Word Recognition Scores in Idiopathic Sudden Sensorineural Hearing Loss: Improvement Beyond Recommended Clinical Guidelines

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- [Christy] It is my pleasure to welcome Dr. Irina Middleton, she is an Audiologist with Jefferson Otolaryngology, and today she'll be presenting Word Recognition Scores in Idiopathic Sudden Sensorineural Hearing Loss. This time I'll hand the mic over to you, Dr. Middleton.

- Thank you, and hi everybody, it's nice to be here, it's nice to be chatting with everyone today. I'm gonna skip into the next slide and introduce myself a little bit. I am Dr. Middleton, I work with, I'm an audiologist with Jefferson Balance and Hearing Center. Before continuing to the learning outcomes of today's course, I do wanna take a moment to thank everybody for taking the time to attend. I also want to extend my gratitude to AudiologyOnline for having me here today and providing the opportunity to share this information on this specific topic. As a clinical audiologist, I work primarily with the adult and geriatric populations within a busy ENT setting. I conduct comprehensive audiologic evaluations, hearing aid evaluations, fittings with verification measures, hearing aid checks.

I also have experience in tinnitus evaluations, tinnitus management, and in recent years I've taken on a more active role within research for the audiology team, as well as our Ototoxicity Monitoring Program for the department. Today I'll be sharing information on my team's research on board recognition score improvement within patients diagnosed with idiopathic sudden sensorineural hearing loss. Before continuing though, I do wanna pose a two-part poll to everybody to complete. So the first question is, what primary age group do you currently work with? Options are pediatric, adult, and or geriatric, all age groups. And the second question is, where do you currently practice? Are you in a private practice, working in an ENT, hospital, school system?

These are the two questions, if you could take a moment and share your answers. Okay, all right, so in the first question about what primary age group you currently work with, about 14% of participants work with the pediatric population, about 60% work

with adult and geriatrics, about 29% work with all age groups. In terms of the clinical practice setting, 59% are in private practice, 21% are in ENT, 16% within the hospital system, and 10% within the school system. Thank you everybody for participating in the poll. I'm gonna advance to the next slide. So this next slide is an overview of the learning outcomes for today. After the course, participants, participants, I'm sorry, will be able to discuss how to differentiate clinical presentations of sensorineural hearing loss and idiopathic sudden sensorineural hearing loss.

Participants will also be able to explain how to determine urgency for referral for medical intervention in patients presenting with idiopathic sudden sensorineural hearing loss. And finally, participants will be able to describe how to apply evidence-based research to recovery anticipation in the collaboration with otolaryngologists, otologist of patients seeking evaluation and treatment for idiopathic sudden sensorineural hearing loss. This next slide is a very general overview of the different types of hearing loss that we encounter. We know there's three different types, there's the conductive hearing loss, sensorineural hearing loss, as well as mixed. Conductive hearing loss, the involvement focuses on either the outer or middle ear. This can result of pathology such as otitis externa, otitis media, cholesteatoma, tympanic membrane perforation, it can also result from cerumen impaction, all in some way impede effective sound flow.

Clinically, low frequencies are typically impacted, resulting in an upward slope to normal, from the low tones to the high tones. Some conductive pathologies are treatable, which then we can see an improvement in the hearing impairment. Sensorineural hearing loss, we're gonna get in more depth in the next slide, but the involvement typically includes the inner ear, it's not typically reversible. And mixed hearing loss involves either the outer and middle ear and some component of the inner ear as well. This next slide focuses on sensorineural hearing loss. So anatomical

involvement we may see it could be the cochlea, the inner hair cells no longer respond or robustly, or there could be some contribution of an issue with the auditory nerve.

Now clinically, traditional sensorineural hearing loss that we encounter, it's a gradual onset, typically it affects both ears, and it's the high frequencies that are typically impacted first. A sudden sensorineural hearing loss is going to present differently. This is defined as a hearing loss of 30 decibels or greater at three consecutive frequencies that occurs within 72 hours. The involvement is usually the same in terms of the cochlea or the auditory nerve, but clinically it will present differently. The hearing loss is going to have a rapid onset, it typically will affect one ear, so it's a unilateral hearing loss, and it may present, but not always, with associated symptoms of tinnitus, aural fullness, dizziness or vertigo, sometimes it'll be a combination of various symptoms all at once, but it's different, and so there is this distinction between sudden versus sensorineural that we see dependent.

With sudden sensorineural hearing loss, it occurs five to 27 cases per 100,000 annually in the US. 10% of cases have a known cause, like, could be Meniere's, labyrinthitis, things of that nature. But idiopathic hearing loss is the majority, is what is seen most often, there's no known cause for it. 32 to 65% of cases recover spontaneously. And the sooner treatment is initiated to the timing of onset, the better the prognosis. So that's a very important key thing with this, the sooner treatment can be initiated, the better the outcomes, the longer someone waits, the likelihood of recovery diminishes. An idiopathic sensorineural hearing loss is the primary focus of today's presentation. And this next slide shows that from what we've reviewed thus far, the first objective we were able to review, the distinction between sensorineural hearing loss and idiopathic sudden sensorineural hearing loss.

The American Academy of Otolaryngology, Head and Neck Surgery Foundations have a clinical practice guideline for managing these specific types of cases, which is why

determining and evaluating if a patient is truly presenting with a sudden hearing loss is important. Listed here are some guidelines which pertain to audiology involvement. However, the management guideline is pages long with several different variations of what's recommended depending on the presentation. But here to focus on, the guideline is specifically designed for adults 18 years and older for sudden hearing loss. The first key action statement that was modified in 2019 is that the evaluation of hearing loss via audiologic testing to distinguish true nature of hearing loss should be conducted as soon as possible, ideally within 14 days of symptom onset.

Patient education of sudden sensorineural hearing loss, including history of the condition, the benefits and risks of medical intervention, and limitation of existing evidence regarding efficacy should also be reviewed, and patients should be provided with information and counseling on audiologic rehabilitative options for patients with confirmed sudden sensorineural hearing loss and residual hearing loss and or tinnitus. Continuing with their guidelines, they do talk about mode of intervention, the timing of intervention, and some critical factors here is to know that with sudden hearing loss, medical intervention is imperative, it should be done right away, this is considered to be a medical emergency. Audiometry should be obtained as soon as possible and typically should continue as treatment is initiated, and as well as after.

The mode of intervention is different depending on at what point patients are presenting to the physician, and they determine if there's any contraindications for one type of therapy versus another. But the guidelines show that the initial therapy within two weeks of onset should be a corticosteroid. They can also offer a combination of steroid therapy and hyperbaric oxygen therapy within a month of onset. And the guidelines also do note that offering or referring to a clinician who can offer an intratympanic steroid therapy when patients have incomplete recovery to sudden hearing loss from two to six weeks after onset of symptoms. In terms of the guidelines,

the way that they noted is that after six weeks of onset, the likelihood of recovery is not good, so it's not common for treatment to be initiated after six weeks.

Typically it's within one to six weeks, and the treatment type differs based on that. Sometimes they can do a combination of an oral corticosteroid and an injection that is determined by the physician. And so that concludes the urgency for referrals, it is considered a medical emergency, treatment should be initiated, and patients should be tested as soon as possible. And so what we're gonna do is move forward to literature and what exists with sudden sensorineural hearing loss and word recognition. Current literature, there's this article that my team pulled and according to this study and much corresponding literature, decreasing pure tone average can go hand in hand with improved word recognition scores. This study specifically focused on whether word recognition improvement was evident despite stable or worsening pure tone average in idiopathic sudden sensorineural hearing loss.

It was a retrospective chart review at an otolaryngology practice, it had 113 participants, and 13 were identified with improved word recognition despite stable pure tone average. Beyond this study, not much exists with the primary focus on word recognition recovery to offer definitive norms to set as defining parameters for word recognition recovery. As a result, the study which I conducted with my cohorts, we focused on looking at word recognition improvement across groups divided based on the timing of onset of their symptoms. This specific study revealed that 11.5%, that's the 13 out of 113, experienced an improvement in word recognition despite the stable pure tone average. They note that the average improvement in word recognition in their sample size and percentage was 23.8. However, the insights offered through their analysis indicate treatment was initiated for their cohort within the first four weeks of symptom onset, they were not treated beyond four weeks.

Additionally, their study called into question how the recovery was able to occur despite stable or worsening pure tone average. They weren't so much looking at explaining, like the focus of word recognition improvement as part of parameters that are assessed as treatment is undergoing. So my team and I, I do wanna note that our research is active, it is ongoing in that we have added another variable to consider in the data set, and I'll get into that in a little bit. We have successfully established that word recognition improvement does occur in idiopathic sensorineural hearing loss despite timing of onset. But again, we are looking at other variables which could serve as novel and significant within this population group.

So the next few slides will be some of our research and our findings. So the aim of the study was to evaluate word recognition scores in patients undergoing steroid treatment for idiopathic sudden sensorineural hearing loss to determine if word recognition improves if treatment is initiated beyond the recommendations of the clinical guidelines. The steroid treatment, expand on that a moment, includes either an oral steroid, an intratympanic injection, or a combination of both, all were considered and included. We conducted a retrospective chart review in patients who were previously treated with the primary complaint of idiopathic sensorineural hearing loss within five of our satellite locations, including our main location in Philadelphia. And this retrospective chart review was from 2016 to 2019.

All patients seeking treatment for idiopathic sensorineural hearing loss were seen in a hospital slash medical setting by our otolaryngologist and otologist. Steroid treatment included, as I said, the oral steroids, intratympanic injections or combination of both. In evaluating recovery of symptoms in patients with idiopathic sudden sensorineural hearing loss, literature documents audiogram configurations and analyzes pure tone average improvement during and post-treatment, however, improvement or lack of improvement in word recognition during audiologic evaluations has been overlooked in current literature. So we are testing the hypothesis that despite timing of onset, word

recognition improvement can be anticipated during treatment of idiopathic sudden sensorineural hearing loss, especially if treatment is initiated beyond the clinical guidelines, so beyond the six weeks.

Within our sample size, there were 160 included participants, the average improvement of word recognition was 16.05%. Similar to the previous reviewed study, we confirmed word recognition score improvement did occur among all participants, but especially within the participants who did not experience pure tone average recovery, and those who did not experience that was about 77.5%. This next slide, it's focusing on the inclusion and exclusion criteria of our study. It was very important for us to ensure that those who were included had a true idiopathic sudden sensorineural hearing loss. So any conductive or mixed hearing loss, history of sudden hearing loss in the affected ear, known tinnitus, confirmed Meniere's, confirmed labyrinthitis, confirmed covid, that's a whole other layer, confirmed diagnosis of perilymph fistula, all these were excluded, and then there's more you can review in the chart.

Those who were included were greater than 17 years of age, we see individuals who are 18 and older as we are not a pediatric site. And we did look at the ICD 10 codes that are listed. We classified the criteria for hearing loss and the years that were listed, and included as no prior treatment had been done in patients who were coming in, so if they were coming in for a second opinion, already had treatment, they were excluded. Of 695 patients, 160 met the inclusion criteria and were analyzed based on timing of onset to the date of service, they were analyzed by age, gender, associated ear, associated symptoms, as well as recovery in pure tone average, and improvement in word recognition scores.

We also did take note of the type of word list that they were tested with, it was all recorded voice, but our research did show that the type of word list used didn't hold any statistical significance on their outcomes. Just wanted to make a note of that. The

participants were then divided into four groups in days of their onset based of symptoms, sorry, timing of onset of symptoms. So group one represented individuals who experienced their hearing loss within the first two weeks. The second group was weeks three to four. The third group was weeks five to six, and group four represented those who had sought treatment after the recommended guidelines, so six weeks and out. And that's based on how treatment is recommended, that's what influenced our division of these groups.

What we, again, what we collected, we looked at pre and post-treatment, we collected information on the pure tone average, word recognition score, frequencies affected. We also looked at gender, age, the recovery detail, the recovery detail was defined with the pure tone average, as there are no norms to be able to definitively define a word recognition recovery. So that could not be incorporated in that way. We also took note of associated symptoms, as well as mode of treatment, which was oral steroids, intratympanic injection, or combination of the two. As data is still ongoing, I don't have concrete data to be able to share on frequencies affected, but the analysis surrounding this specific variable is two part.

We are first looking at the largest affected frequencies from each participant, and the other is looking at each individual frequency to see where maximum recovery occurs. And once all that information is complete, we're gonna generate a bipartite graph to present on paired data. So hopefully once that is done, we will incorporate that into a manuscript for publication. Looking at gender, what's seen here is a depiction of each individual group. So here we have the total sample size of 160 included participants, 56.9% of those were female, 43.1% were male, then it breaks each subset down into the groups. This represents group one, this is group two, group three, group four, and again, the groups are divided based on timing of onset to treatment.

And as we see here, as we can see, a majority of the groups affected were female, but despite that, gender held no statistical significance on their anticipation of recovery. Then looking at age, each group, this breaks down their average mean age, the mean age was 60.5 plus or minus 24.6. And then again, it breaks it down by group, group one, group two, group three, group four, but again, age held no statistical significance on their anticipation of recovery. The recovery detail was defined based on pure tone average, and the definition of it was achieving at least 25 decibels of improvement in pure tone average, or a return to pre-loss values after treatment. The definition was obtained from research articles, which are referenced at the end of the presentation.

But what we did note is that of the 160 participants, 36, which is about 23%, experienced pure tone average recovery and the 77% did not. However, improvement within word recognition was identified in all participants, and that's seen in a later slide. We did also take note of associated symptoms, so if they did not report additional symptoms other than hearing loss, that was factored in. We looked at aural fullness, fullness and dizziness, tinnitus, tinnitus and aural fullness, tinnitus, aural fullness and dizziness, tinnitus and dizziness, and dizziness and isolation. Because again, sometimes individuals can present with a combination of these associated symptoms or none at all, so we did pay attention to that, and based on the patterns that we saw in our data, tinnitus and aural fullness was the most common associated symptom that was reported.

And the second most common reported was tinnitus, in addition to the sudden onset of hearing loss, which I felt was an interesting finding, because literature showed that often patients experience vertigo or dizziness as an associated symptom more than anything else. And that was not the pattern seen within our dataset, it was not often reported that they had dizziness at all. So an interesting finding. The next slide looks at mode of treatment in the overall, all participants, as well as each individual broken down group. So while mode of treatment held no statistical significance on anticipated

recovery, a combination of oral steroids and intratympanic injection was prescribed by the treating physician. And this is true for the overall sample size, but across each group as well, that was the preferred method, a combination.

And these findings are also in agreement with existing literature, that whether you do combination, injection, oral steroid, it doesn't hold any bearing over whether a person will recover more with one method over the other. And whether they do a combination or defer the oral steroid, sometimes it's contraindicated and that judgment is made by the physician when they're evaluating the patient. The next slide is looking at, this is a scatter plot of word recognition that we're seeing pre and post-treatment. Pre-treatment is depicted here along the x-axis of the scatter plot, and post-treatment is depicted along the y-axis. As you can see, this here, this represents group one, this represents group two, this is group three, and this is group four, and again, group four is individuals who sought treatment after six weeks of symptom onset.

So what we're seeing is that word recognition scores improve in all groups. The further out individuals are from their symptom onset to treatment, the recovery and improvement is not as prominent as if they're within the first two weeks, but it's still evident, and that's the takeaway that we focus on. And that again, that's what we wanna focus on, because if there is a possibility that word recognition can improve despite how long it has been, that does change what recommendations could be factored in once patients are done with treatment and are referred to audiology for rehabilitative measures, and that's what's reviewed in the next slide as well. So going into this slide, within our sample size of 160, the average improvement of word recognition scores, again was 16.

05%, compared to the 11% about from the other study. So similar to the other study reviewed, we confirmed that word recognition does occur among all groups. This is further confirmed by the scatter plot that we just reviewed. So the implications for

treatment, and study findings are in line with literature and that prognosis is poor, the further out from the symptom onset an individual is, so the sooner they seek intervention, the better their likelihood of experiencing some type of recovery. However, there is a possibility that word recognition score can improve despite stable pure tone average or no change in pure tone average. And improvement in word recognition was identified again in individuals treated beyond clinical recommendations, which is very big.

The rehabilitative implications of this, word recognition holds more weight on true hearing aid candidacy and realistic expectations. They serve as a guide for hearing specialists and audiologists in determining appropriate rehabilitative recommendations. A poor final word recognition at the time of treatment discharge may alter the appropriate options from binaural amplification, which is the least invasive, to surgical options, which are the most invasive, whether it's a bone anchored hearing aid, or cochlear implant evaluation, the recommendations change. And that's why based on what we're seeing, it's all the more important to ensure or to emphasize that this recovery can happen and should be a variable that's considered as the patient is undergoing treatment from start to finish. And because there's very limited literature out there on this, it's all the more important to get this out there and share with our physicians that we collaborate with, so they can factor that in into their differential diagnosis, into their patient care plans to determine what is best from their perspective for their patients.

What we're gonna go into next is some case samples from patients who we've encountered. So what we're gonna do, we're gonna open the chat for these case studies so that way it opens the forum to allow open communication for what we individually do in these situations. So I'll go into this first case here. So what we're seeing is, in September of 2016, this individual was seen for sudden hearing loss of the left ear, which had occurred in August. They've reported associated symptoms of

tinnitus and dizziness. They were initially treated with oral steroids, they did undergo imaging and the MRI was unremarkable. And so focusing specifically on the left ear, the results here were moderate to profound sensorineural hearing loss, there was no measurable word recognition, they were unable to measure speech recognition thresholds.

So they did speech detection at 40 db is what they measured. So I'm gonna continue to the next one. So this updated hearing test occurred in December, so a couple months later of the same year. So word recognition improved, their thresholds did not, so they've remained stable, but they went from having no measurable word recognition or speech recognition thresholds at all to measuring at 60% word recognition. So what I wanna do is have a poll here for everybody, and it's also a two-part. So what it's looking at is for your perspective, from your opinion and your experiences. So with, the first question is, with a 0% word recognition score, which are you initially recommending to your patient? A hearing aid, a CROS or BiCROS, a bone anchored hearing aid, a cochlear implant?

And the second, given the improved word recognition score from zero to 60%, does your initial recommendation change? Yes or no? Okay, so in looking at the first part of the question, your initial recommendation to the patient, given a 0% word recognition score, about 16% would recommend a hearing aid, 64% recommend a CROS or BiCROS, 4% would recommend a bone anchored hearing aid, and 16% recommend cochlear implant. The second part of the question was factoring in the improved word recognition, does that now change your initial recommendation? And 76% of participants here said yes that would, versus 24% said no it wouldn't. So there's a question that's posed in the chat here, how could the left ear at a speech awareness threshold of 40, if threshold are worse?

So the audiogram that was presented was from an outside office, it wasn't from our office, but honestly, from what I've seen is sometimes you can have an awareness threshold that is a little bit better than where the pure tone average is, because it's an awareness. If they have the sensation that some form of sound or word is there but they can't make it out, they'll still answer. I hope I answered that question, I wasn't the tester on it, but I have seen where the speech awareness threshold is slightly better than where we anticipate the recognition threshold would be. So what I wanna do is go into the next one if I may. This is another case sample, so this is a patient that presented also with the left ear affected with a moderate to severe sensorineural hearing loss.

This patient was seen December 11th, 2018. Similarly as in the last situation, SRT, word recognition wasn't able to be tested. There was no documented speech detection threshold that was measured by the tester, so I don't have that to report. And this patient noted associated symptoms of tinnitus. They also underwent an MRI, and that was unremarkable. They were treated twice with an intratympanic injection. And then in April, thresholds were noted to remain stable, but word recognition, which could not be measured before, was now being measured at 96%. Although, if I go back, there was an improvement in thresholds, it was documented incorrectly in the chart, but from what I'm seeing, there is an improvement in the pure tone average, but the significant improvement that we're visually seeing is that word recognition improved to 96%.

There is a comment in the chat saying, regarding explanation to recommending a hearing aid first, I almost always at least trial amplification regardless of initial word recognition. Does anybody else do that? If you can place it in the chat, I think it's really great to kind of see what individual perspectives are with cases like this to see what success they've had. That's okay, what I'm gonna do is, there was also a comment, let me see, did I miss a comment? I would like to add, yes, okay, there was a comment that I missed, thank you for pointing that out. I would like to add, I would never

complete clinical recommendations on the initial workup. Correct, and I mean, from my perspective as well, and I'm not the physician, there should be medical follow up by the physician and a retesting, 'cause you never wanna go on the initial, you have to track for improvements, especially if it's been say, 3, 4, 5 months later with a sudden hearing loss, you don't know what you're gonna see on that day of, so definitely, I always encourage a repeat and I schedule it that way if I have control over it in my clinical setting.

So with this case, there is also a poll, very similar to the last one that we did, if we can populate the poll for everybody again. With case two, with a 0% of word recognition score, are you initially recommending a hearing aid to this patient, a CROS or BiCROS, or bone anchored hearing aid, or a cochlear implant? So that would be the first one, with the initial 0% word recognition. Given the improvement from zero or unmeasurable to 96% word recognition, does your initial recommendation then change? Okay, all right, so initial recommendations off of no measurable word recognition, 20% would recommend a hearing aid, 73% would recommend CROS or BiCROS, 2% bone anchored hearing aid, 4% cochlear implant. And then given that change and improvement in word recognition, the initial recommendation does change, 86% would say that they would change the recommendation, 14% would not.

In cases like this, sometimes when I have a patient who's like a borderline hearing aid candidate and looks like they would be more fit for a CROS or a BiCROS, some research has suggested doing binaural word recognition testing to see if with both ears there would be a significant improvement to explore binaural amplification versus a CROS or BiCROS. But especially with patients, my recommendation, especially with no word recognition at all, is a BiCROS before any talk of any implantable devices, especially with the sudden hearing loss, it's very sudden, and again, 32 to 65% of cases can spontaneously recover, and I've experienced that maybe once, where six,

eight months later, patient came back to be retested and suddenly there was an improvement that wasn't there before.

Whereas if they had moved down the path of an implantable device and qualified, we would've missed that, and then can't reverse that once you undergo a surgery. So my initial recommendation personally is a BiCROS and a trial with that to see what benefit a patient perceives, but when the word recognition improves so significantly to 96%, that's very telling that a hearing aid would be absolutely appropriate, and that's the direction that I would then personally go over the CROS. Word recognition score is something that is a genuine guide that I use in addition to what we see on the audiogram. Let me see, I think there's something in the chat. So I do have another case to review.

So I do wanna note, the research that we did, the retrospective chart review was from 2016 to 2019. And so the findings again, were that despite the onset and well beyond clinical guidelines, board recognition did improve. So this last case that I wanna present and share is a case that I saw very recently and this person presented this year, to kind of show the word recognition aspect of it. This patient was seen in January. Their right ear was affected, they woke up one morning, no hearing, it significantly dropped. They associated, like one bout of dizziness, tinnitus was already a preexisting condition, they have a lot of loud noise exposure, but he came in within about five, six days of onset to be seen.

And these are the audiograms from January to May. So an overview of the patient, presented with sudden hearing loss of the right ear, reported worsening tinnitus, but it was preexisting, as I said, they have loud noise exposure, military and occupational, and they did have a bout of dizziness that resolved. They were seen again within five days of onset and they underwent audiological evaluation during the visit. Word recognition in the affected ear, which was the right ear, was 52%. And this patient was

treated with oral steroids. Also underwent imaging, they did an MRI to rule out retrocochlear pathology, and the results were unremarkable. So upon follow up in March and in May, we redid testing, the thresholds were stable from March to May, which is what you see right here in this configuration.

But what did improve was this patient's board recognition scores. So even though thresholds remained stable and did not improve, this person's board recognition went from 52% to 96%. But with this particular patient, because no improvement was seen on the audiogram and for other reasons, they deferred injections or further treatment, even though word recognition did improve to 96%. So this is what I wanted to show here. Again, if we have that poll to include, again, it'd be the same. Given in this, I apologize I didn't edit it, but given the 52% word recognition score, what would your initial recommendation be for this patient? A hearing aid, a BiCROS or a CROS, a bone anchor hearing aid, a cochlear implant? And given the improvement from 52% to 96%, would your initial recommendation change?

Okay, so the initial recommendations based on the 52% word recognition, 64% would recommend a hearing aid. 36% would recommend a CROS or a BiCROS. 0% for bone anchored hearing aid, and 0% for cochlear implant. And the second part of the question, given the improved word recognition, does your initial recommendation change? 38% said yes, 62% said no. For me personally, if I have a patient who comes to see me for a hearing aid evaluation and their word recognition is 52%, much like what was said earlier that they do a trial of amplification first, that is my recommendation for this patient as well. And given the improvement, it just solidifies further in the recommendation of a hearing aid versus a CROS or a BiCROS. There is a question in the chat with case three.

Are you suggesting that you think the patient might have had threshold improvement with more treatment given the late word recognition improvement? So, I mean, we can

never predict if initiating treatment is going to elicit and show there's going to be change or variability in the thresholds, we can't know that. And especially, I'm not the physician, there's a lot of different variables that go into their treatment plans and their care with the patient, but to go back to my suggestion, if I think that continuing treatment would've yielded improved thresholds, it could, but there's no way to know for sure if that would actually happen. But my more emphasis is that if purely looking at pure tone average and the configuration of the audiogram as a guide for whether to discuss further treatment and whether it could be helpful, I think that more than just the pure tone should be considered.

So given that there was an improvement, a significant improvement in word recognition, that should be a consideration. And whether that was, again, I'm not the physician, I'm not there in the room, there's a lot of decisions that go into play in the care and the direction that they go, and ultimately, sometimes it's the patient who does not want injections and that has happened as well. There's a question, would you do a binaural word recognition before a decision is made as far as what to fit the patient with? Yes, if there is time and access to the booth and you have poor word recognition based on research that I've seen out there, they do suggest doing a binaural word recognition to see if that's going to help yield some kind of benefit considering binaural summation.

So if you can have the time to do that to see, especially if the person is on a cusp of hearing aid versus CROS, I would do that. And then you definitely want to counsel on realistic expectations as well, depending on what you do. In the chat, there is, are you suggesting, no, so I did talk about that, it says, are you suggesting that you think the patient might have had threshold improvement with more treatment? I'll go back to that again. There is no way to predict if we're going to see results. I would just say that all parameters, everything on that audiogram is something that should be considered. And research suggests that the primary thing that's being looked at is pure tone average,

audiometric configuration, and presentation of symptoms, word recognition is not a variable that's been widely considered currently, and that's what I'm hoping that it can change.

There is another comment in the chat, says, it would be interesting to see if word recognition improves as a result of stimulating slash aiding the affected ear, understandably, this would be difficult to study. It definitely would be interesting to see. I've seen it once, but once is definitely not enough of a sample size to report significant findings on, but it would be interesting. And then there's a question, are all word recognition results were obtained? Yes, all audiograms that were done, especially within our practice, are all with recorded speech, they're not live voice. Okay, so I'm just gonna minimize this for just a quick second to go on to the next slide. The next slide shows that third objective we have gone over.

Again, there's very limited research currently that's focusing on word recognition within this specific population. There are studies out there that talk about looking at audiometric configuration and the suggestion that, potentially, those with low frequencies impacted more so than the high frequencies will recover better than those who have high frequencies impacted. There's also studies that suggest that those who also present with associated symptoms of dizziness or vertigo, they likely will not recover as well as someone who does not present with vertigo or dizziness. And our study showed that that was not even a common reported symptom, it was more so tinnitus and aural fullness or tinnitus. And so the takeaway with word recognition is that the likelihood of recovering the further out from treatment you are, you may not see any recovery at all, word recognition may not improve at all, but in the rare situation that it does, that can be a big deal, it could be a very big conversation, different conversation with the patient in terms of talking about something that's implantable or something that's more traditional, like with a BiCROS or a hearing aid.

And so that was the big takeaway in terms of what to look at, what options are available to our patients, and what information that's new and up and coming in research can we share as we're collaborating with physicians. That's what I have for today. And again, I wanna thank everybody who attended today and a big thank you to AudiologyOnline, to Kimberly, to Christy for guidance and support, and thank you for everyone for participating. There is a comment in the chat. So the question is, when doing trials, how long do you keep a patient in a device before switching to one another, like hearing aid, BiCROS, BAHA with a band, two weeks, longer, is there an order that I start?

So I personally do not work with implantable devices. We have individuals on our team who do a lot of bone anchored hearing aids, who work with cochlear implants, and now there's ever-changing criteria for the consideration of cochlear implantation for single-sided deafness. And so what I can say from my experience and my knowledge is that before any conversation of an implantable device, there has to be some form of a trial, in single-sided deafness, if that's applicable in a case with someone with sudden hearing loss, a BiCROS or CROS is mandated for at least a month. So my trials with patients are at least a month, if the patient is feeling they have benefit, but they're not sure, I've certainly worked to try to extend those trials, but typically it's 30 days before we move on to the next potential pathway for the patient.

I do have a patient who I have fit recently with a CROS for sudden hearing loss. He himself, it was less than a year, so he said, I don't wanna go the implantable direction or even consideration for it, because it's only been a year. What if he later down the line does experience a spontaneous recovery? Not often will that happen, but it can, they can. In my experience, there's a question, how often are patients resistant to medical treatment for their sudden hearing loss? So personally, I can't comment on the experience of it, only because that usually, whether they're pursuing treatment, not

pursuing treatment, that happens between the physician and the patient, but when they're coming to be evaluated, they don't know what happened.

They think maybe there's a wax buildup or an ear infection and that sometimes plays a role in why they wait so long to come in. And then there's always how quick can they get them in, but when you have set protocols, understanding that this is a medical emergency, they try to get patients in as soon as possible. But again, how resistant patients are, from my experience, I've seen most treated, but sometimes they'll defer if they don't want an injection and if too much time has passed is usually like what I've encountered through reviewing patient charts. There's another question, usually, at what point does a patient come in to see the ENT slash audiology when they experience a sudden hearing loss?

Do they usually call right away to get seen to you or do you think that, so I think this is a little bit of what I was kind of touching on. Sometimes patients think they might have a wax buildup or they'll think they have an ear infection, and so they'll usually more often go to like an urgent care to seek immediate treatment, or sometimes they'll get in quickly with their primary care. Some patients who I've seen for this very complaint were referred to the ER where they had all the imaging done and were given like an antibiotic, sometimes a steroid, but that's usually the delay. The delay is they think maybe they have a wax buildup, so they'll wait, or life gets in the way, sometimes they can't get in right away.

At our practice it's known that this is a medical emergency, so we try to get these patients in right away. And typically with our protocols, patients are seeing audiology for the hearing test side of it and then seeing the physician right away. Certainly I've had a patient, a hearing aid patient of mine who noted to me a sudden change, I tested her right away and referred her right to a physician who was on site and saw her the same day. So it just depends on what is happening in that moment, what access you

have, what access that you have, depending on the circumstances, and again, where you're practicing. If you're in private practice, you may not have a physician on site with you, but if you have a referring database then you know who to refer them to and to get them in right away.

There is a few questions, let me kinda make sure I'm not missing any, what could you do as a clinician to encourage awareness of sudden hearing loss and what to do when you know someone is experiencing it? I feel most people don't know what it is or even what to do. So I mean, patient education is a very big thing. Within our practice, within our group, we do have a newsletter that goes out monthly to our patients and we have covered this topic among others before in the past. If you are very involved in your community, this is something that you can do, like patient education on, if you do like physician marketing, you can talk to physicians in the area, talk to them about it, what their protocols are, allow them to know that you're there, that they can refer to you for testing if anything looks suspicious, it's all about advocacy I think.

There's another comment that says, I'm not a CI specialist, but I understand CI prognosis is better if the ear has been aided. Doesn't this tend to support initially aided? So again, I'm not a CI specialist, I have worked with CI, but not that extensively, but from my understanding as well, if the ear, the longer an ear goes unaided, the prognosis does not look good with a cochlear implant, because it's a matter of how long was that nerve left unstimulated. So yes, you definitely want to aid first. And with sudden sensorineural hearing loss and cochlear implant, from my understanding, and again, I'm not a CI specialist, but from my understanding, I feel like FDA criteria does note that the loss in that ear can't be evident and unaided for more than 10 years.

And so that it gets a little bit, all that has to be factored in, but if someone who is a CI specialist can comment, that would be wonderful. Yeah, no problem, about the newsletter, there's a comment that says newsletter is a great idea, thank you. I think

that's a really great way, especially if you can have an interactive newsletter, we like to put polls in to like, to promote patient engagement, and so we'd like to know what patients wanna learn about, and then we have our topics kind of geared towards what patients wanna know. So we've definitely talked about single sided deafness and cochlear implants, we talked about both in conjunction, we've talked about CROS and BiCROS, cognitive decline, we've talked about all those topics, that helps.

There's two questions in the Q&A, let me circle back over there. Can you, yes, so the first question is, can you please remind me of the modes of treatment evaluated? So what we did was we evaluated oral steroid, intratympanic injection, or a combination of oral steroids and intratympanic injection. Within our office, it's not very common for the hyperbaric chamber to be recommended if that was not in the inclusion criteria. And then in terms of what percentage of patients had a pure tone recovery? That's the second question, if I may, I'm gonna go back in the slides to give you the exact number, I think it was about 23%. Let me go back, if I may, I know this is recorded, give me a second.

So pure tone average, so about 23% had pure tone average recovery, 77% did not experience recovery at all. And there's another, yeah, I think that was the question that I was able to just answer, what percentage of patients had pure tone recovery? And what I'll do is kind of go back to, yeah. Are there any additional questions, any comments? Okay, what I'm gonna do is go back to the last slide and kind of open the floor for any additional questions if there are any. This is references, but this is thank you. Oh there are. There is a comment saying thank you, this was a well thought out presentation, thank you very much, I very much appreciate that. And again, I'm very, very thankful for everyone who came in to sit in to learn more about this and to help spread awareness of word recognition and this particular population. We're hoping that we can have something published soon once we finish with our data analysis.

- [Christy] And thank you so much Dr. Middleton. I don't see any other comments in the queue as of now. It was just really nice to have the chat open and have all the comments come through with your cases and the presentation, so we really appreciate your time and your expertise, Dr. Middleton. We're gonna go ahead and close the classroom, thank you so much to everyone who's joined, and we really appreciate it, have a great day.

- [Irina] Thank you, thank you everyone.