear measurements, we're making a measurement so we know where we're starting. And my first goal is to ensure that I'm using as much of the patient's residual auditory area as possible over as broad a frequency response as possible, and then allow the brain a while to start processing before I start fine tuning.

But let the buyer beware when you're using the first fit and even if you think, well, I know my patient, I know what adjustments because I'm comfortable with this software. It's still the audibility is the reason I'm using real ear measurements and acoustically optimizing and matching the performance of that device and the coupling to the patients. Here is the number one job of real ear measurements and without it, you're just guessing you're practicing my astrology. And how important is it to set those realistic expectations with the patient so when they are coming in for their first fitting and how we would run the process is of course we'd have the big screen, real ear measurement normally would do real ear measurement on that first fitting, definitely at their first follow up, but they would see it on the screen and we loved showing them that because you can educate them and we would sort of parallel it to eyeglasses. Of course, very different because there's so many more components with, with hearing tech.

But either way, imagine if you were to get a new prescription for your eyeglasses and the eye doctor says, I have it tuned to where I think it should be for you. And just go. And no, we want to, we want it to be tuned in. So we're using that dual sensory input as a professional of what are we seeing the patient, Patients here with their eyes. So if they go like that, that might be a little too loud.

So, so let's, let's make those adjustments. But what, what you're both saying is it is creating this experience for the patient while mixing art and science. Because what we do is so art and science based on. And yes, real ear measurement. Very important.

But to your point, Dr. Tarvin, it's all about the additional outcome measures that we have. And I want to segue into the art and science of precision fittings. And I really want to reinforce that. Set it and forget it just is not enough. I have a background in audio engineering, musician going to the studios, recording, and then of course, learning how to produce and engineer.

In audio recording, we don't just record the raw track and just say, okay, let's, you know, Dave, let's, let's bring this to like AC dc, right? Like when they went in the studio, sure, they're recording the raw tracks, but that chain, that audio chain might be into most likely a preamp, maybe into a neve compressor, maybe a teletronic. So there is this chain of sound going on that's cleaning up that signal. And then you have post production. So in audio engineering, you're doing the pre production, you're doing that post production, you're eqing mixing and mastering.

And this is all again for the listener's experience. Who is the listener that we're working with? That's our patient. So, Dr. Tarvin, how do you, you know, how do you sort of see that concept applying to hearing aid fittings today instead of. Absolutely, yeah, I'd love to hear your thoughts.

So to take on that analogy, I would say pre production would be functional hearing assessments, diagnostics and functional hearing assessments. I need to understand what is this person's abilities and limitations. Right? Because if we can, our goal is to marry technology with needs. Right?

And then we have to discuss expectations. Expectations can only be discussed appropriately if abilities and limitations have been quantified. Right. And so, yes, you have an audiogram, you have a basic beep test, and you have basic mono or word tests, but that really does not translate to function. So I think pre production is functional assessments.

You need to do binaural speech and quiet binaural speech and noise. You need to do UCLs, you need to. We also sometimes do ANLs. If it's a symmetrical hearing, you have to figure out like, what is this

person's abilities? Then you have the fitting, the production, you know, you have the data, you have that proper, real ear and all that.

And then post production is all your follow up. And it's, it's saying, okay, well how do you want it to sound? And this is what we need, this is what you want. How do we get you to what you need? Right.

And that's the human centered aspect to this. So completely makes sense. But you need to start somewhere. And I think telling somebody what they should care about is very, very different than asking somebody what they do care about and figuring out where are the goals and how do I get you to your goals, not how do I get you to my goals for you. Right.

And, and that's the art, and that's figuring out who are you, who is the person in front of you, who is their family. And then you have to work as a team. And I say that to my patients. We're a team here. I'm the coach.

I can tell you kind of where we need to go and how we can get there. But you're the person who is in reality kind of the consumer and in the driving seat of this. And so how do we get where you want to go together? I love the team based approach, especially as it relates not just to building rapport with that patient, but getting them to the finish line. And I love.

So you are the conductor, right, of this, of this musical masterpiece and how you hear sound, they might hear it differently as it relates to maybe echoic memory. Right. So Dr. Fabre, you're a music buff as well. We all have an appreciation for music here. So how are you seeing that applied to hearing aid fittings today, especially with the patients you're working with?

Yeah, and I like that you brought up music as an example of this in terms of the way that sound engineer, audio engineer, engineer does the pre, current and post production. And I think Dr. Tarvin

framed it really well. And I just want to add a couple things to this. First of all, music is one of those ones that's so personal. And I Remember back probably 15 years ago, we at Starkey introduced our first music program for use in hearing aids.

And out of, out of interest, when we brought in customers to professionals, hearing care professionals to train them on the product, we did a little trick where in the room we played three samples of music and we asked people it was the same sample, one that had been filtered to bias bass boost, one that was mid range boost and one that was treble boost. And then we played all three and then we asked what was your preference? And invariably a third of the room would say they liked the bass boost, a third said they liked the mid range and a third said the high frequency boost. And none could understand why anyone would have chosen the other two options because it was so personal. And I think it really characterizes where we are now is that personalization optimization that recognizing that any prescriptive formula to go back to the previous discussion, the same as it would be if you were taking an oral prescription, it has been based on averaged data.

But individuals it may be higher or lower dose that is effective or causes side effects. And so part of our job is to determine indeed in that production phase whether the pre production assessment of what the prescribed gain and output by frequency would be is appropriate for that person. I do want to build on what you talked about. Number one, UCL and MCL measurements can be extremely useful for music and for speech to say where within their residual auditory area do they want to hear? Because some people like to listen higher in their residual auditory area and some people are lower.

And then there's sort of, you know, that most comfortable target that is assumed to bisect from threshold to discomfort. But some people like to listen higher and others lower. You don't know that without UCL or MCL measurements. The other thing is the National Academies of Science, Engineering and Math recently did an evaluation. They were the group that was responsible for

ultimately developing and kicking off the development of the OTC channel.

They recently published a recommendation that audiologists and hearing care professionals use speech and noise testing. Another measure that has been out there for decades is and has been largely underutilized. I'd put it at around again 30% utilization. Same as for real ear measurements. Despite the fact that there are some very nice measures for use in clinic.

It really moves beyond the audiogram to say, you know, and we've all seen it, two patients that have same audiograms and have very different difficulties in terms of the handicap presented by their hearing loss. And it's another way of getting to know your patient. And then in the post production. The only thing I would add to what you said is data logging serves as a very powerful tool for helping to determine what Stuart Gatehouse 25 years ago referred to as the individual patient's auditory ecology and that is moving beyond the audiogram to the non audiometric factors that contribute to their overall worldview of hearing and how they interface with that. And you can have two people, same audiogram, one that's very social, one that's more sedentary, and the data logging will show that.

And I find that too few professionals actually look at the data logging beyond perhaps the hours of daily use. There's so much information that all the manufacturers put into that data logging that work in the post production phase. Is the patient using multiple programs? Are they adjusting the volume? What percentage of the time are they in noisy versus quiet environments?

Is that interfacing at all with their overall experience with the devices? How is that impacting it? It's a very important part of the post production phase, after the production and the pre production phases. And I think you stated it really well. We had discussed a little bit about the abbreviated profile of hearing aid benefit, other outcome measures of the like, beyond real ear measurement.

What other verification and patient feedback tools are must haves for a modern fitting? And to spin off that, I saw a recent, it was either a LinkedIn post or in one of the Facebook audiology groups about conducting speech and noise testing with the technology in the booth. So I'd love to hear your thoughts on that. Yeah, so one of still in the pre production phase, I guess one of my go tos is electroacoustic analysis. I think it's a big responsibility that we have as the utilizers and the fitters of hearing aid technology to do some quality assurance and just make sure that we're fitting a patient with technology that is meeting the specs put out by the manufacturer.

So you're not gaslighting your patient if they're like something sounds off and you're like, oh, I need to program this out. It's because your ear is distorted, but actually the speaker is busted. If you've not ruled that out, then you've not ruled that out. And so that's pretty critical on the front end. And then we like to do questionnaires, subjective questionnaires.

We don't do the afab, we do modified COZY in the office and then we also do the SSQ on the front end. We also do several different hearing handicap questionnaires. And then we repeat those questionnaires at their second fitting follow up. So usually about three to four weeks after they've been fit, we have them repeat those and then we look at the scores and we can look at, we have bar graphs and we can look at those trends I've also dabbled over the years in and out of doing it consistently because it is time consuming, although that's not an excuse is aided speech and noise testing. And so I've used the Azbio.

Sometimes the limitation for a clinician would be do they have sound field speakers calibrated or can they. Right. Depending on their booth layout. And that has been a limitation for, for me in the past. And so I've made ways of doing it functionally without doing it calibrated because A versus A squared is still A versus A.

Right. Especially if somebody does really poor unaided, and then their aided benefit is significantly better. It becomes a tricky tool if their score got poor with hearing aids or if really there was no change with hearing aids. And so sometimes you need to look at it from a qualitative perspective, not quantitative. And so if you get just, okay, they got this many words right in these sentences, but then you say to them, how hard or easy was that?

And you have them scale and rate it. Oftentimes they'll say it was easier with the hearing aids on, even if they perhaps did just as well quantitatively. With or without hearing aids, you're going to see that more with, you know, normal to mild, moderate to moderately fear, people that have poor low frequencies are going to do poorer across the board. So that's when it gets a little tricky because you want to do outcome measures that show evidence of benefit, but it's still not real world. Right.

And so that's where you kind of sometimes see there's no context here. There's visual information or no visual information. So it can be pretty tricky, I think, to do that where it's effective for everybody. But data is data. Let's lead into patient experience and best practices.

Patient centered fitting process. What does this look like, Dr. Tarvin? From the moment a patient walks in to their first follow up, what is that experience? Like? Why is this so important as it relates to modern hearing aid fittings?

I look at this question as like, what steps have you taken to understand that person's story and their experience and where they're wanting to go? And then you modify your approach to try to help them accomplish that. Right. Kind of what we were going back to earlier. Like you're the coach or the guide, but you're on a team together.

And then the fitting and the follow up with the hearing aids is like we said earlier, right. It's like a combination of all of it. You have to do your due diligence as the provider because the patient doesn't

always know. They might know what they like, but they might not know what they need, you know, and you're wanting to toe the line and figure that out together. I think that having quicker follow ups so something I think there's a wide variability in the space of like how long it goes between a fitting and the first follow up.

And I don't remember along my journey where I developed that it needed to be about one week for a new user and I go about two weeks for a veteran user. But if everything is going right, cool, a week is cool. If something is going wrong, a week is imperative. Right. Because then enough time went by that they got some experience, but not enough time goes by that you can't make a pivot or make it appropriate adjustment or answer a new question.

And so I think the being able to do things via telehealth in hearing aid apps is cool. If you needed to check in. But even not even hearing aid related, just being able to shoot a patient a text or send them an email like other aspects aspects to technology has made it a lot easier to check in with patients and make yourself available even from a We've recorded videos, here's our YouTube page. Here's how you pair it to your phone, right. And then within hearing aid apps, different videos and stuff that are out there.

The tech boost has made it a lot easier to walk the journey with the patient when they're not in your office. And just to dovetail off that a little bit. I have a background in speech language pathology, so I'm also hearing instruments specialist. So it's like after grad school I was like oh my gosh, all this functional communication, let's implement it into the hearing aid fitting. So creating a patient diary that we sent home with every single one of our first time fits and they would take notes.

It gave them that ability to just let's be real here. They're going through that grieving process. So how can you as the hearing care professional walk with them? And I love your approach to one week for those new new fits. First time fits.

Dr. Fabry, telehealth tools are becoming mainstream. How can remote fine tuning maintain or even improve the patient experience? Well, even prior to that, what I would say is that part of the patient centered model means meeting the patient where they are. And with that sometimes as long as audiometrically, if a patient shows a preference for a certain style because of what they've seen or a friend or this or that or the other thing, as long as it's not an inappropriate style trying to meet the patient where they are. In combination with additional data that I can provide.

I use the speech and noise testing in addition to getting an overall assessment of how much difficulty they're having based on their audiogram to actually select technologies like directional microphones, noise management, maybe even more sophisticated accessories because accessories in my opinion are often underutilized, in particular for those people who have double digit speech and noise deficits. But I can't come at with them with a bull rush with all of this technology and all of these tests initially I have to meet them where they are. Remember that I am the conductor, I am the professional and I'm not going to make a decision that I know isn't in the best interest of the patient. But in meeting the patient where they are, sometimes I have to start a little bit in baby steps compared to where I might be and then I will even go shorter intervals whether I use telehealth to your point blaze to do a quick synchronous check in a couple days afterwards because importantly I almost as a standard of care, like many, I'm using receiver in the canal devices the majority of time. I still do quite a few custom devices for specific patients, but two or three things will bring a hearing aid back for credit or for concern faster than anything else.

First is physical discomfort in the ear if the dome tip isn't if it's moving around or irritating their canal if they have an allergic reaction, although that's pretty rare, that will bring back a patient quickly if it's not retaining in their ear, if they feel like it's not secure in the ear and then discomfort loudness discomfort if the output levels have been set such that they exceed the patient's loudness discomfort level or if you

guessed and you didn't do real ear measurements and you don't and you didn't use a digital test like this to determine whether the hearing aids were amplifying too loudly. I like to do a check in 48 hours because I do an inordinate number on patients wearing RIC devices with custom case molds because I find I get better retention, better physical comfort, better sound quality because I have a more consistent way of having them ensure as opposed to a dome tip where they can push it in further or not or twist it. I can direct that sound down the ear canal to hit the drum on a straight line path. But because I do a higher percentage of custom case molds, those can also contribute to discomfort. If I didn't make a Good impression or there was some imperfection in the process.

And usually a 48 hour check in via telehealth is something I don't make them come in during that first period, but I'll just jump on even with a phone call. That's telehealth. Ultimately, it's the definition of telehealth. And I can just do a phone call or a synchronous telehealth session just for the purposes of a check in. Is it comfortable acoustically and physically?

And how are they Starting to hear? 48 hours is too quick for me to start fiddling, with rare exceptions, unless if they're getting feedback. But then I use that one to two week interval to meet face to face, or if it's impossible to do so, and I've established the patient relationship, I can do that via telehealth, save both of us time and travel time, either me going to them or them coming to me. But in a nutshell, the only thing I would say that's a little different about my process is that initial check in. Because in my experience, physical discomfort, acoustic discomfort and retention in the ear are three things that will bring a device back quickly.

And start with a mild problem can become a bigger problem if it's, if it's not tended to quickly, and then at least the patient will know. Okay, my hearing care professional has this on record. So when I do go back, we're going to address that as well. And that can decrease some of maybe that anxiety that they could have as patients. Now, we've been talking mostly about patients who present with sensorineural

hearing loss bilaterally.

I want to dive a little bit into fitting patients with IDUs. Now, Dr. Tarv, in your clinic, when a patient presents with IDUs, how does that influence your initial fitting strategy? Does it influence your initial fitting strategy? Yeah, sure. So as a tinnitus specialist, hearing aids for a very long time are like the go to, right?

And now they're one of the options that are available for tinnitus patients. So if we go further down the train and we're answering that question for patients that we've already moved forward, that we're moving with hearing aids and that's their main treatment path. I will say that my fitting protocol rarely changes if they have tinnitus, because I've also already measured if they have hyperacusis. So if they have hyperacusis, I'm handling that separately before I'm going to treat the hearing loss and the tinnitus. So if they don't have hyperacusis and sound sensitivity is a non issue, then I'm going to continue my normal fitting process.

The selection of the hearing aid might come into play if they have tinnitus. Do I want a hearing aid that has a little bit of a noisier circuit so quiet is not as quiet? Do I want a hearing aid that has a greater dynamic range or Y band or they sound not hyperacoustic but sound sensitive in different ways. So those are going to apply on my selection process. But my fitting process process is pretty much the same.

But then my follow ups might look a little bit different depending on how is their brain making, making modifications, where is their tinnitus perception and how are things changing? Are we adding anything extra to this equation like top down, like mind, mental health strategies, tools? Right. Where do we need to go from there? How Dr. Tarvin, have you integrated sound therapy options into your hearing aid fittings?

And then if you can just touch on the app that you developed for patients who do present with tinnitus. Because this is really exciting stuff. Yeah. Thank you. So sound therapy I think is incredible, incredibly powerful tool, but I like it as the umbrella term of using sound.

So I think amplification without any type of masking sound is still sound therapy. Right. And so if, if you're, if your question's more of like implementing additional tinnitus, masking sounds or comfort sounds, absolutely. I personally like to give my patients control. I think one of the issues, and if you measure it, one of the issues with tinnitus perception being problematic for an individual is a lack of control and that feeling of powerlessness or hopelessness.

And so I'm not a huge fan. I'm not saying I never do it, but I'm not a huge fan of like adding a program that says like this is what you will listen to as opposed to this. I like saying, hey, because of all this connectivity we have, here are one or two apps that you can download that have things built into it and depending on what your activity is, depending on what your mood is, you, if you want additional sound in the background, can pick what you want and listen to it. And here are just some guidelines or rules that you need to put follow to make sure you're not overdoing it. Right now.

When in the journey of building a tinnitus app called Twilo tw I L l o, we did put sound therapy into it. We did allow the user to turn on ambient sounds, ocean sounds, some colored noises turned on, turn it off as Just part of the therapeutic process of as you're reading and learning information on how to better manage your tinnitus, that you don't have to do that in pure silence and you don't have to use another, another app to do it. So we did build that in very strategically to allow the user to have some more control on what they're experiencing while they're bimodally. Right. You're hearing something, you're reading, you're gathering data, you have that top down approach and you want it to be therapeutic.

We know sound is very therapeutic and so it's definitely a really cool tool to be able to use, use. But yeah, I think we as providers, going back to what we've said multiple times, like we can't tell our

patients everything that they need to do. Sometimes they need to take ownership over it and kind of figure out what works for them. Dr. Fabry, as it relates to fitting patients who do present with tinnitus, are there specific follow up protocols or even adjustments you find critical for tinnitus patients compared to non tinnitus patients? It's a great question.

Thank you. I figured, yeah. One of my best friends is Robert Sweeto, who's retired, but he's been very active in the tinnitus area over the years and a lot of different strategies have been incorporated, whether to use music, whether to use fractal tones, whether to use other sounds in the process of trying to familiarize or distract from the internal noise by introducing external noise or using it in combination with cognitive behavioral training. One of the things that he and I have talked about a lot is that for the patient, as Dr. Tarvin said, engaging them more in trying different things. I'd be curious as to your thoughts on this, Dr. Tarvin, of using modulation.

One of the things that we have in our app is different stimuli that may be used. But I think to your question, blaze the modulation and being able to use slow, moderate or fast modulation even in an individual may change throughout the day or throughout their, their week. But, but that ability to modulate whatever stimulus, whether it's music, whether it's noise, whether it's fractal tones or something else, we're not machines and so we do modulate. And in my experience, in my hands, in working with external noises as a means of adapting or incorporating with cognitive behavioral therapy approaches, the use of a stimulus, that modulation is in my hands pretty critical. And do you find that, Dr. Tarvin, or do you disagree?

I don't feel like I have that much experience relying on modulation. So I don't disagree, but I don't think it is critical. Right. I think allow, you know, allow for the patient to figure out if that works well for them. Yeah, but I like modulating what they're listening to.

But whether you need like an intensity modulation specifically. Yeah, yeah, we can use frequency or intensity modulation, but just because it does vary a little bit. Little bit. And I would also be very curious as to your experience with some of the bimodal techniques that are increasingly being used. And there are, you know, there.

There's evidence base for showing that it's having an impact. Unfortunately, there is no medical surgical treatment that is really currently withstood, you know, for everybody that's going to work. But, but, but, you know, bimodal has been sort of interesting in that that several groups have been working on this recently. Are you finding. Do you incorporate this?

And if so, what are your thoughts for those people who are struggling with tinnitus out there and the fact that they're looking for that brass ring, that will solve their issue and we know there is no cure. But what are your thoughts? Yes, I'm a fan of bimodal neuromodulation. I do use it in my practice. It's pretty neat when you have somebody who is already a hearing aid user that then starts using the bimodal neuromodulation and still uses their hearing aid, and then vice versa.

You have somebody who uses bimodal, proceeds through that journey, is successful, and then is able to start their hearing journey because we've taken the tinnitus problem kind of off their back a bit. Right. And so it's really interesting when they can work consecutively. But, yes, there's definitely a lot of evidence behind it. It's still not for everybody.

It's not the magic bullet, but it's more magical that we've had for a lot of people. And I'm grateful that we're at a point in technology to be able to have that. And I really look forward to how it will continue to adapt over time. So, Dr. Faber, you are presenting at UHA in a couple of weeks, and I want to know what emerging technologies or clinical tools excite you the most the next five, ten years in hearing aid fittings? Well, a couple of the presentations, I was fortunate to have three selected this year for Yuha, but we have been very active in the area of saying hearing health is connected to overall health and

wellness, and hearing loss does not occur in a vacuum.

I know, again, the people that are likely to be listening to this CEU event are already understanding that hearing loss doesn't occur in a vacuum. But you know, there's been lots of areas that have suggested, you know, cardiovascular disease, cognition, falls, balance there, there's many, many low hanging fruits, if you will, that connect hearing to other overall health and wellness. And we've been working on that and I'll be speaking on those topics at uha. So that's one thing. The other, as we've been discussing earlier in this podcast, is speech and noise testing and REM testing on the clinician side.

They're not new, but use them is one. But in terms of the emerging areas, two come to mind. One is LE Audio and the Bluetooth low energy audio. We're on the cusp of of major breakthroughs in the infrastructure for people with hearing loss who wear hearing aids or even those who are using wireless headsets to be able to be in public places like airports, movie theaters, classrooms, places of worship where they need the benefit of being able to easily connect to public address systems in those areas, as well as being able to watch on home TV without the need for an accessory. LE Audio is going to make major changes in the life of our patients who have devices that are equipped to be able to receive this standard audio streaming protocol in situations where they're using broadcast mode in a public area.

And that's one area that really excites me. And the other is dnn. As we've talked about with regards to AI, it is both a huge opportunity, but it can be a threat if now hearing aids start using dnn. There are no hearing aids on the market today that do this, but that make permanent changes in the device on the basis of the patient's use of those devices in the real world. It's not that that's not going to happen quickly.

The computational power in integrated circuits right now and systems AI systems is doubling every three and a half months. And we're going to continue to see rapid advances in the way that the DNN

models onboard our hearing aids are capable of monitoring and making changes not only to the patient's audiogram, but on their lifestyle. The risk of that to the professional. Putting my audiology hat on now is that if patients come back wearing these devices that are capable of making permanent changes beyond what the audiologist, what the professional did in the clinic, the clinician needs to know what changes were made in this black box that we call dnn. Because if the patient comes back and says, yeah, I'm hearing better, but I'm still not hearing my granddaughter the way I'd like to.

If I don't know what changes have been applied, buy that DNN model in the real world, then I'm kind of stuck. I don't know what to do. So I think the risk is going to be that there has to be collaboration, trust and a partnership between the manufacturer and the professional to say, here's what the DNN changed just in case it's not. I mean, we take this utopian ideal that DNN is going to be able to personalize, customize better than a human. I don't believe that.

I believe that the technology and the human Yield Better outcomes. Dr. Tarvin, what is one thing that you wish every hearing care professional would start doing tomorrow to improve their fittings and patient experience? Being open minded. Being open minded to trying new verification methods that they have not in the past. Be open minded to embracing different tests.

Just being open minded that how you've done something for a very long time perhaps is not the way you should continue to do it. If there is room for improvement, Wonderful. Love it. Well, to our colleagues who tuned in today, thank you again. We had Dr. Alex Tarvin from Elevate Audiology.

She is the owner and founder and audiologist there. And Dr. Dave Faber, who is the chief Hearing Health Officer at Starkey. I'm Blaise Delfino with the Hearing Matters podcast and until next time, hear Life's story.