eAudiology: Real Talk About Real Ear: How to Integrate Rehabilitative Verification into Your Practice

Presenter: American Academy of Audiology

Hello everyone and welcome. The American Academy of Audiology would like to thank you for joining us on today's webinar Real Talk about Real Ear how to integrate rehabilitative verification into your practice. My name is Katie Sidwell and I'm the moderator for this presentation. This presentation will last approximately one hour. Before we begin, I would also like to go over a couple of items.

First, a copy of the slides can be found in the Handout tab on the webinar page. If at any point during this presentation the audio and slides do not appear in sync for you, please feel free to follow along using the slide handout. In addition, please remember that you will need to return to the main webinar page to access the evaluation, assessment and Certificate. In order to receive CEUs for this web seminar, you must view the entire program, complete the assessment and the evaluation for those attending this presentation during the live recording, Please record the 4 digit passcode found in the chat box. Following this introduction, this passcode is required to access and print a certificate documenting real time live participation of this webinar.

All other viewers will be able to print the on demand CEU certificate after successfully completing the assessment. Last, there will be time for questions at the end of this webinar. Please feel free to type your questions for the presenter in the chat box located on the left of your screen as you think of them. But again, we will hold the questions until the end of the presentation. And now I'm pleased to welcome and introduce today's presenters.

Dr. Sarah Curtis is the owner of Sounds of Lice Hearing center in Concord Township, Ohio. Dr. Curtis provides audiological services for pediatric and adult patients. She is a board member of the Audiology Practice Standards Organization and is passionate about growing the profession of audiology through improved clinical practices and education of Future Audiologists.

Joining Dr. Curtis today is Dr. Megan Jacobs, a recent graduate of at Still University. Dr. Jacobs has recently been employed by Physical Therapy Imbalance in Loveland, Colorado, where she is excited to

work with both the auditory and vestibular systems.

And now I will turn it over to Dr. Curtis. Hi. So thank you for joining us for the presentation today. I just wanted to talk really quickly about I just wanted to mention Eleni Santorelli.

Eleni Santarelli was a third year student from the Northeastern Ohio Audiology Consortium, or noac, who was working with us on this project and did a huge amount with Dr. Jacobs in the data collection. And so I just want to thank Eleni for her very I just wanted to tell you a little bit about our team at the time that we conducted the study and why we did it. So I opened this practice in October 2018. It's a small private practice we only had at the time, myself, Dr.

Jacobs and DeLenny. And so we were a little bit strapped. But so all this data was collected with a lot of love and passion for this project. I do have a history of doing clinical research. And so in 2017 I conducted independent research with Gail Murray, PhD and Kelsey Kruger, AUD at University Hospitals of Cleveland.

It was on using trial hearing aids in the selection process for amplification. And we did present at AAA and at Unicron National International Conferences. But you know, I'm not somebody who's a PhD and is out there doing a lot of research and but I do think that it's needed, it's practical. Those of us who are out in the field doing this work, we see the problems that are happening. And so I thought, you know, we're seeing this big lack of practical examples of what's going on in really our measures.

And so I said, let's go ahead and look at it. We saw this pattern of underfittings and varying first inter and interim manufacturer first fits. And it was also just a great learning opportunity for our students. Did we have funding? Nope, we were self funded.

The cost of the study though was very low. We just had to cover a few shipping charges. The aids were requested by from the manufacturers and some of them sent them at no cost to us, some had us order them and return them. But really it was very low cost and we did cover whatever was required. We had no sponsorship for this.

So our objective for the presentation today one is to provide you some research about real ear measures and verification. Two is to emphasize why aiding to audibility is critical and and how to utilize the speech intelligibility index in real ear verification. Three, demonstrate the first fittings to the same exact hearing losses from a variety of manufacturers. Next to discuss what effects individual factors can have upon manufacturer first fits to explain how transducers and earpieces may affect amplification. To show what real ear verification looks like on different REALLY equipment.

To instruct how to implement common sense. Easy to integrate methods of really or verification into clinical practice. And to provide guidance on how to counsel differently for rehabilitative settings. Before I move forward, I do want to just give a little credit to Dave Smearga. Dave Smearga offered me initial back in 2013 or 12.

He trained the staff of the place where I worked at the time and totally opened My eyes to all these different things about real ear and really just spun me off into learning a whole lot more. So thank you to Mr. Snuga. What is our role as an audiologist in hearing loss rehabilitation? One, you know, we want to use our scientific training and expertise to provide patient centered, evidence based techniques for the comprehensive diagnosis and rehabilitation of auditory and vestibular disorders.

And then to establish a realistic and achievable patient and family centered treatment plan, which often includes the selection and fitting of hearing aids. I want to just emphasize we are doctors, we are not technicians, we are not salespeople. Our patients trust them with our hearing health care expertise, outcomes. And so I think when we flip it so that we look at it that way, when we hold ourselves in a very

responsible way and look at this from a rehabilitative standpoint, a lot of this stuff really starts to make sense and you'll start to think about things differently. But I'm sure many of you out there are already doing this.

I'm going to turn it over now to Megan Jacobs. Dr. Jacobs, thank you so very much. Dr. Curtis.

So going forward with that idea of the, ah, providing a patient centered care, before we get into the importance of ear measurements and verification and why we do it, we need to understand what our goal is when we are fitting a hearing aid. And so the goal when we're fitting a patient with hearing aids, as we all very much aware, is to help them achieve their personal goals in regards to the verbal communication as well as sound awareness. A lot of times we can get a little bit more focused on the actual communication aspects of it. But we do also need to think about, well, what sounds are important to our patient, because those sounds are what are going to improve their overall quality of life and their satisfaction with not only the hearing aids that they are using, but with our services as well.

Now, in order to achieve these goals, you have to ensure that our patients are given adequate audibility. And that's kind of the big, the big part where real ear measurements come in is because, and you'll see as we go through this presentation that when we're only relying on things such as a manufacturer's first fit or just relying on the patient's ability to provide a feedback. We're not always giving them what they need.

Real air verification has existed since 1984. That was when it was first introduced to us. And in the 36 years since real air measurements were introduced, they gained quite a bit of traction in pediatric world, but not so much in the adult world. In fact, in a 2010study by Knoller and Tikow, it was observed that real error measurements are used in approximately 40% of fittings. It was also observed at that time that there really hadn't been an increase in the application of real error measurements by clinicians.

Meaning that as the years have gone by, we haven't seen more and more people using this technique to verify the fitting their hearing aid fitting. Instead, that number is just kind of staying at that same level, which is a little alarming when that number is only about 40%. What's even more shocking with this study though, was that Mueller and PACAO found that 50% of clinicians who had access to the equipment to use really unmeasured real ear verification, they would not routinely perform real ear measurements. Again, that's half the people in this study with the access to the technology were not using it for their patients, which is a little alarming. Dr.

Curtis and myself, we respect that experienced audiologists have an incredible amount of knowledge and it's possible that they aren't using real measurement. Real ear measurements we have because they may be unaware of exactly how detrimental can be jumped to rely on things such as, again, the first bit of the manufacturer, their own sort of experience with it and patient feedback. But in this day and age, when we're so, excuse me, when we're so wanting to have more objective data, we really do need to be using real ear verification.

Before we get to the object, before we talk about more about those objective readings as to why we need to use real ear measurement, I think it's important that we mention the subjective data, mainly how patients are in support of using real ear verifications. In 2016, Jorgensen summarized the Sheepalcontent study that Marked Smart Track did, which was indicating that there, quote, was a high percentage of people who were highly dissatisfied with their hearing aid. In that same year. In 2010, a study by Beck had showed there was an 18% increase in satisfaction when real ear measurements were applied to the sitting of hearing aids. And he wasn't the only one.

We've also found other studies that also show support of improved patient satisfaction when using real ear measurements. Improved personal outcome as well as reduced follows, which is great for both them as patients and for others as clinicians.

Now we're going to kind of go into what exactly are sort of the necessary tools to have effective hearing aid fittings. The factors that impact the audibility are the application of the manufacturer's proprietary algorithm. We will get to this later in our Slides just some heat in the front of your mind right now is how you can manufacture algorithm. The degree, type and configuration of the hearing loss affects the hearing aid fitting because obviously we don't want to fit a person who has a mild hearing loss with the same formula and the same amount of configuration that we wouldn't for a patient with a computer profound hearing loss. Also asymmetricalities can affect your sitting mean well because again we don't want to treat ears the same.

We want to address different losses characteristics of each individual patient can include headaches, did ear canals, collapsing canals, differences in skin texture along the canal as well as insert perforation in the scannic membrane. All of these different features will affect the STL at the level of the of the tympanic membrane because as you know, softer textures tend to abort more sound, harder textures tend to reflect more sound and that can drastically affect how you need to adjust again that gain curve.

If you are the choice of transducers proverbial ear measurement is that if you're using real ear decoupler difference you need to it's very important you use both the same transducer when you are catching their hearing aid in the hearing in the boot as well as when you are tapping it on the actual machine. If you're using inserts in puzzle burst, you need to use an insert when you are doing your measurement. If you're using their ear molds so their measurements you need to be testing during the air mold as well.

We kind of can't really do that with super old headphones obviously because you can't bring super oral headphones inside the inside the measurement.

The type of earpiece obviously that the person is using is also going to impact your fitting because obviously if you're using a more open dome or a mold that has a larger opening in it, you're going to

have more reverbation and I'm sorry, you're going to have more sound reflecting even escaping the ear, which means you may have to add more Dane as you go along.

Another factor I'm sure that I did not mention before was the fact that the insertion depth of your probe tube is also a very important factor. It's very important that that probe tube is within 5 millimeters of the tympanic membrane. There are a lot of different methods as to how to get it that accurate, including using a sound generator that then reflects and then it will show you the Verific 2 has that and that's wonderful. There's Also just using the measurement tools as well. But it's very important to get it within that 5 millimeters because otherwise if it's too far away, it's going to.

You're going to have to increase your gain all over. The other thing to be careful about is that if the probe tube is wafted by its lumen or in any way shape or form, it can lead to all of your permits being low across all frequencies.

The choice of prescriptive algorithm is also incredibly important. So you've decided to fit your. You decided that you're new verification in your fitting, but now you're, now you're placed with the important decision of which prescriptive algorithm do you use? In school I was taught to Prescribe these algorithms NAL, NL1, NAL, NL2, DSLadult and DSL child, which gives us at least four algorithms to choose from when fitting a patient. Each of these algorithms are designed with a different goal in mind when it comes to amplification.

For example, the NAL, NL1 and NL2 algorithms place more emphasis on amplifying speech signals while the DSL adult and child algorithms focus on amplifying all sounds across the frequencies. So when it comes to choosing a prescriptive algorithm, we again want to make sure that we that the prescriptive algorithm that we choose is in line with the same goal as our patient. If our patients want to focus more on speech then we obviously going to lean more towards an NAL, ML1 or 2 algorithm. If they are for instance a child, you can go with ESL because we're trying to give them as much audibility

as possible. Now the bond has decided that there's a term called the speech intelligibility index or SII for short.

And this is an estimate of the audibility of the skeet signal month performing earlier measurement. This is kind of our objective measurement. We do look at how the lpac, which would be the line or the curve that you see of how much amplification there is. But this is our objective measurement and according to the literature we tend to want an FII of 70 or greater.

Now we can go into the study design of triple tid. In this study we chose four different curing wash patterns. We had a mild to moderate, a moderate to severe, a moderately severe flat and a severe to profound which we. For the severe to profound we used the high powered btes as well as a different formula because it just wasn't appropriate to apply the same formulas for the mild to severe hearing losses. And it was demonstrated for foundation the algorithms we did use were the proprietary algorithm provided by the manufacturer, the NAL NL1 formula and again that except when it came to severe to profound loss.

The NAL NL2 formula and then the DSL adult formula which was only used for those computer profound losses use 14 WAT configurations. I know that it may or may not be a little bit difficult to which is why I can read off some of the values here or an estimation. The mild to moderate starts at about 10db sloping down about 35db. A little bit of a wise at 6 and 8. Our moderate KV started at about 30db and it sloped all the way down to 85.

The moderate kids of year flat range about 65db to 65db and then the computer profound started at 70db sloping down to 120pb with 8000 Odyssey being immeasurable. The manufacturers that we used were Oticon, Phonak, Resound, Signia, Darky, Unitron and Widex. For Oticon we use the open F1 and the XCeed one. For Sonic we have the Marvel M90 and the Naida D90. For Xan we have the Lynx Quattro 9S and the Enzo the Signon.

For Signia we use the Pure XS7X excuse me and the Motion 13P darky we have the Lizio 240s and then use VPE. For Unitron you use the Demoxc 9 and the TMAC GP and then for Widex we had the Evoke 44030 PBS and the Invoke 1 1013.

All measures are protocol for the following all measures were made using the manufacturer related to Shiba strengths. So essentially they would we would put the loss into the computer software and the software would tell us what Shiba strength they would recommend. All measures were made during the audio scan verification test box. We recorded both the results in DDL as output levels in addition in each condition as well as the feature intelligibility index and all manufacturers were de identified and plotted atop each other to each our differences in the application of algorithms including the color that is used in the graph.

We did the bidding based on the sii. It is important to note that this procedure does not apply when any of the thresholds between 500 and 4000 Hz exceeds 70 BDM DHL it just isn't very applicable considering that once you reach a hearing loss of that magnitude it's very hard to get the fusion tell to go. The index that we require. But essentially to start it, you would measure the measurement, your measure of hearing aid at 65dB SCL. And if the Speech Intelligibility Index is 70 or better, then you're basically done.

You can do a couple measurements, you can do a couple of adjustments, maybe smooth out the curve, but it's really not as necessary. But if the fuse intelligibility index is less than 70, you have to adjust. So what you will do then is you will measure it at 50dB STL and then you will adjust the center of the L task, which is that line that you see. And you'll see it in the slide below. It's very thick, but then the center line is a little bit clearer to look at and you'll essentially adjust that center line to rest on top of the threshold.

And then after that you will remeasure at 65dB and it should be close to 70. But if not, then you'll just continue to make those adjustments.

And with that, I will now go ahead and leave it up to Dr. Curtis to reduce the flex the results.

Okay. And you know, I just really again want to give a lot of credit to Dr. Jacobs. She worked very, very hard with Ms. Antarelli and collecting the majority of this data.

When I sat down and looked at it, there were 20 to 21 conditions per hearing loss. So that's about 80 different scenarios they ran. So thank you, thank you for that. Okay, so, alrighty. So first what I want to show you a graphical demonstration of our findings.

So again, your speech intelligibility index is. It's a measurement essentially of the percentage of a speech signal that you are making audible with the hearing aid. It's an easy way when you're counseling to the patients to describe it to them. So on this graph you're looking at the inter manufacturer proprietary algorithms and their resultant speech intelligibility indexes. This is for the mild to moderate hearing loss.

The range here, it's pretty huge. 54 was the lowest SII and the highest was 91. So this I think is, was by far our most variable. So really, really, this is really important when you are running, when you're choosing a manufacturer, do not trust what their first fit outcome is going to be. Go ahead and measure it yourself.

I want to note that that 54 was worse than the unaided SII, which was 69. So that hearing aid was actually hurting that patient's audibility. I do want to note also that if you do want to do this in your clinic, if you are using. We found, you know, we, we got to know a lot of products and softwares. If you're running a product that you are open fitting in a test box situation with a Synova product.

So Phonak or Unitron, make sure that you do use the test box settings. You can choose that. You can choose for verification, test box or real ear. We learned pretty quickly that everything was pretty thrown off when we were trying to run this initially without selecting the test box, but then it worked very well. So now this is our proprietaries for moderate to severe and that is variable.

You're at 40 to 51. Keep in mind that with the exception of severe to profound, none of these have thresholds that exceed 70. Which if we remember the measurement for is this an adequately appropriate audibility for this loss is to have an SII of 70 or better. So 40 to 51, nobody's doing very well. This is for the moderately severe flat loss.

We are at a range of 37 to 51. Again, sort of variable, not nearly as much as mild, mild, moderate. But also nobody hitting 70. And they should be. And then this severe to profound, this is kind of all over the place.

And so we have a range of 12 to 30 here. Now, we don't expect this to hit 7 to hit 70 as an FII, because the threshold, the pure tone average here is 90. But that's a pretty big variability and I certainly don't want to ever fit a severe to per pound hearing loss, especially somebody that's been wearing hearing aids for a long time when they're going to have SII of 12. They're going to tell you it's way too soft, because it is. All right, so for the following slides, we're just going to look at one loss, the moderate to severe loss, and we're going to observe the variability in the SII between manufacturers for proprietary NL1 and NL2 algorithms.

Also, I want you to observe the change within the manufacturers as the slides change.

So for this first one here, as we saw before, this was in the previous set, the range is 40 to 51. Manufacture E does not have a proprietary algorithm, so we are not going to see them in these slides.

Sorry about that. Okay. And I hit NAL NL1, you can see there was a shift that's going to be more pronounced in a future slide. But the range here is 44 to 68. And in NAL NL2 we have a range of 41 to 58.

The red line walked up a little higher than it was supposed to be on this side, it was supposed to be at 70, but this slide represents per lock type how all three algorithms varied within the manufacturers. The pure tone average for this loss was 70 or better. So the goal is to meet or exceed an SII of 70 unaided on here was 69, so should definitely have hit 70 and everybody pretty much does. Everybody does, except for that random proprietary down at 54A1. You are not what I would pick.

The best on average for this particular loss for mild to moderate is manufacturer C. And then manufacturer E isn't doing a bad job as well.

Now here the red line does represent that SII of 70, which is our goal because the moderate to severe loss does not exceed 70 at any point. The pure tone average here is 59. No goodings hit 70 here. The unaided SII was 11. So you are going to come up a bit and anything shown here is an improvement.

And C2 did get close for NALNL1, but everybody's really low here. Everybody has room to grow and improve. Again, the red line is 70 for the moderately severe flat loss. With the exception of C2, which was really excited about this hearing loss, nobody approaches 70 here. The pure tone average here is 62.

Otherwise, the next closest of all the other 20 measurements we made was fisci ache. So not doing well. And then for severe to profound losses again, we decided to sub out NAL NL1 and put in DSL version 5A. We assumed if an audiologist is going to choose something other than the proprietary or NAL NL2, which is often presumed to be the better algorithm to choose, it's going to be with DSL

because that's really enforcing audibility. And a lot of times as severe to profound hearing losses have worn hearing aids for a long time and really do enjoy all that power.

So the pure tone average is not going to did exceed 70. So our goal isn't implied here. We don't have a particular level that we're trying to hit, but this graph surely shows that there's a huge variability, anywhere from 6 to 34. And the DSL is always louder than NAL NL 2. The N for D and G, it was actually louder than the proprietary.

The best bet here is manufacturer G with an average SII regardless of the algorithm that you choose of 31. But I wouldn't choose manufacturer C which is at 13 average. All right, so now we're going to just look at the outputs in DBSPL for the proprietary algorithms per hearing loss. So the mild to moderate proprietary programmings were certainly very variable. Look at the difference between the red and the yellow manufacturers.

The it was most variable here at 750 hertz. If you look it's very wide and also at 3000 hertz. The shape for all of them is similar but except for the manufacturer G which is quite an outlier.

So moderate to severe than proprietary. They're close ish except for the high frequencies but there's still quite a bit of variability for the moderately severe flat hearing losses. You can see the low frequencies have quite a bit of variability here and the and as do the highs. The middles are usually pretty similar on a lot of these. And with the severe to profound the shapes are all relatively similar.

There is a boost around 2000 for everybody and that the high frequencies are going to be very variable. Now when we're dealing with actual prescriptive targets, what we did is represented in black on all of these graphs. Black solid lines. The actual prescriptive targets that were generated within the verifit. Everything laying atop that is what the manufacturers did.

When you went into the software and selected those manufacturers and those algorithms, this is what they ended up looking like when we measured them against those prescriptive targets in the test box. So you can see here nothing really looks like the black line. This is an important lesson when you are choosing an algorithm within a manufacturer software. A lot of people feel like okay cool, this is really going to Mac this I'm doing, I'm going to do a better job. It's still going to be way off.

Same thing for moderate to severe. Now these do get a little bit closer. There's the most variability for any of this stuff tends to be at the low and high end. So the mild to moderate and the severe to profounds. But the purple one which is I think B is way above everybody else.

Same thing here on this graph. Manufacturer C here is way above. The general shape is closer here with a moderately severe and it's severe to profound. Everybody tanks on the highs. We're under amplifying the hives in DFL5A for every manufacturer for NAL NL2 the same thing is noted.

The verifit generated prescriptive targets for NALNL2 are represented by the black line. Whereas the manufacturer's interpretation within their own softwares of that of the NAL NL2 algorithm are represented by the dotted colored lines. These are a little closer except for this looks like G and D are quite low in the low frequencies for mild to moderate, moderate to severe, they actually Do a pretty good job. You know, manufacture D is overshooting in the lows and E in those highs, but same thing here for moderately severe flat. Manufacturer D here is really excited about those lows again.

Everybody else is right close to the targets in the lows and mids, but really tank off in the highs and severe to profound. NAL NL 2 similar shape, but all could do better in the high frequencies. So our take home point from all of these, the FII can vary widely depending on the manufacturer. It can vary widely depending on the algorithm that you choose. NALNL1 in the software is unlikely to meet the NAL NL2 targets.

NALNL2 in the software is unlikely to meet THE NALNL2 targets. And some manufacturers can be close on one type of loss but way off on another. So don't assume that just because it's usually closer in the mild to moderate hearing losses, it's going to be the same thing in a moderately severe flat. So I just wanted to also give a few more programming tips. If it's asymmetrical, you want to pick an algorithm and make sure that both ears fit the targets.

Even if you're not looking at, in this case, you're looking less at audibility because the losses are different and looking more at those target settings. I do want to emphasize when you're looking strictly at audibility, you do not necessarily need to measure the recd, but when you're looking at targets you do. You're going to want to make sure your thresholds are measured with inserts that you then measure with an insert their recds, apply those in the verification equipment that you are using and then go ahead and look at matching your targets because you want to make sure that the targets are accurate if those, if those are what you're going to use. It's also really important to look at your mid frequency gain. Even if your speech intelligibility index score is over 70, consider giving gain to the mid frequencies about 750 to 2000 Hertz.

This will likely improve the patient's perceived speech quality both for themselves and others. And it's going to reduce that kine sensation. So instead of reducing your highs, increase your mids a little bit. You'll often see when you run these there's a dip even though the even if they hit 70 out of the box, you're going to see that dip right between 750 and 2 and it's not providing much audibility. And we know those are the biggest frequencies for speech.

And then own voice problems. I highly recommend against making changes on day one. Encourage the patient to work through it. It's going to be gone within a few days unless it's truly something to do with the hearing aids. If there is true occlusion, then you might want to try opening the vent, dropping the soft gain below 800Hz by about 3-5db.

And do not use anything referred to as occlusion manager or anything such as that in the software. It tends to actually make the problem worse.

Okay.

And all right. So I just wanted to show a difference between what a loss looks like on the verifit versus what it would look like on a different piece of equipment. So this is what a well amplified good SII fitting looks like on the veritip and this is, we ran it on the medrecs equipment. This is what the exact same output looked like on their graph. You can just see within that white range.

The purple tracing, which is like the midpoint of the LTAs is well placed within there. It is definitely much clearer to see on the verifit though.

So what are some of the counseling differences you're going to use when you're fitting to audibility? A lot. Fitting to audibility is hard and I think that's like Gary sometimes to run that verification at the first fit because the patient's going to tell you it's too loud because it is for them. Everything's louder but it's not too loud. It's just appropriately loud for their law.

If you've done your job and provided a good rehabilitative fitting. But we've got to work to rehabilitate, rehabilitate our patients. It's not our job to make them happy on day one. It's our job to make their aids mandatory. They can't live without them by, you know, six weeks later.

We have to give them realistic expectations and give them permission to be agitated at the beginning of their, of their experience with hearing aids. I tell my patients, if you want to curse me under your breasts, I give you full permission. But I promise it gets better. They need to wear them full time. I tell my patients, if you're awake and dry, the hearing aid should be in your ears.

My hearing aid patients, after their two week follow ups routinely come in with data logging that indicates like 11 to 14 hours of wear time. Right off the bat, implement the manufacturer's auto acclimatization functions. It's called different, something different in everything. But basically it allows you to back off of your 100% prescriptive. Prescriptive outcomes and then very, very slowly increase them over time.

And based on your patients, you might want to say I want to go from about 70% to 100% over three months, over six months, over two weeks. Some people just acclimate more quickly. This will get most, if not all of your patients to that 100% target, that final fitting, but always verify at 100% and back it off from there.

I don't give my patients the volume control initially and I hope that especially with better technology, that they don't ever have to use it. A patient's going to turn the volume down and make themselves more comfortable. That is their tendency. If you give them a volume control, they're probably going to go home and want to change it and have a really hard time not doing so. This is getting harder with those smartphone apps.

You really have to try to get them to not touch that volume, but you want them to be adjusting to the volume as it's programmed per real ear measures. And then explain what the real ear measures are showing you and why it's important. Show what the effect of lowering the volume will do while it's on their ears. Turn the overall gain back and show them how their percentage is going to drop on that sii. That helped them to understand if you turn that volume down, that's okay, but you're not going to hear as much speech.

So let's look at what your goals are. So we're going to go to some case studies. So this is case number one. This patient had been fit with hearing aids somewhere. Oh, they had never had wheel ear measures.

We ran NAL NL1 Green and the manufacturer proprietary Pipple. Notice that Neither met the NAL NL1 targets in the middle frequencies. Now he's a new hearing aids. He's fit to audibility and he says his life is amazing. And he is so frustrated with the time spent hearing poorly.

He feels like he wasted three years of his life and hearing aids that weren't fit. Well.

Okay, Phil, I'm going to turn this over to Megan to talk to you about in situ audiometry.

Megan? Dr. Curtis, I just want to ask if everybody can hear me. Okay. Because I know during that first time that my voice wasn't very audible.

So I'm just hoping that that can sort it out moving forward. In situ audiology is another or institute testing is another tool for clinicians to use when fitting hearing aids. Essentially, for those of you who are unsungarial with in situ testing, it's basically giving kind of like a short and sweet hearing kit through the hearing aids and through the hearing aid software. So depending on the manufacturer may hear beeps, they may hear kind of more like a whistling noise. They may hear static.

But you essentially do a mini hearing text. You tell them to respond when they hear it. You want to be in a quiet room. And what the. What the software does is with these updated thresholds, or showing the differences between the threshold in the booth and the threshold with the hearing aid in it, trying to compensate for the differences and how the ear canal works versus the obviously the juicy C coupler that they were using to make their kind of their algorithm.

However, as we can see with this particular case and many other cases, we do have two of them today. Since just using in situ, it doesn't replace real ear measurement. As we can see here. On the right side here, it has the general shape of what we're going for, but it's still missing a lot of that gain in the mid to

high frequencies. And it's only when we program with audibility in mind that we are able to get those nice scores.

We go from an SII of 36 to 66. Our second example here. Our second example here shows and in situ, again, as you can see with the shape of the lpac, it's pretty good for what we're going for, but we're still missing a lot of that gain in the mid high frequencies, especially on that right side. We see that there's an SIA of 51 on the left here and 41 on the right, which we would definitely want to increase. But after reprogramming it, we are able to adjust floatability, and we're able to see a really big improvement, especially on the left side, going to an SII of 79.

And in. And in the right ear, we get an SI of 59, which, again, isn't perfect, but considering the hearing loss that's happening and the limitations of hearing aid gain in those higher frequencies is actually very good. And so now I will return it once again back to Dr. Curtin.

All righty.

Okay. This is just another demonstration of a poor outside fitting. I don't have another anything to compare this to, but I want to show you what happened when people have never had real ear. This patient was fit elsewhere. They complained that their hearing aids did not work well and were not helping.

We ran real ear measures just to see where he was prior to our reprogramming, and this was where he was when we reprogrammed him, it was life changing. He did so much better. And I want you to keep in mind that this was showing prescriptive targets for NL2, which is by far across the board, usually the quietest of all of them. So looking at audibility, he was at 57 for the left ear and 36 for the right ear at a 65dB input, which is really much too low considering he didn't have thresholds that exceeded 70.

This is an interesting case. This made me a believer in running wheel ear when I do a hearing aid trial. So as I discussed earlier, I had done studies earlier and I'm a big believer in doing trials with patients, but I made the false assumption that you shouldn't run wheel ear. This patient, where those circles are, she was recommended I her primary care doctor. This is actually a great story.

I had delivered some little screeners to and said, you know, I want you testing everybody who's 50 and up. Well, this woman in her early 50s was screened and failed that little screening. And so she came in to see me with this mild to moderate cookie bite tensora hearing loss that was unknown to her. We fit initially her trial aids. First could the manufacturer recommended settings.

She came in two weeks later. She said, I, I don't know, I'm not noticing much difference. I said, I feel like you should. I really had an instinct that that something's wrong here. So I ran real ear measures where you see those circles.

The output of the hearing aid was essentially on top of their thresholds. It really dropped down when I went in and I reprogrammed and got this output. She loved her hearing aids. She called me within about three days and said, I don't need to wait the two weeks. I need you to order me these hearing aids.

I cannot live without them. And she wears her hearing aids religiously. So this is just a demonstration of when you're doing trials. Really it's a huge benefit to the patient if you do go in and make those real ear measurements because you're giving them an apples to apples comparison or an apples to apples idea of what their experience would be like. I want to show you this next study.

This is a very, was very interesting to me. This woman in her early 60s, she works for a place where she's like a membership director. She's very, very busy. She talks to people all day long. When you see her loss, I want you to just remember until about a year ago, this woman never wore hearing aids.

She has a history of recurrent colectoma for the right ear so due to the extent of her loss, I sit her with a trial hearing aid to the left ear while she waited and got medical evaluation and clearance and treatment for the right ear if needed so that she wasn't struggling any more than she had to. And I want to also point out I did the hearing handicap inventory for adults. Pre fitting she was a 22, which is a moderate handicap, kind of close to the top of moderate. Afterwards she was a two. These hearing aids made a huge difference for this patient.

So this was her pre fitting loss. Pre fitting fit, this is what the manufacturer thought she should have. The left ear, eh, you know, it's at 74, it's not bad. Her unaided is 72. So not hard to achieve.

The right ear, which I should indicate is a mixed loss with the largest conductive components in the lows and highs. Yeah, she's going from a 7 to a 9 at 65, so not good.

After I programmed her, this is what she got to. Okay, so let's go back. So Again, before her NAL NL1 SII was 74, it was 66 for the proprietary. Her right ear it was 19 for NL1 and proprietary was 9. When we made the changes she went to an SII of 90.

For the left ear this was an increase of 16. And in the right ear her adjusted SII was 54. And this is an increase of 35 from her proprietary. I would just want to reiterate, she loves her hearing aids. My final thoughts on this.

I always hear people say trust but verify. I'm going to alter that. I'm going to say don't trust and always verify.

It's, it's. We can see clearly here. Nobody's really close. And even people that are close or manufacturers that are close one place are really far off someplace else. Part of the reason I de

identified is because I didn't want to bias anybody.

This is everything. And I had some manufacturers that I love to work with more than others and sometimes they didn't do well at all. Final thought number two, Consider the goals for your patients and the algorithms you choose. Know what you gain and lose with each and and try different things. Number three, if available, use the speech intelligibility index to guide your adjustments and also to counsel your patient.

And number four, you as an audiologist should always be asking questions. Do clinical research. It doesn't have to be formal, but you could learn a whole lot. So take some risk, take your time. If you have any spare time, if you have graduate students, this is a Great project.

But find something that looks off in our industry and start looking into it. It can tell you a whole lot.

All right, well, thank you so much for attending our presentation. My contact information is at the end there if anybody wants to discuss the results or talk about it. I believe that we do have some time for questions. So Kayte, if you have any of those.

Yes, we have a couple questions that have come in and I'd like to remind our attendees to go ahead and type any questions that you have in the chat box on the lower left hand side of your screen. Okay, so the first question I've got for you is what should we do when a patient cannot handle the hearing aids at 100% gain even with auto acclimatization?

Megan, let's see how well Megan was my fourth year. So let's see what you learned. Megan, what do you think you would do in this case? Well, there's quite a few different things you can do. The first thing is that obviously counties a big deal into this.

Why? What is she annoying them? Is it chico I found or is it just the overall volume? Because those are two totally different. Two totally different things when different adjustments that need to be made.

I know that we've had some patients who we've never gotten them up to 100, but typically we try to slow down the period so that kids are bringing more time to address. Or sometimes the patient just wants to say at 90% and honestly I'd rather have them at 90% than not wearing their hearing aids. Better than 100%. That would be correct. Do you have anything to add to that?

No. I did forget to mention earlier, one of the reasons I do advise using that, using the other measures at your initial fit is, and I forgot to mention this, is you need to make sure that the configuration of your hearing aids that you've ordered is actually able to meet the needs of the hearing, of the hearing loss to the patient. I had a patient right out of school. I was in my first job and I was trying to run it and it looked like the hearing aid was dead. This was a 98 year old patient with tissue paper skin in her ear canals.

She had a severely, severely sloping loss and really needed to be in a mold. But when I put the moles in her ear, it collapsed her canals and she was hearing nothing. And as unideal as it was, we had to actually fit this patient with phlegm tubes because that was the only thing that could keep her canal open.

But I would never have known she wasn't hearing anything if I had not run those real ear measures at her first fit and if we hadn't made changes. So I will also say, though, don't sometimes, you know what, remeasure, retry, question yourself, tell the patient, you know what, let's, let's just start from scratch and let's try again. Don't be too proud to say, maybe it was my problem, maybe I clicked something and I didn't mean to click it. So let's check. But.

And you know, if you didn't really mess up, you didn't, but it'll make them feel like you're really trying to fix their problem because you are.

Great. Okay, so we have another question. When should we consider using the NAL NL2 targets for a patient instead of the NAL NL1? So I will take this one. This is, goes right back to that first question.

We've had patients who have not responded well at all to the NAL NL1 target. That's what we typically use because they do give a better audibility if we're going to use targets. Usually these are less noise tolerant patients. When we change them over and fit them to an NAL NL2 prescription, all of a sudden they just accept their hearing aids. So if you notice that most of it is a comfort issue, sometimes you do have to sacrifice some of that audibility to get the patients to tolerate the hearing aids.

Nobody, not every patient's going to be the same. So always be willing to switch gears.

Okay, thank you. Another question, in your opinion, what is a good balance of using REMS and patient feedback to adjust sound gain and how much should we rely on REMS compared to our patients?

So I think that it's a very difficult balance. You do want to listen to your patients. I tend to trust experience patients feedback very much. And so even if it looks good on the screen, if I know they were fit pretty well before and they're having some complaints, you know, trust your patient. Some patients are horrible reporters, Some patients are amazing reporters.

But you know, the more comfortable you get with your programming and the more confident you get in your programming abilities and your patient's responses. I think you do know, but always be aware of what the changes that you're doing are making to their output and the functioning of their hearing aids. A good example of this would be somebody that says, oh, I hate all that background noise. Well, if you increase their noise comfort settings so you make it just stronger, it's going to cancel out more noise. Yeah, but you might take speech away for them for some people and make sure they know that, you know, and maybe they're like, that's okay, I'm okay if I lose speech.

Otherwise I'm going to rip the hearing aid down in my head. I'd rather wear something than hear a little bit better and be comfortable than hear a lot more and hate my hearing aids. So listen to your patients, act them, involve them. But sometimes you have to counsel them and get them to where they need to be because maybe they went someplace elf and they were severely underfit for a long time and they think that the hearing aid should be way more comfortable out of the gate. Well, if you know that that's not the case, work with them.

Great. All right, well, it looks like we're at the top of the hour, so with that, this concludes today's Web Seminar. The Assessment questions and Web Seminar evaluation links can be found in the Dashboard section of your account. Both of these items need to be completed to receive CEU credit for the Web Seminar. As a reminder for those attending this presentation during the live recording, please be sure to record the four digit passcode found in the chat box.

The passcode is required to access and print a certificate documenting real time live participation of this webinar. All other viewers will be able to print the On Demand CU certificate after successfully completing the assessment. To register for any of our upcoming web seminars or to purchase an On Demand Web Seminar package, please visit www.eaudiology.org. thank you again to our presenters today and thank you for your participation on today's Web Seminar. Please note, Academy approval of this continuing education is based on course content only and does not imply endorsement of course content, specific products or clinical procedures, or adherence of the event to the Academy's Code of Ethics.

Any views that are presented are those of the presenter and not necessarily of the Academy. The Academy shall be the copyright owner of any compilation created by the Academy that includes this Eaudiology Web Seminar presentation. All other copyright ownership shall remain with the presenters or authors if using third party material with permission. This concludes today's program. Thank you.

You may now disconnect.