Troubleshooting the Most Common Fitting Issues With Modern Beltone Devices

Presenter: Chris Phoenix

Welcome everyone, to today's webinar troubleshooting the most common fitting issues with belt tone devices. We are so pleased to welcome back one of our favorite people, Christopher Phoenix, as today's presenter. And with that, Chris, I'm going to hand things over to you. Thank you so very much, Kimberly, it was great to see you and I want to welcome everybody as well. And a special thanks to Kimberly for always being the greatest host, making this easy for us and so much fun.

So again, welcome to the presentation today. My name is Chris Phoenix. I am the regional training manager for the western half of the United States at Belt Home. I have been practicing with hearing aids for a little over 20 years. And so everybody knows that the topics that we picked today came about because of primarily conversations with providers like yourselves who have needed help with fittings.

And then they've sent me their NOAA files. We've had conversations about what we found. These are the things that we find most commonly that are being missed or need to be elaborated on in order to get the best benefit. So hopefully, when we finish today, you'll have a good idea of what needs to be done to begin with and what to start looking for in order to solve so many of the problems that occur with our current complex hearing aids. Now, our learning objectives today we want to start by identifying what constitutes a complete audiogram, how it's going to impact your fitting.

We want to talk about domes and vent selection and how that can impact occlusion, and then how vent effect will help us to better understand what's actually happening in a patient's ear. We want to talk about negative gain and how we can use negative gain to offset some of that shell occlusion to give both a better streaming experience and overall better quality of sound. We want to identify the right fitting profile for you to use for each of our different patients to give them the best experience. We want to talk a bit

about the different receivers that we have available and when you might want to choose one versus another and what kinds of problems can occur if you select the wrong one. We're going to talk about the underlying elements of band split directionality and then how we use that along with our mixing point to improve the outcomes for patients.

And then finally, we want to talk about time constants and how using those time constants can and give our patients, again, a better listening experience and something that's more comfortable and more appropriate for them.

In our complex and ever changing world of hearing aid and hearing aid fittings, we find that more and more, we're trying to bridge that gulf between art and science. Now, hearing aids are becoming really automated, very automatic, and very adaptive. A lot of people argue that because of that development, that capability, we should really just let the technology set everything for us, and that ultimately, people like yourselves and myself aren't really even needed. You know, that's the whole argument behind OTC. These proponents of that make that case that we're not necessary constantly.

However, anybody that's ever actually fit a patient knows that there's a huge amount of complexity involved in dealing with human beings, and that ultimately it takes a human being to interpret a patient's needs and then allow us to adjust the hearing aid to give them a more successful fitting. Now, that being said, the value in a hearing aid professional really is found in our ability to apply the art of sound to a fitting. It's our ability to take the experiences and the frustrations, the successes of a patient, and then apply just that right amount of nuance to be able to get more out of the hearing aid. It's to give them more comfort in more places. But like a lot of things, art takes practice, it takes detail, and it takes passion.

So, like a great painter or great musician, we really have to be so passionately engaged in the process that we know when and how to apply those brushstrokes. We really have to know our craft so well and apply it at such a high level that we can become both truly and in reality, irreplaceable. So that, having been said, a lot of what we're going to talk about is not just the science, but really it's about the art. So anytime you start a building of any sort, you have to have a really good, solid foundation. And for us, that foundation really takes place in the battery tests that we do prior to fitting hearing aid.

And it also takes place on a regular basis after the fitting, when we do ongoing testing. So every one of the tests that we do and we recommend have a very specific value and a specific purpose that's going to ensure that a patient has the best chance of the successful fitting. So we're going to take a minute to remind you of what tests we should be doing, and then afterwards, we're going to talk about why it's relevant and how each of those tests is used and why it is critical. So, to begin with, we've got our pure tone, air and bone scores. Obviously, these are critical.

Those are the primary frequencies. And according to the most recent guidance from the IHS, we should now be testing all of the half octaves as well. Now, it should go without saying that, but for sake of being thorough, we've also got to be diligent about using appropriate masking, and we've got to make sure that we're doing bone testing when appropriate. Now, there can be times where we shortcut on a test because of a patient's ability to focus or because of time constraints. However, this is never the place to be doing so.

And so let's make sure that we're doing a full and complete error and bones course. Now, the next one is pure tone ldls or UCLs. Those should be done at 5123 and 4k. It is one of the least completed tests, but it has become critical to a good, clean fit and we'll talk a bit about more why later. SRTs are a very, very well known standard.

They belong on every single test. I'm going to argue that speech, MCLs and UCLs are both fast to acquire and full of really, really helpful information. For us, a personal focus for myself and a soapbox you can often find me on is the word discrimination. Not just Monaro, but also binaural. Very, very critical.

More and more studies are also showing us the value of a quicksand, and we recommend you perform this on every single patient. And then lastly, Doctor Laura Choctaw and I routinely preach the necessity of performing a verification or validation of some sort, and it is unquestionably an extension of the initial audiogram. So now that we've talked about all of the different tests that we should be doing, let's talk a bit about why and why do we care. So we'll start with the pure tone, air and bone scores. These are obviously the basis for an entire fitting.

If we don't have complete and accurate scores, the software just doesn't know what to do in order to provide the patient with the sound they need. And I can't stress this enough, bone scores are a must. Too many times I see hearing tests that come in or the NOAA files that come to me, and the only thing listed on the audiogram is air scores. But bone scores are critical, beside being just a federal legal requirement that they must be done. When you input the bone scores, Solis takes those into account and is going to increase your gain.

Recommendations to compensate for any kind of conductive loss that may be present, as well as just that sensory nerve loss. Even if you don't have enough conductive component to require a referral for a patient, there is still likely to be one or two frequencies that have a ten or 15 decibel airborne gap. In a case like that, we need additional gain to compensate for that airborne gap and make sure that the patients are getting an adequate target level and adequate gain. There have been several times in the last six months where I've seen NOAA files where a patient, where there's

nothing but air scores, a patient's complaining that they're not getting enough volume. And when you add in those bone scores, all of a sudden the target levels jump up significantly because we need to compensate.

So please don't ever miss that. That's going to save a lot of trouble down the road trying to fix problems if we put those scores in in the first place. The same thing is very true about ldls or UCLs on a pure tone level. These are critical for us. So up until recently, when we would set the MPOs, they would be set based off of a logarithm that was built around the averages of multiple people with a similar hearing loss.

But today, when we put those ldls or the UCLs into the software, Solus will take those and then create a custom NPO based on the patient's loss. And that's going to give us, again, a much more accurate fit from day one for the people that tell us, oh, I would never do that. It just takes too long. I'll see if I can't destroy that myth for you. So, not long ago, I did five tests in a row, five different people, and I wanted to know how long it's going to take to do each of these different sections.

When it came to the Puritan ldls, it took between 90 and 120 seconds. That's it. It's less than two minutes for the average patient. I will tell you again and again, I see problems where people are dropping your MPOs too much. And when that happens, we then have to spend one, two, three appointments trying to track down why the patient is struggling, eventually figuring out where that MPO should be set.

If we would have taken the two minutes upfront on the testing and put those in, it would have saved two or three appointments later down the road. So don't be afraid. Take the time. It's worth it. For those pure tone ldls and for the people that are asking, we should be doing those at 5123 and 4000 hz.

There are times you might want to do mid octaves, but typically that sweep was enough to do the right settings for us. The next thing we want to do is SRT. Why do we care about the speech reception threshold? Well, ultimately, that's a standard for validity verification. We want to make sure that the results that we see with that audio are accurate and that we can trust those numbers so that down the road, when we go to make sure the gain levels are set properly, tone levels are set properly, that we're not basing it off of faulty data.

So if our SRTs and our pure tone averages don't match, we know there's a problem with the test. Does it happen a lot? No, that those two don't match. But does it happen? Yeah, without a doubt it happens.

If we catch it again prior to having to do the fitting, we're going to have a much easier time fitting it down the road because we know what to look for now. Speech MCLs this is one where people push back on me all the time and say, well, it's really not that relevant. It's not going to give us all that much. However, this is really beneficial for us. And again, it only takes 30 seconds or so.

When we use the MCLs, we get a good idea of what the patient prefers. Some people like a very soft experience, some people are power junkies. Some people say it's too much, some people say it's not enough. There's an old saying when I was a kid, if it's too loud, you're too old. Now, obviously it refers to music, but it's true to a degree.

Right. We know that there are people who like it too loud. We know people who like it really soft. That speech MCL can help us to know whether we need to introduce amplification slowly over a long period of time, or if we have somebody there that loves to blast down and we can take it all the way to eleven on day one. So the same thing is true with our speech UCLs.

Despite having already found Puritan UCLs or LDLs, we don't really know what a patient is going to do when we react to a broadband volume increase. So speech UCLs show us if there are likely to be concerns. In a lot of ways, it's the second half of the information we found in the MCL. When we put those two pieces together, that gives us a really good idea of the patient's dynamic range, which is then going to help us to set our initial gain levels, as well as give us a good idea of how likely we are to be able to be successful with the fitting in the first place. It can also be very advantageous for us when we go to select the patient profile that we're going to start with.

Do we need to start with a gentler first time user onboarding, or can we go to a full time user experience? Nonlinear. That's the kind of question that is easily answered with MCLs and UCLs. And again, for most of our patients, it takes between 30 and 90 seconds to get that done.

All right, one of my big, big ones, monarch and binaural discrimination, or word recognition. Word recognition is one of the most powerful tools we have for predicting the likely benefits of amplification, and it tells us how much time we're going to need to devote to counseling, as well as whether or not we're going to need to set that patient up for some auditory therapies. Moving forward. On top of all of that, there have been countless examples in my career of patients who were told in the past that they have an unavoidable ear because of poor discrimination. However, when I do binaural discrimination, we find that there's clear benefit to be had by using both ears.

We hear with two ears. Normally, anytime we can fit two ears, we want to fit two ears, because that, again, is more natural and more real. Without that binaural discrimination, you're not going to have a good idea of whether or not the patient will benefit.

There's also the flip side of that as well. I had a patient on one occasion where the two ears were both solid individually, but when I put the two ears together, we got some

binaural degradation that caused us to be concerned because the patient, according to their loss, should not necessarily have had that. That caused me then to refer the patient out to a primary care physician, who then sent them into a neurologist who did an MRI and discovered a brain lesion that needed immediate treatment. That ability for the two ears to work together was the physical point in the brain where that lesion occurred that allowed us to, in this case, possibly save the patient's life. Those are things that we need to make sure that we're doing.

Both monarch and binaural are critical, not just for the benefit of the sound, but because there may be occasion where you get to save a patient's life as well.

So let's talk a bit about quicksin speech and noise. Quick speech and noise is a test that becomes more and more common, as it does provide some fantastic information for us. With that speech and noise test, we're able to have a much clearer idea of how the patient is likely to do with noise, and that gives us a chance to recommend a better product that can handle the noise more effectively. It's also going to give us a very effective tool to set expectations appropriately and make recommendations for communication strategies. If we know that a patient is going to struggle in noise and that patient is dead set on not spending any money and sticking with the base model, we're going to very easily be able to say when they come back complaining about background noise.

Well, this is what you opted for. We let you know that you struggle in noise, that remember, this was your quick sense score. And we also told you that the hearing aid is only capable of minimizing noise to this degree. If you want to have a better chance in noise, we recommend this product because it's going to give you an easier solution. It also helps us to work with third parties and help them understand the impact that noise has on that particular provider or patient, so that when we make recommendations for where they would go to eat dinner, how they might sit at a table

to orient themselves to background noise, how a family member can do a better job to assist a patient by facing them by talking a little bit slower.

All of the different strategies that we talk about for counseling, they come into play when we have a hard number based off of a quicksand. So make sure that we're taking the time. Again, it's a very fast, but a very, very impactful test. The next one, and the last one we want to talk about is validation and verification. I know that a lot of you are saying validation is not part of testing because it occurs after we fit them in the first place, but I'm going to counter that without verification and using a real ear system or something similar, you really don't know what the patient's ear environment is doing and how it's affecting the acoustics of that sound.

There are so many times where we chase a problem without having enough data. So if you take the time to verify, that's five to seven minutes. Typically, you can bend that time today, or again, you can chase a problem for one, two, three appointments down the road and spend 30, 40, 50 minutes down the road to solve a problem you could have solved upfront by finding those issues in the validation process. So again, I want to, I want to go back to wrap this up with the idea that the most important part of, of a proper foundation in terms of troubleshooting is based off that old adage. An ounce of prevention is truly worth the pound of cure.

When we build a solid, complete foundation, we find that there are considerably less problems that we occur later on, and the troubleshooting is much less common because we don't have to do it. Our prescriptions are based off of complete information. Easily half of the calls that I get for help wouldn't be necessary. If people did all of the appropriate tests and had that information at hand, it would be so much easier. So build that.

That foundation first. Okay, now let's talk about occlusion. Occlusion. Is it really our enemy, or can it be our best friend? Until the advent of open fit hearing aids, patients that suffered from a high frequency loss were always forced to be over occluded.

This was in part due to both the lack of electronic feedback controls, as well as a limitation caused by material availability. But with the advent of a separate receiver and an aid, now that we have a receiver in the ear, receiver in the canal, we. And by adding in a really robust feedback manager, we now have the ability to really fit in a much more open manner. It's both good and bad, right? For a long time, the pendulum was swung all the way over to the over occluding.

But now we've gone to the point where we have a tendency to under occlude our patients. And that's a problem, because that creates really bad sound quality. It makes things shrill or harsh or tinny, and yet, when we use occlusion properly, it improves the richness of the sound. It helps to manage speech and noise, it normalizes the patient's own voice, and it makes for a much better streaming experience. So first thing we have to do is make sure that we accept that occlusion is not a curse word.

It's a tool, and it's a tool that needs to be used properly. Occlusion is the trapping of low frequencies into the ear canal, where we can then use them for amplification. Without occlusion, we can't provide our patients with any low frequency at all, and that won't then meet their needs. The next thing we've got to understand is that there are two different types of occlusion. We have shell occlusion, and that shell occlusion is caused by a tip or a dome or an ear mold, and then the venting that's built into that.

And the other type of occlusion is amplifier occlusion. An amplifier occlusion is created by gain and either too much or not enough gain in the low frequencies.

So recently, and there was a republishing and an update of an article that initially came out in 2019 called the challenges of instant fit ear tips. What happens at the eardrum? It's found in the hearing journal or most recently in the hearing Review. Fantastic article by Kubik et al. And it talks about the preponderance of underfitting and under occluding.

When they tested for this particular study, they found that over 80% of the patients that they tested were underfit in the low frequencies, and that's because they were not properly occluded. I see providers all the time that tell me, oh, I fit every patient with an open fit, which is the wrong approach, just as wrong as the other side, where our providers will tell me that they fit every patient with a closed fit. Neither one of them are pro, but we need to match the loss to the occlusion. So acoustic properties are part of the deal. Keep in mind that the same dome is going to affect different patients differently.

The size, the shape, the nature of those ear canals will be unique to every patient, and so the benefits are unique, and we need to be paying attention to that. When we choose a tip that's too small, we're going to increase the risk of leakage, which then takes away low frequencies that we need for that fitting. But conversely, if we get a tip that's too large, we also create that same problem. Why? Because you end up with what they call a tackling effect, where you get a mold that's too large and it ends up buckling and creating a slit, which then all that low frequency just drains right out again.

Same problem can occur with a custom dome, the instant fit domes, and that the tips never seal an ear as effectively as a custom mold. But with the custom mold, we can open or close the dome much easier. Open and close the vent much easier, which is great because it allows us to fit flatter losses and more severe hearing losses that give us that additional low frequency, which is what we want. But it can actually be a little

bit harder to overcome some of that venting effect initially, and we have to be a little more cautious and typically spend a little more time modifying the dome to get the right size vent. So where do we start?

So this is one of the handouts that we have available. Many of you have seen it multiple times. This is a great place for us to start. But like I talked about in the beginning, there is a big difference between the art and the science. This is the science, and what you're going to then do is apply the art for it.

I'm going to argue that the most conservative you should be when fitting personally, when you, when you fit, is to be more, to lean more on the side of occlusion. I start occluding at, for instance, 20 decibels in the low frequencies and sometimes even earlier, which means I'm going to fit an open dome on somebody who's around 15 decibels or better. Other than that, I'm going to start with a tulip dome or a closed dome. Remember when you select a closed dome that the tulip and the closed domes are acoustically identical? The big difference is really about the shape of the patient's ear.

With a closed dome, it's really only appropriate for a patient who has a very round ear canal. If a patient has an oval, an oblong, or a kidney shaped canal, what you want to then do is use a tulip dome, which is going to be able to shape according to that patient's ear. Personally, I like the closed dome first because I want that occlusion and because the closed dome has a small pressure event that's already built into it, and that can help to eliminate some of the vacuum pressure effect that can occur with some patients. But remember, too, you can always put a small vent in a tulip dome as well, or even in a power dome to eliminate that vacuum effect. Most often by using a Jody vac or an ear vac ear mold vacuum needle, they will make a great little hole in it.

What I find, though, is the most commonly skipped and yet ultimately very critical step in fitting is to look in the ear with the dome or the mold in place. That's the only way we're going to know if the fit is appropriate. A closed dome that, again, that is too small and doesn't seal in ear is no different acoustically than an open dome. So even though you think you're doing the right thing, you might not be because the dome is too large or too small. When comfort is.

While I know that comfort is critical, I know that people need it to be comfortable. Acoustics are equally critical, especially with providing the right sound and the right amplification for your patients. So take the time to look in the ear, select the right dome or the right custom ear mold. Make sure that your vents start on the side of too small, because you can much more easily open a vent than you can close it down. And then always check the way it's fitting in the ear.

And one other little tip is that a patient can lose five pounds and change the shape of their ear canal because that 1st third of the ear is a lot of fatty tissue. If a patient loses five pounds or ten pounds, that's fantastic for them. Most of the time, however, it can now mean that you need to change your dome to get a better seal. So pay attention to that. Another thing that we want to make sure that you're paying attention to is our vent correction screen under the display options.

You want to make sure that your vent corrections button is clicked. When you do that. It means that the graph in the gain adjustment screen is going to display the estimated amplified gain settings that are going to be received at the eardrum based on the selected venting of the hearing aid fitting or the selected dome of the hearing aid fitting. Now, keep in mind that the vent correction does not change the targets, it does not change the gain. All it does is shows you what's happening based on the type of dome or vent that you've selected.

This also goes to remind us that when we go to set up the hearing aid in the first place, or if we change the dome down the road, we need to ensure that we change it in the software so that the fitting software properly reflects what's happening. Now, in this case, on the display, you notice that there are no lows being given below 750 and minimal above. That's because this is fit with the tulip dome, which does not hold in a great deal at 200, 5500 and very little at 750. If we were to change this, let's take it to another screen here and we can see that with the vent correction on at 1000, patient's at five decibels at 750, if we unclick that vent correction, it makes it look like the patient's getting 13 decibels at 750, up to 15 at 1000 hz, that's more than a ten decibel swing. And all we did was turn off that vent correction.

Remember that if that vent correction is off, you get a false sense of what's happening in the earth. That's something we want to avoid, because again, low frequency amplification is just as critical as high frequency amplification. How we're going to achieve it using that occlusion is what's most important. So using the event correction allows us to see what's really happening and that's going to help us to make a better decision. So I'll teach you now a quick technique that works fantastic for setting the low frequencies properly.

Now this, there's a lot of ways to do it. This is not the only way to do it, but this is a method that I was taught by my mentor, Mister Dennis Thomas. So shout out to Dennis if you find that in the future, this has helped you and you ever get a chance, buy him a beer. He'd be very grateful. Thank him for it, because it truly made a huge difference in my fitting and ensuring that my patients got the low frequencies that they needed without over amplifying it.

And the way that we do this is really based off a very simple point. Ultimately, a patient's voice should always be in their mouth. If their voice is above their mouth, in their nose or their ears or in their head, they don't have enough low frequency. If their

voice is in their chest, in their throat, they have too much low frequency. So, remember, we can change that low frequency through the occlusion, either through changing the shell or the amplifier.

Either way, the way that I go about the process is very simple. I asked the patient to count to five so the conversation would go something like, Kimberly, now that we've got these in your ears, I want to make sure that your voice is where it belongs. What I'd like you to do is count to five out loud and tell me, where is your voice? Is it in your chest, in your mouth, in your ears? And the patient will then count 12345.

And Kimberly will say to me, for instance, well, Chris, it feels like it's down in my chest. Well, it's below their mouth, so we know there's too much low frequency. Now, if we have low frequency gain to play with, what I'm going to do is then reduce the gain at 200, 5500, 750, and even up to 1000. I'm going to do that three decibels at a time. So I'll click those down three decibels, and then I'll say, all right, kimberly, go ahead and count to five for me again, where she'll say, 12345.

Now she's likely to say, well, Chris, now it's in my throat. Perfect. It's still below their mouth. We're making progress. I'm going to reduce the low frequency again.

Go ahead and count for me again, Kimberly. 12345. Great. Now it's up in our mouth. That's where we want to stop playing with the low frequencies.

Now, if it's the other way, 12345. Well, Chris, that's kind of in my ears. Okay, great. Now we want to first start by looking at the. The dome.

That or the event that we're using. If we're using an open dome, we immediately want to switch to a close or tulip dome and then have them count to five again. Just by

including the ear, you're typically going to increase about a four decibel gain and lows just right off the bat 12345. So it's gone from my ears to my mouth. Great.

Now we're going to increase that low frequency from 250 up to 1000, and we're going to increase that in three decibel increments. 12345. It's gone from my ears to my nose. We'll kick it up a little bit more. 1234.

Now it's gone from my nose down to my mouth. Once it hits their mouth, stop messing with the low frequencies. That's the key that tells you you've properly occluded them. And now they're going to get sufficient low frequency. Now everybody says, but they're going to tell me that their voice echoes.

Yes. Excellent. So what you ask them after you get their voice to their mouth is, all right, Kimberly. Now, I want to make sure that your voice is normalized. So, as you're talking to me, does it feel like there's an echo in your voice?

Regardless of what they say, yes or no, the answer is fantastic. If they say yes, there's a little bit of echo in my voice, you're going to say, great, that's what I want. That tells me that your brain is getting used to, and it recognizes that there's more sound than you're used to. Fantastic. Within 72 hours, that's going to go away.

Now, on the flip side, they say, no, there's no echo in my voice. You're going to say, fantastic. That tells me that your brain is already starting to acclimate to the changes in your own voice. That's fantastic. And it's going to get even better over the next couple of days.

So we want it there in their voice. I don't care if there's an echo in their voice. I don't care at all. It doesn't matter. As long as their voice is in their mouth, I promise you they will acclimate to it.

The question you ask next is, all right, now that your voice is right, I want to know, is there any echo in my voice? So, as I'm talking to you, do you hear an echo or is it normal? If they tell you it's normal, you're in a good shape. If they tell you that there's an echo in your voice, that tells you that your overall gain is too high, and that's at a point where you're then going to decrease that overall gain two decibels at a time until there's no longer an echo in your voice. Once you've done that again, your low frequencies are set.

Don't mess with them. Again, at this point, any adjustments you want to make are going to be just for the high frequencies or the mid frequencies, for quality of sound and for tone, that's the key. But once you get their voice into their mouth, stop messing with the lows. That's how we use occlusion to our benefit and as our tool, as opposed to our enemy. Now some of you are going to say, what about what happens if I can't get enough low frequency out of their voice?

Great. Well, if you've gone to the point where it's in their chest or it's in their throat and you're down to zero on your gain levels, one of the things you can now do is go negative on your gain. So remember that even if gain shows zero, that does not mean there's no output, that means that there's no gain. So a 50 decibel input is going to be output at 50 decibels. 70 decibel input is going to be output at 70 decibels.

However, we can go as far as negative ten, meaning that a 50 decibel input will have a 40 decibel output. That additional ten decibels has been more than enough to eliminate any amplifier occlusion or offset any shell occlusion that I've had with any patients. Just recently, about a month ago, I fit a good friend of mine. His name is Rick. Rick is a heavy equipment operator.

He drives skid steers and mini xs and big excavators. And while he's in a cab, he's typically listening to podcasts or music. He takes phone calls. He's often talking to his crew by phone while they're working down below him and they're telling him, come back four inches or eight inches, or go out eight inches, or shift as he's digging. So having it stream right to his hearing aids has been a game changer for him, and he loves it.

The challenge initially was that Rick has low frequency in the twenties, 2025 decibels in those lows, which initially suggests that we need to keep him very open with his fit. However, I know that if I was going to be streaming, I could not leave him open because the sound quality would be horrible. So I actually took a risk. I put him in a power dome and then I drop that low frequency down to around negative five, negative seven decibels in the low frequencies, and all of a sudden his voice is right in his mouth where it belongs. He does not feel any occlusion, and yet I'm able to keep all that low frequency, which gives us a really good streaming sound.

And that's been fantastic for Rick. I'm also going to remind you that more and more our patients are used to wearing headphones. They're wearing earbuds during the day, which is by definition a very occluding fit. Our patients can tolerate a lot more occlusion than they used to be, especially our younger patients. So don't be afraid of it.

And when you do fight a little of that, use that negative game to give you some advantages. This is especially true when we're fitting across system. Oftentimes a true cross with a healthy ear and a dead ear feels very occluded. But we, again, don't necessarily want to go with an open dome, although we can. Even with an open dome, you'll sometimes have occlusion.

In that case, that negative ten up to negative ten in the gain value for the low frequencies can be an absolute game changer for the patient to make it more

comfortable for them on that crossfitting. So don't be afraid to use it for that. Remember that the hearing aid microphones are on, especially on a cross, so they're always getting sound coming across.

All right, now let's talk a little bit about target rules. This is probably the second biggest problem that I see when people are sending me files to work on that they have not been updating their target rules appropriately. I did an audit about two weeks ago, and of all of the fittings that have been sent to me in the last six months, 70% of them were on the inappropriate experience level. This would be patients who've been wearing hearing aids for years that are still set as a first time user or they're set as an experienced user, linear. And yet they've never been a linear fitting in the first place.

This can very much impact the outcome of a fitting and skew the targets and the gain applied to those targets, so that what we see is not necessarily what's showing or what's actually happening. Now, there are a lot of different schools of thought about this and how much control that we should give the software and how much control we should keep as providers. This goes back to that art science aspect again. Now, I grew up in a world where there was no software support, no quick buttons, no self fit buttons. It was a very hands on approach.

And fitters, we didn't trust the software because of that. I always fit every one of my patients, regardless of experience with the experience, full time, nonlinear, because that gives me a full blown target every, every time, and then I'll make adjustments accordingly. And yet, one of my most trusted friends is a six time magnum award winner. And he starts all of his patients with a first time user onboarding. He likes that gentler sound and wakes them and moves them in.

Today, my goal is ultimately to convert you to my way of thinking and when to use one profile or when to use another profile. Instead. It's to ensure that you know what to do

and what the different profiles do themselves and then why it's so critical to know what you're using and how it affects the fitting and how it's going to affect you moving forward. So let's look at the different options. Our first option is going to be that first time user onboarding.

Then we have a just basic first time user. We have an experienced full time nonlinear and then we have an experienced full time linear fitting. So let's take a look. These are all going to be the same patient and no different changes have been made other than we changed the profile that we're using. To start with, this would be a first time user onboarding.

With this patient, you're going to notice that the gain targets are fairly low. And remember, when you're looking at this, the dotted lines are the target or what the software feels they should be at. The solid lines are what the actual gain output levels are. So with the first time user onboarding, we're going to start with a lower target and we're going to only apply 70% of the gain to that lower target. We're also going to reduce some of the noise settings in the smart gain settings for that patient as well.

Now you'll notice, we'll just look at some numbers real quick. At 1000 hz, they're at 26 decibels in the right year. 26, 24, 22 for that one k, one and a half and two k. Now, if we go to a first time user, we're going to find that now the patient's at 32, uh, 34, 32 and 29, significantly more gain. That's because we're using the same targets that we just were.

But this time we're applying 100% full on gain. Again, this is a great way to ease somebody who might be a little bit sensitive. If we go back to what we tested and we saw those speech MCLs and UCLs, and we found that a patient was fairly normal MCLs, but maybe a little bit reduced UCLs. In a case like that, we might start a patient with a first time user, whereas if they had both low mcls and low UCLs, we might start

them with the first time user onboarding at that 70% level. This is one of those times, however, that we see people forget, providers forget to move people out of the first time user.

Now, the argument is, when should you do that? Well, some people are very good about being aggressive on. They'll go from the first time user onboarding to the first time user within the first two weeks, and then they'll go from first time user to experience full time nonlinear within the first three months. My recommendation is that you should never go longer than six months in a first time user or first time user onboarding setting. Within six months, every patient should be up at the full time user nonlinear setting.

And that's because we'll see what happens with your targets here in a second when you make that shift. So if you'll notice right now, our targets and our gain are about the same, right? So we're at 34, 32, 29. If we go to that experienced nonlinear. Now we're at 4039 38.

Significantly more gain applied to this particular patient. Experience full time nonlinear is where the target should be based off of NaL NL two, which is the standard for modern fitting for that wide dynamic range compression systems. This is where the patient ultimately should be. Now, if we go all the way back to first time user onboarding, we'll find that that patient again at 1000 hz, they're at 26, 24, 22, and we'll take them back up at 40, 39, 38. We're talking almost 50% more volume is where they should be by the time we're done with our initial fitting.

So we want to make sure that if nothing else, even if the patient never reaches full targets here, we want to know what those full targets are to ensure that we're seeing where they need to be and help them to get there. The last one we have option wise, is that experienced full time linear fitting and a linear fitting, you'll notice that the gain

output isn't as high as it was with the nonlinear, but what is changed is that compression is significantly lower. You'll notice that your 50 and your 70 line are almost on top of each other, and that 90 line is pushed way up as well. This is a much more common fitting for patients who are traditional power BTE fitters now, people who have become power junkies. If you find a patient whose UCLs are, you know, 100 and 2130, but their loss is only at 70, 75 decibels, you know that they're power junkies.

In a case like that, a full time linear may be a better choice for you because they get a lot more oomph, not because there's more 50, but because there's more 70 and more 90. So those are the four settings. And again, pay attention to where you are. And if you are somebody who likes to ease your patients in by starting with the onboarding or first time user fitting, make sure that you're getting them moved up appropriately into that experienced fitting level sometime within the first three to six months. So let's talk a little bit about receivers.

And the thing about receivers that I want you to pay attention to these days is that we have a great tendency to over fit our receivers. We have four options. The LP, the medium power. So low power, medium power, high power and ultra power. We do love our acronyms.

In the hearing aid world, the biggest difference between them is not just the fitting range, but also in terms of volume or the output range, but also the fitting range in terms of frequencies. Now, while it's not always all that important to recognize and remember what these actual frequency ranges are, it is still interesting to note our low power receivers are going to provide amplification from 100 hz out to 9410. Our Marie's are very similar. They're going to go 100. Our medium power is 100.

Our high power though drops pretty significantly from 100. So we lose about 2000 hz worth of amplification range. And then our ultra power is even more so when we go

from 100 to 501(c)(3), significant decline. So to go from a medium power to an ultra power, you go from a top end of 9160 down to 501(c)(3), significant change. Now traditionally we worried about that.

We wanted to build in enough headroom so that if the patient's loss continued, we can take it into account. Well, nowadays if their hearing loss changes significantly, all you have to do is pop off the old receiver, put on a new one, recalibrate and you're good to go again. So we don't have to start them out with a higher power receiver. The other thing that you'll often find is that when you move from a low power to an ultra power you tend to get a lot more circuit noise introduced into the equation. And that can be very frustrating and very annoying for a patient to hear that background sound.

So not overfitting will help to prevent that as well. Now, when it comes to the fitting range, when you're looking at these, you'll notice that we go power wise from an LP to an MP and we gain very, very little in the high frequencies. Really you go from 90 to 95 decibels above two k. But in the lower frequencies we pick up about another ten decibels. When you go from a medium power to a high power again you don't pick up a significant amount of gain in the higher frequencies.

What you end up getting is more in the lower frequencies. Also keep in mind that in the high power receiver there's no benefit once you get above 7000 hz. How you can't even amplify it out there. And then when you go from high power to ultra power again you pick a ton of, pick up a ton of low frequency gain but we only amplify it to 5000 hz so it's really a moot point above 4k for most people anyway. So keep in mind, don't over fit your patients receivers.

Pay attention to that and watch for that. It makes a big, big difference. The next thing we really want to talk about is utilizing our output view. When we're in doubt there are times when our gain levels and our targets start to look really wonky. When that

happens, if you switch to an output view you can often find what it is that's causing that wonkiness.

This was a patient that was sent to me and keep in mind that your output view again is listed under display options. But the patient came in to the provider and was complaining that the left ear was annoying but it wasn't very clear. Well we can see from the gain views on both sides that they're patient is well below their target levels. But in the right ear when you switch the output view while it is outside their target levels they are still audible. Anything above the dotted line here at the bottom is going to be audible.

Everything is still audible in the right ear all the way out to 6000 hz. But when you look at the left ear there's nothing audible in those 50 or 70 in decibel inputs past 1500 hertz. So yeah, there's not going to be any clarity whatsoever for that patient because they're getting basically no volume whatsoever. Now output view isn't something that a lot of us are very familiar with. It is much more commonly seen and understood if you use real ear systems a lot because real ear measures an output view.

Remember that between a gain view and an output view all your numbers flip. So in an output view the top line is your 50 decibel. This is your 70 and this is your 90 decibel input. When you go to output view you got to flip that. The top line here is your 90, this is your 70 and that's your 50.

And the nice thing I like too, is that this red line is your MPO. You'll notice in the right year, they're maxing out at their MPO at three k. We can't go any higher because your MPO is already limiting it. Now, if we take another example, we'll see here that there's an issue again, the right ear looks pretty good. They're right at target levels.

And when you look at the output view, they're getting appropriate gain across the board. Right. Everything's audible. When you go to the left here, you'll notice that without any changes, at 1500 hertz and above, they start to plummet. Well, why is this plummeting here?

Well, when you look at it, your MPO is set so low that the MPO is preventing the gain levels for the, for the 70, 90 from ever reaching their targets. You couldn't do it even if you tried. Instead, you would have to increase your MPO levels to get you the access to that higher output. And on this as well, we're going to be able to see at 3000 above the patient. There's no audibility in that left ear.

So we need to be paying attention to what's possible given that fitting in a case like this, we might increase the MPOs, we might switch to a higher power receiver, but without having looked at the the output view, we wouldn't be able to see from this what's going on. But it's quite clear what's going on when you switch to that. So don't be afraid to switch to that output view when you need to get a little more clarification. I want to take a minute to really plug and talk about the Marie. The Marie is a phenomenal tool when it's used properly.

It's one of the most missed solutions for patients. It has great sound and it is an incredible tool for patients that struggle outdoors or with wind noise. Ultimately, it's kind of that, that LP receiver. It's got an output range of 100 to 9100. In terms of the gain output, you're flat to your 80, out to three k, and then you pick up some in the highs.

Okay, fantastic. But where we got burned was when we first released it, we really didn't understand the limitations of who to fit it on and who not to fit it on. So we want to look at these. We have two different ranges here. We have a dark blue and a teal.

If the patient is fully within the dark blue or fully within the teal, they're a great candidate for the marine, if they cross over between the two, they're less likely to be a good candidate for it. Now, a little bit of swooping around, you should probably still try it out. However, if they're, you know, flat 40 until they hit two k, and then they plummet down to around 90, 95 decibels in the highs, they're not going to be a good candidate because we're too likely to get feedback. Remember, we're literally putting a microphone and a receiver right on top of each other, which is going to create some limitations. The other thing to remember is we have to occlude these patients.

Tulip Dome, closed dome at the bare minimum, anything above 40, definitely go with a power dome or a ear mold. That's going to give us sufficient gain in those low frequencies. Great option, especially for wind noise and wind noise reduction. Don't be afraid of it. Play with it.

It is a phenomenal tool, and again, it will make a big difference for those people that have that low frequency loss. All right, let's talk a little bit about band split directionality. This is something that I see people mess with a little bit as well, and I don't think they truly understand how it works or why they would want to change their mixing point frequency. So to understand it, we need to understand band split. We've been doing band split now for, I think, 14 years.

It's something our competitors used to laugh at us and say, oh, that's silly, that doesn't have any value in it. And yet all of them are starting now to introduce this band split into their fitting as well. What it allows us to do is to break the sound spectrum into three different groups. We take the lows, the mids, and the highs. And those lows we treat in an omnidirectional fashion.

The advantage to this is that it's going to keep your own voice normal and natural. That's because we take away any issues of low frequency dropout by going to a

directional mode. But in the mid frequencies, we're able to focus in very, very narrowly using that adaptive beam former, and that's going to give us a much higher level of clarity, both in quiet and in noise. And then the highest frequencies we do independently each year, independently for directionality, which is going to give us a better sound localization, which is really relevant for keeping a patient becoming isolated or stuck in the wrong place, not knowing where to look, or being blocked out from the outside world. Now, we can see this really effectively in this fantastic spectrogram in a spectrogram on the outside.

What we see is the low frequencies out here, high frequencies towards the middle. Okay? We put a speaker right here for a patient talking to them, and then we introduce noise all the way around it. What we find is that the low frequencies you notice are very calm or very blue, very low, additional gain to it. And yet, right here, we have a very narrow bandwidth for speech.

This is going to take that clarity section of the speech, the mid frequencies in a very, very tight bandwidth, and then the higher frequencies above five k, we're able to then again, independently process them and put a little bit more sound out there to keep patients grounded in the environment. Very quiet for most of it. And yet, when you look at one of our competitors, what we find is that those low frequencies are very, very loud, which introduces too much background noise. That makes it much harder to narrow in the speech focus. Everything on that angle is going to be over amplified, which makes it harder then to hear in noise.

Well, how does that affect us when we go to do our fitting in the 17s, we now have available to us the ability to adjust the mixing point frequency. Now, the single easiest thing to remember about how do you adjust the mixing point frequency is don't, unless there's a very specific reason for it. There typically better ways to accomplish what you're trying to do. But in case you have a very, very good reason for it, then you need

to understand what you're doing when you make those changes. So, in the mixing point frequency, the low setting on the far left means that the portion of the low frequency spectrum that's processed in an omnidirectional manner is very, very small.

Again, we don't want to put too much into it, but as you move to the right, to moderately low and then medium and then high, we add a larger and larger portion of the spectrum that will then be processed in an omnidirectional fashion. Now, in a noisy environment, a high or a medium setting is going to allow a lot more low frequency through, and that's going to give you more background noise, which is going to be more distracting. However, if you're in something like a music mode, you probably want it in a medium or a high, which is going to give it a more rich or robust type of a sound. In a restaurant, we don't want that. But in music mode, we do.

So ultimately, this is a place where the software knows where it should be. And unless, again, you have a very specific reason for messing with it, just don't mess with it, there's no reason to. This is one of those where you let the hearing aid do it. However, if you do have a reason to give them more low frequency, then feel free to do so by shifting it from low to moderately low or medium or high.

In a similar context, we have our time constants. Okay? Now, time constants is a feature that we very rarely need to adjust. Most of what would cause audiology support to recommend you change this is to is again something that we can better address in other ways, but there are a handful of times where we might change it. This is not your go to to change, but if there's a reason, you might change it.

So, for instance, if you have a patient with has very poor discrimination, slowing down that time constant can really help them to be more comfortable with the sound. A very syllabic is very clear and distinct and sharp very fast, attack very fast, release. By going a little bit slower, it makes it a little bit gentler type of a sound. Typically, my rule is

when a patient drops below 80 decibels or, excuse me, 80% speech discrimination, then I will consider going from a syllabic to a normal. And if they go from 80 to 60, then I might consider going down to a moderate.

However, the irony is that once you get to below 60, I actually start speeding it back up again, because then that patient typically needs a more precise and more crisp type of a setting and sound. Now, another time where we might adjust for it would be when we're trying to convert a competitive user that's used to something with a gentler type of a con time constant. So oticon and Widex are both known for that. Widex especially has a reputation for being a very gentle sound. It's warm, it's comfortable, but it tends to not be as clean or as clear.

However, patients that like a wide x sound typically really want that gentler sound. So in a case like that, you might start a patient on a slow or a moderate, which will give them that gentler type of a sound. However, over time you're going to want to increase that and get it up to normal or syllabic within the net first three to six months, because that's going to help them. Again in an active lifestyle, it's going to be much crisper and much cleaner. So syllabic, fantastic for meetings, for gatherings.

It really prioritizes speech understanding and it's designed to catch all of the syllables syllables. The normal is a little bit slower. Again, it's good for varying environments. It's kind of an overall type of a sound. It's been popular for tv and radio broadcasts because the sound being transmitted is a little bit softer that way.

And then when you go, like all the way down to slow attack, slow release, that's again for people with poor speech cues and people with processing issues. So what have we talked about? What are some conclusions, some segues? First and foremost, our field is built on science, but it's perfected in the art, and we are the art. Okay.

To improve the quality of the streaming, we have to occlude with our patients, and we can use that negative gain to help offset that shell occlusion. Choosing the right receiver can really simplify your process, and changing the mixing point can help your fittings, but you really don't need to change it unless there's a reason for it. Occlusion, when properly used, is our friend, not our enemy. Okay. Fitting profiles can simplify your acceptance, but you have to manage them appropriately.

Band slip processing is powerful. It really sets us apart. However, don't change it unless there's a reason. And the same thing is true with the time constants. Don't use them in, use it sparingly, change it sparingly.

Let the software, in that case do what it needs to do. So we said in the beginning we were going to identify what constitutes a complete audiogram, how it's going to impact your fittings. We talked about dome selection, event selection, how that's going to impact your occlusion, and then how we can use the vent effect to understand what's actually happening in the ear. We talked about negative gain and how that's going to offset shell occlusion. It's going to allow for more effective streaming experience.

We talked about fitting profiles and when to use them. We talked about the difference between receivers and how maybe to make a better choice than that. In the beginning, we wanted to recognize those underlying elements that apply to split band directionality and how we can then use the mixing point to improve our outcomes. And then we talked about applying the time constant to make sure that we get a good listening experience for our patients. Ultimately, I want to thank you guys for taking the time to be with us again.

So there's a question about using negative gain. Can you drop the negative gain while the event corrections are on? Yes, very much. It really depends, though, if you're going to see it as to how much you're including the ear in the first place. If you're in an open

fitting, you can go negative ten in the gain you just won't see anything change on the screen itself.

And then Sam says, do you have any tips or focus points when fitting reverse slope, centering or loss? Yes, very much. The biggest mistake that we make fitting a reverse slope is that we don't occlude appropriately. We treat it like a high frequency. So you have to occlude reverse slopes fairly dramatically, again, normalize their voice, and then recognize that you need to put more mid and high frequencies than it calls for.

More often than not, because we're creating so much low frequency, we have to offset that by pushing a little bit more mids and highs to give them a clearer, brighter sound, not just a louder sound. So occlude, occlude, occlude with a reverse slope, and then you're going to end up probably pushing more mids and highs than it calls for to offset some of that occlusion, which is a good thing. And I don't see any other questions, but if anybody comes up anything else, I want to leave you with the idea. You're welcome to call me at any time. If you have fitting problems or issues, don't hesitate to call me or send me your NOAA file by email and I can take a look at it and see what we can't do to help.

But otherwise, again, a huge thanks to Kimberly and audiology online for hosting us today. And a huge thanks to all of you who took the time to be here and to join us. It's been fantastic and I love to be a part of your, your guys's care for your patients. So have a fantastic day and we'll talk to you all soon.