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Grand Round by ReSound: Better Hearing Aid Outcomes for Musicians

Presenter: Tracy Rudd, AuD

So our topic today is going to be on programming tips for musician patients. And we are going to start this off with a quick poll to get everyone warmed up with that platform. So I'm curious to hear from you in that poll. What is your comfort level for programming for musicians in their unique needs?

Okay, looks like we've got a good mix and that a lot of us are somewhat comfortable. So my goal today is to move you to being a little bit more comfortable with that. So thank you so much for that intel up front. So, as Melissa said, my name is Tracy Rudd. I'm a field training audiologist for GN Resound.

I'm based in the Ann Arbor, Michigan area. I've been with Resound as a field training audiologist for over seven years. I play multiple instruments myself. So I think this will be a really fun topic today. Our learning objectives for the course.

First of all, we're going to talk about why musicians have different listening needs compared to those who might strictly be focusing on speech with their hearing aids. We're going to look at different programming changes that could help our musician population get a little more enjoyment out of their hearing aids. And then we'll look at how we can make changes in Resound's music program for even better outcomes. So I am happy to use the chat as well. If you have any questions, please type in the chat what your question is.

Happy to answer those as we go along and then we'll have a couple other polls along the way to do so. This is meant to be very interactive and informative. These are our risks and benefits for today's class. You are also welcome to find them in your handout for review.

Thank you. Katie. Hello from Texas. Why is programming different for musicians? Well, the biggest thing is that speech understanding is the main goal of hearing aids.

And that's what the R and D and hearing aids goes towards. That's what the programming for hearing aids is focused on is speech makes sense. That's the bulk of what we're focusing on. But music is definitely an important thing for a lot of our patients, so we want to make sure that that is understood very clearly for them too. So what happens with speech compared to music for programming?

Well, speech processing focus on things like wdrc, noise reduction, dfs, feedback suppression, directional microphones. However, those things can distort music sound and that can lead to the following issues that can lead to poor pitch discrimination, distinguishing what note is being played versus another, and then taking that a step further, it can lead to poor melodic intonation. You might have a hard time really recognizing what that song is. And then we also can have poor instrument identification. Each instrument has its own unique sound or timbre.

And when the hearing aid isn't processing that cleanly, it can be interesting to tell what instrument that they're actually hearing.

Another big difference is that music has a greater dynamic range than speech. Music has a lot of soft sounds and then very loud sounds. And we want all those to enter our processor cleanly. And then most of those can get pretty loud. Speech is not nearly as loud as music.

Music can easily get over 100 decibels in sound. There's no standard protocol for optimizing music appreciation. So my goal is to today is to give you a couple ideas on what might help. And then when patients come in, because there is no standard protocol, sadly, a lot of these patients are told that there really isn't a lot that can be done. So we're going to change that.

What things can help? There are a couple things that we know from some research that can certainly make music more appreciated for our patients. So before I go too far from here, Melissa's going to throw up another poll and we're going to find out. Oh no, we're going to talk in the chat. I want you to

type in the chat what changes you might have found helpful in your time.

What can help those musician patients? Is there anything that you do for your musician patients to help that sound quality? Go ahead and type more bass. I like that.

Wait for a couple more to come in. Yeah. Adding a music program, absolutely. That is definitely a game changer for a lot of patients. And we'll talk about why.

See if anyone else has 1.

Raise MPO. Yep, that's a great one.

Cool. So my first three things are going to focus on making sure that our patients get all those peaks and valleys and all the dynamic ranges of music. A slower acting compression system is going to do a better job at preserving those. Fast acting compression is going to give gain very quickly to those softer parts of music and that can lead to some distortion. So we want to slow that down, slow down the compression.

That way it comes through as like we don't want it to be over processed. Also in that same vein, a more linear frequency response, that is going to help as well. So not as much compression overall. So slower compression and just less compression in general are two things that will help. Also having small differences between the channels in terms of their compression.

We don't want a big jump in compression from one channel to another. So when we smooth that out, it's almost like we're having fewer channels in the hearing aid, where that smaller difference is going to make it a smoother sound for our patients as well. And then Sharon hit raise mpo. That way we get all even those louder parts of music. We want to come in cleanly.

So yep, that's a great one too, Drew. Thank you. Adjusting the music program while they're playing. I'm sure I'm not the only one who's had folks bringing their instruments. I think that's fun.

We also can think of not just loud to soft, but low to high for frequencies. And we want to turn off or ensure that it's still off any kind of frequency compression. We don't want to bring down any of those higher frequencies into lower frequencies. That can certainly affect that instrument timbre. As I mentioned distinguishing instruments, we really need all those higher frequencies to help distinguish.

Was that a flute? Was that a clarinet? We really need all those to come in cleanly. So we definitely do not want any frequency compression and just less processing of the signal overall. Things like no noise reduction, a very patient feedback system, those things will also help keep it to be a nice clean signal.

So I think what you're seeing overall is a high input dynamic range. That way low to loud sounds can all come in cleanly as well as a good bandwidth low to high just to get all that sound into the processor.

So next I'm going to show you what Resound does in the music program to help with this. I completely agree with adding that music program and seeing how that is working for the patient as well as just an all around program. I strongly recommend adding a music program manually for those patients. So let's look at what happens when you do that under advanced features. We're going to look on the speech side of advanced features first and you'll see that the mic directionality is going to Omni.

That way we are not going to kick into directional mics. We don't want that. We want our mics to stay omni. So it's picking up everything evenly. Another option that Resound has for these patients is that Marie receiver.

So Marie is microphone and receiver in ear. So it's a microphone that's built into the receiver and, and that's going to collect sound right at ear level. Gives a nice natural sound quality, which is very helpful for music as well. You'll see those time constants for compression are down to slow. That way it's not over compressing that music signal and Then Sound shaper for frequency compression is most certainly going to be off.

If we look over on the comfort side of advanced features, you'll see DFS Ultra, that's the feedback system you'll see that goes over to music. Resound uses a phase cancellation for feedback reduction. And if that phase cancellation is working to cancel out a tonal sound, it thinks it's feedback. If it's working too hard, it might pick up music in there. It might think that music is a tonal sound that needs to be canceled out.

So if we move that over to music mode, it's going to be very patient so it won't affect that tonal sound, which we actually know in this case is music. We want to leave that alone. If you make that too strong, you'll hear what's termed entrainment. It's almost like a, like a double beep or like a double sound from an. Probably from an instrument in this case.

So that would be entrainment. So we want to make sure that DFS is on music mode so it preserves all that. And then things like that, noise reduction, wind noise reduction, impulse noise expansion, all those are off. Just less processing of that signal in general.

Next we'll look at the compression. This is an example of the difference in compression between an all around program and then the next slide. I'll have the music program in the all around program. You'll see that the CR for compression ratio down towards the bottom there. They're around 1.4 up to maybe 1.8 in the right ear.

That looks good to me. Personally I like to keep my compression ratios under 2, so I am very happy with that for an all around program. But for a music program, if I move over to that, you will see that goes even lower. You'll see that's more like a 1.2 up to a 1.4 and then 1.5 I've got on the left ear. So the difference here is that the compression is a little lower and the compression is also a little more even between the channels.

Katie's got a question in the chat. Running REM but never copy the changes to the music program. Is that what's recommended? Katie, that's a great question. And that is what I tend to do as well.

If I am running real ear, I probably don't want a copy to the music program. There's probably separate changes that I am making to that program or other considerations for that program. So yes, let's say I need to bump up my mids or highs to Meet my auto. Remember that might have a negative effect on the music program. So I might auto relate to the hearing noise, but maybe not the music program.

So great question.

So those are some changes that you'll see resound makes in the program. Next thing I have is kind of an interesting study in how the hearing aid frequency response lines up with a musical frequency response. Middle C on a piano is 250 hertz. You might recognize that as being a pretty low frequency for a hearing aid. And then if I move up to the next C key on a piano, so that's what we call an octave jump from 1C to the next C up, that's an octave you'll see that's approximately a doubling in frequency.

So every time we double the frequency, we move up an octave to the next C key up on the piano. So how does that line up with music? A bass singing voice. So we got a couple examples for singing and a couple examples for instruments. A bass singing voice, your lowest singing voice, you'll see it falls mostly below that middle C. So that is going to actually fall below where the hearing aid is going to do a lot of the processing.

So the bass voice is going to largely be left on untouched by the hearing aid. On the other end of that, a soprano singing voice, your highest singing voice is most certainly within the frequency response of the hearing aid, but maybe not quite as high as you'd think. That's still more in the low to mid frequencies of the hearing aid response. What about some instruments? A trombone, not too different from that bass singing voice.

Trombone is considered more of like a tenor instrument. So you can see that is going in between those two Cs here, in between the 250 and 500. So again, it's a pretty low instrument compared to the frequency response of our hearing aid. Trumpet, a little bit higher brass instrument, that one is going to fall a little more into the frequency response of the hearing aid. Again more in that low to mid frequency.

And then flute, which is one instrument I play that is going to be one of your highest instruments and that will certainly be within the frequency response of your hearing aids. So as you move between different instruments, you're going to have a different frequency response. I show this because I cannot be the only one here who's had a musician patient bring in their instrument or, or tell me that when they play a certain note on their instrument, it doesn't sound good. And that can be really intimidating. So what I'm hoping you see here is this is a way for you to kind of help guide that.

So let's walk through a couple examples as well. Think about a little bit higher of a C, the next C up on a piano that's going to be right around 1000 hertz. That's more like the mid frequency response of the hearing aid. Now let's say that that patient comes in and they say when I play a lower note on my trumpet, it's not coming through. It just doesn't sound good.

But they have an open dome on open domes aren't going to give you a whole lot of amplification. Below 1000 Hz, a lot of that leaks out. So they are not going to get a lot of that middle or bass out of that trumpet. They're only going to hear like the very highest bit of that trumpet range. So it wouldn't surprise

me that they come back in and say that the trumpet just it doesn't have as full of a sound as they would like.

So I would make sure that they've got that music program. And then I would also consider probably putting on a little bit more of an occluded dome. That way we keep in more of that trumpet range. Conversely, what if they say volume on my trumpet's pretty good, but when I play the higher notes it's not coming through very clearly. Maybe in those cases I want to increase the high frequency gain.

So in the first case I want to make sure I've got on a little more occluded dome and maybe increase that bass and mid as some of you had already suggested earlier, I would do that. But if they say me maybe doesn't sound as clear or crisp, maybe I want to focus more on the higher range of that instrument. If anyone's got any questions on that, please let me know in the chat. But I think this is a really eye opening way to kind of compare the frequency response of the hearing aid to different instruments.

If anyone has a question, I will come back and address it. But I want to point out now different ways they could Potentially use the Smart 3D app by Resound. Once you are streaming music, I'll focus on the streaming as opposed to the live playing. Once you're streaming music from the phone, we can actually go back and switch programs. Let's say that they're streaming and they're all around initially, but they could go back into the app and flip.

That way they're streaming music in the music settings. They can then further go into their sound enhancer and they can adjust that bass mid and Treble response. That way they can find what sounds good for particularly that focus. Another thing you can do, a couple of you mentioned was increasing the bass boost. You can increase that streaming bass boost and you can do that in device controls under the accessories tab.

So give the patient the bass mid treble. That way they have the ownership of what's sounding best for them. And that can be very dependent upon the certain situation that they're in for a live recording versus listen to music live or versus listening it to a recording streaming. They might have different considerations for bass mid treble. Different recordings sound more reverberant some than others.

So that might have different considerations, different instruments, different types of music. So patients can have fun with this and find out what exactly they like. If they are doing something consistently, they can always add it as a favorite in the bottom of the screen if you're interested. Here are those frequency cutoffs for bass mid treble. So bass is going to be below 1000 Hz, mid is between 1 and 3000 and treble is over 3000 Hz.

So those are a couple things there. Drew is asking. Any charts for string instruments? Great question. So I play guitar myself as well and that is pretty similar to a trombone.

Violin is going to be pretty similar to a trumpet.

Cello or bass is going to be more similar to like that bass singing voice. Don't have a chart, but I'm hoping that me verbally telling you is a little bit helpful.

Certainly we could probably dig one of those up for some other instruments.

Any other questions or follow ups on that, please let me know.

So what might I do a little bit further than just to add a patient's music program? I might flatten out that frequency response even further. That means I might increase that base or mid or maybe even the treble depending upon the patient preference to make it an even flatter frequency response and further lower that compression ratio. I might also give more or less gain based on that patient preference. So

thinking back to that trumpet player example, if they weren't hearing the lower end of the trumpet as well, maybe I'm going to bump up the gain there.

Several of us have also already said to raise the MPO to ensure we got that good headroom and consider that Marie receiver for just the nice natural sound quality and to counsel on the use of that music program, make sure they're flipping over to it when they need to and use the app for the adjustments. That way the patient has ownership of very listening situations they might find themselves in.

So here's A picture of what that might look like in the Smart Fit software. So what we've got here is I've further flattened out the frequency response, particularly in the lower end, again around that 250 and 500. I've increased those frequencies a little more for gain. And I have also lowered my compression ratios even further than so. So they're more like a 1.1.1, 1.2.

Left ears got a 1.3. So those are even lower than they were before. And I believe I did raise the MPO on there to make sure I've got really, really good headroom.

So I'll throw it back up to the chat then. And I would love to hear from you which of these tips you think might be most helpful.

Or if you've got any other questions you want me to cover here, give it a second for the chat to come in there.

Try the MPO option. All right.

Are you able to suggest linear versus WDRC in the music program? Great question. You can see I'm a little closer to the linear settings. I'm not fully linear. By all means, you could do that.

I think I probably have done that a time or two. Just go fully linear. But I definitely want to have minimal. Minimal compression, minimal wdrc. What directional option is best?

I would say keep them omni. Directional mics can. Can actually be a distortion to that music signal. So I do want to keep the mics omnidirectional or use the Marie receiver, which would then be omnidirectional, using their ear's own ability to collect that sound.

Good thoughts and questions there.

See if there's any others that come in.

Okay.

Any other questions, please reach out. But what we will do now is pivot to a couple more poll questions that Melissa is going to help me with and sneak peek a little bit for the quiz with these as well.

Okay, let's talk through some of these. First question, which of the following was not a reason that music appreciation can be difficult with hearing aids? So it is true that there is no standard protocol for optimizing music appreciation. There's a little bit of research out there, but could be more. In my opinion, all around programs are going to prioritize speech that is 100% true.

And over processing of a music signal can definitely lead to distortion. Therefore, the correct answer is C. Music does indeed have a smaller dynamic, a larger dynamic range than speech. Speech doesn't have as much fluctuations in volume as music can. So you are. Most of you are correct.

The answer there is C which of the following changes does not help with music appreciation? And y' all did very good on that as well. Lower compression helps. Slow acting compression helps. Higher MPO helps.

Therefore the correct answer was that frequency compression does not help music appreciation.

What frequency response is best? Y' all were almost perfect on that one. A flat response is often going to be best. Some of you answer low frequency emphasis. Certainly I've seen musicians who do prefer that at the end of the day, but I typically start out with a pretty flat frequency response.

And question four which of the following changes are seen in resounds program? So you guys did good. The answer was slower time constants is a change that is made. It's not higher compression. It's going to be lower compression, lower noise reduction and then expansion is going to be off and then what directional option is best?

Everyone is perfect on that one. Omni or Marie, So very well done.

Thank you Melissa and the reminder to take the quiz and I thank you for your time today. If you have any follow up questions, please go ahead and type them in the chat or Q and A and we're happy to answer those.

And I do have a quick reference here as well if you're interested in anything further. Yes, as Melissa said, thanks everyone for joining and participating today.