Factors Related to Hearing Instrument Wearing Time

Presenters: Kristina Petraitis, AuD, FAAA, Riley Garrone

Hi, everyone. Thank you so much for joining us today to learn about factors related to hearing instrument wearing time. We're excited to have you all to chat about a study that we conducted with Unitron. So our objectives and our agenda today we're going to go over counseling our patients on the relative merits of the replaceable and rechargeable battery types with respect to wearing time, being able to choose hearing instrument features and technology levels best suited to the client's economic situation and explain this potential impact that it has on wearing time. And then also evaluate potential feature choices as much upon the relative likelihood of longer wearing time as that of cost or other benefits.

So we know wearing time is a very important thing that we're going to measure for our patients. We want to make sure that patients are wearing their hearing aids. So I want to start off with a little bit of a poll and feel free to just type into the q and a box. How many of you out there prefer to fit your patients with lithium ion rechargeable batteries? Feel free to type it in the q and a box if that's typically your go to.

Is rechargeable batteries.

I see a couple coming through. Some. Definitely some yes. Now, what about disposable batteries? Any of you out there that prefer disposable batteries over rechargeable batteries?

We'll wait for some answers to come through. I'm not seeing any just yet, as it's probably not super surprising to us. It seems like we're kind of rearing towards that lithium ion rechargeability becoming a little bit more popular. Now, what about connectivity? So we talked a little bit about rechargeability.

What about connectivity? How many of you out there prefer to give connectivity options to your patients? So Bluetooth, connecting to the app, how many of you out there choose to do that? For most of your patients? I'm seeing some answers come through.

Even when it comes to that previous question of lithium ion versus Bluetooth. Depends on the patient sometimes. Also, if a patient forgets to charge the hearing aids or the parents forget to charge the hearing aids, that's why a zinc air might be better. Which, yes, definitely agree. And then with connectivity, depends on, you know, maybe what the patient can handle or prefer, which I agree.

It really does depend patient by patient base. Right.

So we're going to start off with a little bit of a question, too. So do we think longer wearing time means higher satisfaction with our hearing instruments? And it's really an important question whenever we're fitting our patients. I mean, certainly one of the potential useful pieces of our data logging that we have is providing data showing if our parents or if our patients are wearing their hearing aids and how much or for how long. And we know that wearing time should be considered a strong indicator of success.

Putting your hearing aids in a drawer and not wearing them is not the goal we necessarily have for our patients. We want to make sure that they are getting good use out of them. And usually wearing time is a strong indicator of that. Now, deep diving into some of the characteristics that we have and some of the options that are available when it comes to fitting hearing aids, if it meant longer wearing time, would you change your product recommendation? So if we knew certain factors and characteristics related to hearing aids would result in longer wearing time for patients, would you consider this?

Would you maybe not recommend these features, or would you recommend them? And that's a little bit what we're going to look into today.

So this study posed from a very interesting question from one of our colleagues at Unitron, who, just by his own observations in a clinic, his clinical experience and his intuition, he posed do people with Bluetooth wireless devices wear them? His assumption was that phone and media streaming

capabilities encourage longer wearing times for patients. Presumably this would be because a person patient will wear their devices for more hours per day if the devices provide a greater range of useful functionality and more settings, more activities. So if your patient can stream, Netflix, stream, Spotify, surely they're able to wear their hearing aids. This will encourage them to wear their hearing aids more often?

It seems like a logical enough assumption, even backed up by some studies that do talk about more coverage of a patient's listening activities, does also show higher satisfaction with their devices as well. This was a bit of the basis of the study that we're going to look into today. We wanted to see, are there some antidotal reports of patients telling us that when they wear their hearing devices and has Bluetooth capabilities, will this allow to wear them more? Could this be true? This is what we wanted to figure out.

So luckily at Unitron we have access to a lot of data. We know that big data and data mining are real buzzwords, specifically within the hearing aid industry. So we wanted to use some of the data that we had at our fingertips to figure out if that previous question was true.

So in terms of our data that we gathered at Unitron as part of our post market follow up study, we are required by industry regulations to obtain basic hearing information about our hearing aids out in the field. So this includes hearing instrument models, the average hours of use per day. So how long our patients are wearing the hearing aids, which technology level they were fit with any type of wireless protocols for Bluetooth and battery type. Was it rechargeable or was it a zinc air disposable battery? Typically, a fitting will also include the audiogram, the age, and then the gender information as well.

Of course, there are privacy restrictions that mean no information is available to identify the patient or the fitter of the products. And all of the data we will talk about today is strictly anonymous. So, using that Bluetooth question that we talked about with our colleague, we really wanted to pose this question.

So, what factors correlate with hearing wearing time? So, let's look into some of the data that we found through this retrospective analysis.

So, the retrospective analysis just means that we are looking at previous data that we have acquired a couple interesting aspects about the study. So we did look at data from three of our major markets, which would be the United States, Germany and France. We considered only RiC instruments for this study. And we did look at all four technology levels. So three, five, seven and nine are the four technology levels associated with Unitron hearing aids.

And all technology levels were included in this. In this study, we did include two different platforms from Unitron as well. So both our Tempus and our discover generation products. Tempus has a high band wireless protocol. It stands for hearing instrument body area network.

And that's the Bluetooth protocol that Tempest operated off of. This high band protocol has a 10.6 MHz transmission frequency. Then we also use the discover platform, which has a 2.4 GHz Bluetooth capability. The moxi fit devices that we included in this study from both platforms will use a 312 battery. And then we did include the Moxi rechargeable battery that uses the lithium ion rechargeable model.

And we do like to note that this study was gathered from all of the data that we have acquired, and it's not implying that the results are predictive. Future studies might be able to do that, but we're just analyzing past data that we have collected.

So what we did find from this study is wearing time differs considerably across products. We want to figure out and dig a little bit deeper and figure out why this might be so. When we looked at all 5436 records, that's how many patient files were taken. In order to conduct this data, our dependent variable that we're looking at is going to be the wearing time. So we're measuring the wearing time when we're looking at all of these different factors and contributors.

We did eliminate outliers as well by removing the top, bottom and 10% as well. So removing any patients that were their hearing aids less than 2 hours per day, removing any patients that were them greater than 15 hours a day. To really look at that middle range and we really want to know the difference. Are any of these three variables correlated with different wearing time? So we'll be looking at the wireless technology that Bluetooth protocol versus the high band protocol battery type.

Is there a difference in wearing type between a lithium ion rechargeable battery and a 312 disposable battery? And then we're also looking at technology level as well. We included all four technology levels and we want to see is there any type of correlation between technology level and wearing time for our patients? And as you might have guessed, and as we've implied a little bit already there, there are some differences that we are going to look at and deep dive in today. While we look at the data, we do want to note that there were no significant impacts due to degree of hearing loss or age.

We did check this as well, so we won't be discussing those aspects.

So as we talked about previously, when we're looking at these different contributors and these different factors, both of the moxie fit products use a 312 battery, but they're going to differ by the type of wireless protocol. So you have that Bluetooth versus that pipe in both discover products are going to use the Bluetooth protocol, but they're going to differ by battery type. This allows us to compare the rechargeable versus the disposable model of batteries. And then we can also easily compare the two wireless options, like I mentioned, between the DfIT and the T fit. All three products have the four technology levels.

So therefore, technology level is going to be a part of both comparisons like we talked about previously. So the first one we're going to look at is going to be comparing the Tempus moxie fit with the Discover moxie fit. So we're going to be looking at those Bluetooth versus high band protocols. There was a

significant wireless main effect, so the p value is 0.0033. We are also going to look at that technology level comparison as well as we go up in technology level.

Is wearing time increasing? We'll look at that on the next slide. We did find a significant technology level main effect. The p value for it to be significant is less than 0.001, which means that this would happen by chance less than one in 10,000 times. And then we also looked at the wireless and technology level interaction as well, that was non significant because we know that the technology levels, all of them, are going to be included in this study as well.

So these charts do a really good job of showing us visually what we could expect and what the data showed us. So you can see that those dark blue bars show that the mean wearing time per day by technology level for Bluetooth, which is the Discover moxie fit, the lighter blue bars show the same information, but for the high band, which is the Tempus moxie products, the stats tell us that there's two significant differences in this data set. So, among people who are the moxie fit devices, and remember, these fit devices are going to have. So this is all looking at that lithium or that the lithium ion batteries. But comparing the different Bluetooth protocols, the instruments, surprisingly enough, using high band, were actually worn longer and hours perennial day.

With the exception of technology level seven, that mean difference is about a half an hour per day.

Now, the patients that were the higher technology level products, regardless of the wireless types, you can also see that regardless of the technology levels, you will see a steadily increase there as well, except for technology level seven. So the line graph on the right is another way to look at the data. The slope of each line shows the mean difference in direction of wearing time between the Bluetooth and the high band devices. The absolute technology differences are very clear. By comparing each colored line to the other three, the difference between the yellow and the blue lines will represent the difference in mean wearing time from technology level nine down to three.

So this is where we really want to compare the highest technology to the lowest technology and see if there is any difference in the wearing time. And as you can see by these charts, the premium level nine instruments were worn is about 1 hour longer per day than the level three devices. This essentially means that the difference between the Bluetooth technology level nine and Bluetooth technology level three was, it was about 1.24 hours per day, if we're getting really specific. Similarly, when we're looking at the high band devices, the technology level nine products were worn an average about 1.2 hours longer per day than technology level three. Looking at all this data, it's clear at that higher technology level for both of these comparisons, we are seeing a bit longer wearing time at a technology level nine compared to a technology level three.

But we also wanted to look at rechargeability. Does this play a factor in wearing time for our patients as well? So we're looking at the lithium ion versus that disposable battery as well. There's a significant battery type main effect, which means that p value is less than 0.001 or zero zero one. We do have all four technology levels like previously mentioned, and there was a significant technology level mean effect as well, with that p value equaling 0.002.

And then, like mentioned previously when we were looking at the Bluetooth components, technology level is going to vary since we included all four. Now, we have a similar chart that we looked at previously, but this time comparing the battery type. So the dark blue bars mean the wearing time for technology level for the lithium ion battery and the lighter blue bars will show the same information. But for the 312 zinc air wireless products, the stats tell us that there's two significant differences. Like previously mentioned on the previous slide, among patients who wear the discover devices with Bluetooth, the lithium ion instruments were worn significantly longer in hours per day.

So we can see that comparison that patients that had rechargeability, we are seeing longer wearing time than that 312 zinc air battery. The lithium ion technology level three products were learned were

the lithium ion technology level three products were worn 2 hours longer per day than the technology level three with disposable batteries. And then you also can see with the technology level nine that the lithium ion instruments were worn an average of over an hour longer per day than the technology level nine was in care batteries. The patients who were higher technology level products, regardless of the battery type, wore them significantly longer than those who were at lower technology levels. When you're comparing high tech with low tech, and then we have this line graph again.

So what you can see from this line graph, you can see on the right graphic, it's a little bit, it's a little bit more clear. It shows the data in a different way. Again, the slope of each line means the mean difference in direction of wearing time between the lithium ion and the 312 disposable zinc air batteries, the absolute technology level differences are very clear. By comparing each colored line to the other three, and the difference between the yellow and the blue lines will represent the difference in mean wearing time. When you're comparing that technology level nine down to a technology level three, the mean difference between the rechargeable technology level nine and then the lithium ions at the rechargeable technology level three was about 0.3 hours per day.

And similarly enough among our disposable battery 312 patients, the technology level nine products were worn at an average about 1.25 hours longer per day than technology level three. So we are seeing some of that correlation between longer wearing time and that higher technology level as well.

Now, when we combine all of these three factors together, the bar chart to the left and then the line graph to the right, it'll show all those factors that we just talked about, but all combined on the same graph. So it's clear that the Bluetooth lithium ion combination is consistent with a lot more wearing time than the other two at all four technology levels from three, five, seven and nine. And while we know both 312 disposable battery options had considerably lower wearing times than lithium ion devices, ultimately, it was the 312 disposable Bluetooth devices that had the lowest wearing time for all of our

technology levels, with the exception of technology level seven. Furthermore, when we dig into this data, the precipitous drop in wearing time between our Bluetooth rechargeable hearing aids and our Bluetooth zinc air disposable hearing aids was most noticeable at that lowest technology level. You can see that biggest difference at level three.

Now, our key takeaway when we're really diving into all of this data today, is that common? It's really a little bit more in depth than that original question we posed right in the very beginning. Today we posed what factors are related to hearing instrument wearing time? Would it maybe change your recommendation? Do Bluetooth devices cause patients to lead to longer wearing time?

For our patients, the key takeaway we have today, it's really a combo effect. That combination of lithium ion rechargeability and with that 2.4 GHz Bluetooth capability, plus when we're also looking at higher technology levels, those three features, rechargeability, Bluetooth and higher technology level, have the highest correlation with increased wearing time. So it might not be as simple as we posed in the beginning. There's a lot of factors that can ultimately lead to our patient's success, and that might set them up for success. The condition with the greatest mean wearing time was the technology level nine.

The Bluetooth instruments with a rechargeable lithium ion battery resulted in an average of 9.76 hours per day. The condition with the lowest mean wearing time was the technology level three Bluetooth instrument with a replaceable zinc air battery, which resulted in about 7.41 hours per day. So that's about a mean wearing time difference of 2.35 hours per day between those two. And as we kind of said earlier, due to the nature of this data mining research, this is a retrospective analysis of our existing data. It's not predictive, but it is pretty compelling to see these numbers, to see what factors might be associated with longer wearing time and certainly should motivate further deliberate research in this area.

As we know, good research always does. And there's still plenty of questions to look at when looking at this study and variables to consider, like budget. We know some patients who might have bought a level three instrument, perhaps for budget reasons, know that using Bluetooth functionality will reduce battery life of disposable batteries. Do they wear them less just to conserve their batteries compared to someone who might not need to worry about that with their rechargeable? There's lots of potential questions for future consideration, but it's still something really great to think about that can lead us in making those decisions for our patients.

So now, knowing what we know from this study, let's kind of end with that same question that we started with. Would you change your product recommendation if it meant longer wearing time? So we've just seen that rechargeable Bluetooth capable products at all technology levels were worn significantly longer each day in this big data retrospective analysis. And if you agree that longer wearing time relates with higher overall customer satisfaction, we asked this before, but if wearing time does relate to satisfaction and their characteristics that are available in certain products which lead to longer wearing time, why would you not recommend them? And I know earlier in the Q and a when we chatted about do you recommend rechargeable batteries versus the disposable batteries?

It really is patient dependent, but this is something to keep in mind when we're wanting to set up our patients for success. And we'll end today as well. Doing a little bit of a recap in just a moment of the rechargeable products that we do have offered at Unitron and some of our made for all connectivity options. This data is really interesting, though. So as we talked earlier, looked like most of our providers, at least on this training today, rechargeable is definitely becoming more popular.

There's no denying that. Looking at this chart is really interesting. If you compare 2019 to 2020 rechargeable sales to this past fiscal year of 2023 to 2024, you can see that steady increase from 26% in 2019 to 2020, jumping up to about 55% of all overall sales in Unitron were with rechargeable hearing

aids. So we're naturally seeing that increase in the market now. At Unitron, with our newest Vivante platform, we do have an array of options that offer that rechargeability.

We have Ric options and a BTE option as well.

With Vivante, we do offer three different RiC options. So the first two is our rechargeable Ric. Our standard Ric. We have our rechargeable telecoil. If you are wanting an option, it's a great option for patients that maybe they need a telecoil option.

They go to theater, they go to different public settings where they are in a loop system, but they want something a little bit more cosmetically appealing than a BTE device. And you will see that both of these do use our standard, our charger for the mock CVR and the VRTA. We also have our VR hearing aid. Our VRs hearing aid is another rechargeable model. It's a sleek, cosmetically appealing option for our patients that might want something a little bit more techy, a little bit more sleek looking.

You will see a more sleek, smaller, more compact charger that is offered with our moxie VRs as well. And it has one mini awards for its award winning design and style. Now, if you have a patient that wants rechargeability, but maybe they require the power of a BTE, we do have a BTE rechargeable option as well, in addition to our rips. So we do have our stride VPR, which is our power BTE option that does offer rechargeability. And in addition to our stride pertain, we do have a disposable battery option for our BTEs as well, which is an ultra power option powered by a 675 battery.

So quite an array, as we talked about earlier that study. It's important to give our patients the options that they need, and we have options to cover both needs for our patients. Now, when it comes to connectivity, of course, talking about Bluetooth, we know how important Bluetooth is and that it can possibly lead to a little bit of longer wearing time in combination with that rechargeability and possibly higher technology level as well. Something we pride ourselves on at Unitron is our made for all

connectivity. Our made for all wireless connectivity remains a major factor for our patients.

It can be particularly impactful for those with severe to profound hearing loss to leverage those direct wireless capabilities to stay connected in ways that they might have had trouble in the past. It's a really wonderful benefit for you to not have to consider which type of phone and operating system the patient might have and what that might mean for direct connectivity and control options as you still might have to with other competing products. Our made for all connectivity allows you to connect to both Android, iPhone and anything with a Bluetooth signal. It allows our patients to make hands free phone calls, stream music, podcasts and any other media directly into any of their hearing aids. It does also offer the two simultaneous active connections and up to eight device pairings.

So this can include tablets, computers. We know our patients are more connected to technology today than ever before, so they can easily access the growing numbers of apps and other communication tools that are available to them at all times. We're trying to connect to so many Bluetooth devices at once these days. At the same time, they can also have two devices paired at once. So if they have a work phone, if they have a personal phone, maybe they always like having their iPad and their phone.

We do allow the two active Bluetooth connections as well. The two simultaneous connections.

Now, if you are wanting to look in a little bit further to the data we talked about today, we do have a white paper on this as well called do Bluetooth wireless devices extend wearing time? You can find this at our myunitron site. You can also scan this QR code and it will lead you to that white paper site as well. I'm going to open up the floor for any questions for the next couple of minutes, and we thank you all so much for attending today and hope you learned a little something about the hearing factors that are related to our instrument wear time. Thanks so much.