From Clinic to Classroom: Functional Approaches to Working with Children with Unilateral Hearing Loss Pt. 1, in partnership with Educational Audiology Association

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It is my pleasure to introduce our guest speaker today, Dr. Kristen Dilaj. Dr. Delai comes to us from the New England center for Hearing Rehabilitation. This course is in partnership with eaa, the Educational Audiology Association.

It's a two part series. So I would hope that you guys can join us next week at this time. I'll hand it over to you. Dr. Dilaj.

Thank you so much. I appreciate the introduction. I'm very excited to be here and welcome to everyone that's joining today. Thank you for being here.

All right, these are my disclosures and I just wanted to say a quick thank you to the Educational Audiology association for setting up the joint presentations and to my partner, Kate Jablonski, Dr. Jablonski, who will be presenting part two next week. So I'm very excited to see her talk as well. I'd like to thank continue ed and Audiology Online for having us and my team at the New England center for Hearing, especially my co director, Jennifer Cox, whose ideas and whose thoughtful clinical practices have motivated me and have inspired much of the presentation.

Here are the learning outcomes for today that were listed and you saw on Audiology Online.

And now I'd like to begin again. Thank you for being here. It's very exciting to be able to talk about two of the hats that I wear. I am a private clinician at a private practice and then I'm also an educational audiologist as well. So I wear two hats.

And it's a privilege to be able to wear both of these hats because I've been able to learn a great deal about how what I recommend in my private clinical practice impacts what's happening and what sets the stage for school recommendations and how it impacts a child's educational plan. Today's part one of this talk or this series, I should say will focus on recommendations from the clinic for children,

specifically with unilateral hearing loss and how important it is to partner with educational audiologists, school teams and families. Part two will focus on unilateral hearing loss in the schools and on working with students in the schools and what that means. Let's jump right in. So with regard to unilateral hearing loss, many times when we see a student, we have some template recommendations that we think about or some common recommendations.

So I'm going to start off with a case actually, and we're going to talk about Scooby. So Scooby presents with a moderately severe hearing loss and I apologize, I'm moving things around my screen in his right ear and normal hearing in the left ear due to the unilateral hearing loss, Scooby will have difficulty hearing in noisy environments at school. As well as localizing, the following is recommended. Scooby should receive preferential seating in school. Scooby should use an FMDM system in school.

Okay, so case that we might see, we don't know too much about the child's function at this point. We just know they have the unilateral hearing loss. And this could be a report that would come from a diagnosing audiologist that would be sent to a school. But the question that I posed to all of you, right, Is what do these recommendations mean and what could the school potentially take away from this? Now, some districts do have educational audiologists that will support and some don't.

So what could this possibly mean for a school system and for this child? What are some potential school takeaways? There's no hearing device. There's no problem. I'm going to be honest with you that this is something that I've heard at school meetings When I'm involved in an IEP meeting or a 504 meeting, even from school professionals in conversation or even from patients and their families, the child has normal hearing.

In one year, they will be fine. Not an issue. Why don't we seat Scooby just up front and center? This will provide great access. That way that preferential seating is taken care of.

Okay, and how about we place a remote microphone system in the ear with the hearing loss? That will definitely help this child. They'll be all set. We don't have to worry about anything else. So we're going to be covering a couple of different things along the way here.

And I want you to remember this case and these recommendations throughout this presentation. And we're going to circle back to this later on.

All right, So I know many of you this. For many of you, this will be a review with regard to covering some topics on unilateral hearing loss. And so I will, you know, make every effort to make sure that we move through it at a relatively fast pace. Okay, so when we're talking about unilateral hearing loss, we're talking about hearing loss in one year. So average, pure tone average or PTI greater than or equal to 20dB HL.

Now, there does have to be normal hearing in that opposite ear. And the reason I mention that is because sometimes we do confuse unilateral hearing loss with asymmetric hearing loss. And I definitely want to separate those two for this presentation today. So the normal Hearing ear must have true normal hearing PTA adder better 15 db hl in that better hearing earth. Now for unilateral hearing loss, etiology is unknown for 30 to 55% of the cases that we see.

However, there are congenital as well as acquired causes that we know about. And those do include cmv, meningitis, eva, atresia, genetic causes, prematurity, cochlear nerve deficiency, ototoxicity, head trauma and craniofacial anomalies. The reason that I mentioned this, and I think it's important to note the etiology, is because with newborn hearing screenings and when we think about risk factors, we do want to follow children that have any of these risk factors and ensure that they don't acquire a unilateral hearing loss later on or that they haven't been missed. And with these different etiologies, we also see different types of hearing loss. So we see conductive hearing losses due to either middle ear effusion or atresia, craniofacial anomalies, we see sensorineural hearing losses, the result of CMV or EVA or ansd.

Then of course, I do want to mention single sided deafness where one ear or the ear with hearing loss is completely without hearing. I have seen a few cases recently where the MRI has shown that there's no auditory nerve on that side. These children were picked up. We've been doing testing in the booth, they had an abr, did the mri, sure enough, no auditory nerve thinking about that ear or unusable ear. When we think about single sided deafness.

Okay, so unilateral hearing loss is known to occur in about 0.6 to 0.7 per 1,000 newborns. And this is from the Centers for Disease Control Early Hearing Detection and Intervention database. However, when we look at school age children, we see an increase in that prevalence of children that have unilateral hearing loss. And there's definitely many reasons why this can occur, whether it's from a progressive hearing loss in that one ear or that late onset of hearing loss, or even a non detection of unilateral hearing loss of a mild degree. Because even though the newborn screening programs are fantastic, we have seen those children pop up later on.

And therefore, it's very important again that we're monitoring these kids in the schools because as we're going to discuss, these children are at risk of academic, social, speech and language difficulties as they're developing their speech and language skills and as they're developing as children. Okay, so let's review why do two ears make such a difference? But we know binaural hearing is important for access. And let's talk about why and when we're talking about this, I also want you to be thinking about preschool situations all the way up through high school situations and learning environments, because that's what we're talking about. How does this hearing loss impact what's happening for these children in the classroom?

So when we think about why two ears are important, we know that having two ears results in improvements in loudness, localization and speech understanding in adverse conditions. And this is really from some of the things like binaural summation, interaural differences, including phase intensity

and timing, the head shadow effect, release from masking, and the precedence effect. All of these help children with localized sound in their environments. They help improved hearing and background noise. And in addition, they make sure they have that good loudness perception where they're feeling comfortable and confident in what they're hearing from all around them.

Now, again, all of these factors impact a student's ability to communicate in these dynamic learning environments. Because it is not just a teacher focused world in schools anymore. Students are asked to listen to many different things. We're going to cover what those are in a few minutes. But it's very important that we understand that it's these types of abilities that impact that student's ability to function in their classroom environments.

Now, historically, going back to some of the beginning things that we had thought about, the conventional attitude concerning the effects of a unilateral hearing loss has been that it would have little impact upon a child's academic performance. Again, these children were often kind of forgotten or told, you will be fine, you have that normal hearing ear. Students with unilateral hearing loss should be able to go through school and learn like any child. That's the attitude from the 1970s and 1980s. However, again, we know that we're not just in a classroom where there's desks lined up and the teacher is talking for hours upon hours during the day.

What we have is environments where peers are working together. We have environments where they're expected to all learn as a class. We have carpeted environments now in the beginning or in the front of classrooms around smart boards where students congregate and meet there and do their learning. And of course, of course, we have small group work where teachers are able to sit and work with a small group of students. In addition to this, there's the cafeteria, there's social situations at recess or in gym class.

All the specials are Very much set up differently with regard to art and music. And there's a lot of listening expectations for these students. And many times the students don't even realize that they could be missing information or having a difficult time. So again, what are the expectations in today's classroom? Well, there is still teacher directed learning and that can be where the teacher is seated in front of the smart board directing that information to the entire class.

Now there's also co taught classes where there's more than one teacher. And there's also classes that have para or additional adult support. And it's important to understand that what type of classroom these students are in. Because if there's multiple adults in a classroom that the student is expected to listen to, what do we do to ensure that access for them? There's also significant increase in peer directed learning where students are asked to work with partners, where they're asked to be in small groups.

Lately I've been in many math classes where they're doing small groups at different whiteboards around the classroom. Well, that's very difficult because the teacher's talking in the center of the classroom. There's multiple groups around the classroom. That student is expected to hear their peers, hear the teacher, and also block out the background noise from all the other students talking. That's a lot of work.

It's a lot of focus. It can be a lot of fatigue for that student. There's also lab groups in different environments. And then of course there's the different stations that students are expected to choose or go to. Whether that's in preschool or in elementary school, or again working in small groups in a middle school classroom.

Now in addition to this, there's also independent learning and that has to, that can occur either at a student's desk or with their tablet or Chromebook. And so the access to that is also important. And then like I mentioned before, the social situations, thinking about the students access in the hallways,

thinking about recess, indoor recess, free choice times, cafeteria, these again are fatiguing times and more difficult times because of the level of background noise that the students are expected to listen in and to be able to communicate with a peer in.

So when we look at students with unilateral hearing loss and we think about areas of concern, the research has been pretty, pretty consistent for the most part. There is some variability with regard to how well students do or do not do. And a lot of that is based upon the degree of hearing loss that the student has. Children with severe to profound unilateral hearing loss tend to need more support than children with a slight to mild unilateral hearing loss. Now, overall, there is research to support that they do have difficulty with speech perception in quiet as well as in background noise.

Again, more correlated with the degree of hearing loss. But all students are at risk for those difficulties. Not only that, but the research does show a concern with regard to localization ability. So the student's ability to find who's talking in the environment. And again, if you're thinking about a dynamic classroom with a teacher that's teaching up at the front and then calling on peers to answer, by the time a student looks to find who is talking, that peer might have already asked their question or made that comment, and then that student with unilateral hearing loss is at a loss.

In addition, lots of current research showing that students with unilateral hearing loss also present with auditory fatigue, meaning that they're exhausted by the end of the day when. If you look at this research, what it's showing is that while children with unilateral hearing loss do better or have less fatigue than children that have bilateral hearing loss, they still present with more auditory fatigue. Whether it's on some of the pediatric quality of life scales or whether it's on a specific fatigue scale, they present with more concerns regarding fatigue than children with typical hearing. So we are seeing those impacts in multiple areas. Speech perception, the localization, as well as the fatigue.

And of course, all of this impacts that student's academic and social success.

So again, what does this all lead to? Areas of concern would be language development. Research has supported that outcomes of children with unilateral hearing loss. There's significant difficulties in their language, academic and social and emotional development. Some of the research has really looked at language comprehension as well as language receptive and expressive language and shown that in comparison to either normal siblings or typical hearing children of the same age, that our students with unilateral hearing loss typically have more difficulty and are further behind.

Now, again, a lot of what's, what's exciting and encouraging is that when we look at these children over the years, they do tend to catch up and their speech and language scores do get better. But still when we're looking at them, they are delayed in many of those speech and language abilities, socially and emotionally. Children with unilateral hearing loss may experience low self esteem, may experience more anxiety, may have strained peer relationships, and even feel like they have less social support. And that's again concerning. We want to make sure that we address those concerns that we're aware of those concerns as being a potential issue in these students academic learning environments.

And not only that, you know, another thing that we do know from primarily the adult literature is that there's going to be cortical reorganization. Okay. From the lack of input from that side, there's going to be a change in the reorganization of the or in the organization of those auditory pathways.

Okay. So one of the things that we've really been thinking about is not just looking at that audiogram and thinking, wow, you know, gosh, they're going to have these issues. But what are some of the things that the teachers and the parents are reporting that are red flags to us that we might need to take a different approach, that we might need to look at the student, think about a device, think about something different in those recommendations. So some of the common parent and teacher concerns that have come forward to our clinic or within our practice have been that the student seems inattentive, that the student also seems uninterested in completing classwork, or that they're not following the

classwork or the directions. This student tends to be acting out as having more, more and more poor behavior.

And also, we can tell that the student is not achieving to their full potential. And a lot of times, you know, when we see these changes are when the demands in the classroom become higher. As soon as the comfort level changes or there's more academic information, that's when we tend to see a lot of these concerns come forward.

Now, we also know that the research has shown that there's been an academic impact to unilateral hearing loss. So issues with failing or repeating grades, academic and behavioral concerns have also been reported as well. And again, many of these students need either a 504 or an IEP. So again, in comparing children with unilateral hearing loss to children with typical hearing, the number of students with unilateral hearing loss tend to be higher when it comes to the number of the students that need the plans, whether it's again, the IEP or the 504.

Okay, so let's talk about diagnosing unilateral hearing loss.

Overall, the diagnosis of unilateral hearing loss has become earlier for many kids because of newborn hearing screening and also because we have more screening protocols in place in the schools. And I also think that many more professionals are more aware of the impact of hearing loss on speech and language development. So we are getting more and more referrals from speech language pathologists with regard to hearing evaluations, and we're getting More and more referrals from birth to three programs who are picking up on kids that have those speech and language delays.

Now, when it comes to diagnosis, of course, it always helps if we know the etiology, right? We. If we see that a child has atresia, again, that's going to kind of dictate our path. However, when we have a student or a child that has cmv, cmv, for instance, or we have that sensorineural hearing loss in that ear

that was picked up on the newborn screening, what happens in that side? Do they have usable hearing?

And that's, of course, always the question, can we provide a typical hearing aid for that child? Is that appropriate? Is that going to give them benefit? Now, we know that for young, young kids, masking can be quite difficult. We know that by age 3, we expect to really have a reliable audiogram.

I hope that it's earlier than that by far. However, typically by age 3, we know that we're getting reliable results. So often, you know, what we're trying to do is help the family figure out, what should this child be doing on this side that they have hearing loss? Do we need to give them access in some way? For some of our children, we can only get sound field results when they're at a young age.

And what do we do with that information? So when I see. I have a case coming up where we've been working to figure out, does this child have hearing in one of their ears? The tones are showing that there might be a moderate hearing loss, but there's no speech recognition on that side. What do we do also for a student or the child, where the parent comes in and says, my child's localizing, they're developing speech and language perfectly.

We get into the booth, they will not wear headphones. We can't verify that that side has any hearing. What do we do about that? Thinking about this when you're doing your testing is very important. The goal of the evaluation at any point is to verify whether or not the child has usable hearing on that side.

Tones versus speech. Again, if you have the mri, you're going to go forward with that. You're going to make a different choice on device. If there's no auditory nerve. However, what I do like to do is compare that tones versus speech like I described earlier, because it is important with regard to function.

Some children can detect those tones but can't detect the speech. Some children have way better speech reception than I ever would have thought in the ear. With the hearing loss, every child is very different and it's important that you verify it per child. Now, how does the child hear in background noise? We're going to talk about functional testing in a few moments because that's very important for you with your verification of whatever device that you're recommending, whether it's a personal device for that child or, or whether it's a device specifically for school.

And I think that it's important that we all think about the now as well as what could potentially happen in the future, because you're going to be seeing that child at that point in time. You're going to get to know what their life is like, right? Then what is appropriate for them at that evaluation might not be appropriate for them in the future. And it's very important that families understand that things can change and your recommendations might change and the child's needs and wants might change. I mentioned later in the talk talk, you know, some things that students have said and I had a child with a maximum conductive hearing loss on one side.

And when he was small, we saw him through birth three. He did fabulously. The family chose no device at that time. When he was enrolled in kindergarten, he came home and said to mom, I can't hear on my right side. I want to hear what's happening at the sand table from my friends on the right side.

He had fantastic language and from then on. And now he's, I think, 18. But we have chosen different devices along the way. So we tried a cross, we tried a Baja, and now he currently has an asea. And we had to make those choices depending on the, on his needs, his educational environments and his family's feelings and thoughts on it as well as we went along.

So again, what happens initially for these children doesn't always end up the same way when you're looking in the future. Okay, so let's review some device options for children with unilateral hearing loss. So the purpose of providing amplification for children is to minimize the negative impacts of their

hearing loss on communication development and academic achievement. I loved that quote from the AAA document. It's a from 2013.

I think it's important to note that AAA has always been a proponent and recommended that children with unilateral hearing loss are candidates for different types of amplification. But that when you're assessing what that amplification or what that device should be, it should be on a case by case basis.

So the device options for children with unilateral hearing loss include a hearing aid, a CROs device, a Bone conduction device, which can also be considered a cross device as well a cochlear implant, assistive technology options such as your FM or DM system. And then I included access supports here, even though they aren't a device option. But really what that means is no device and that you're just recommending supports in that child's listening environment at school.

All right, so let's talk about the pros and cons of some of these device choices. And I will say that the Bugatto article from 2019 provides a nice review of this as well, if you're looking for additional support or additional materials. Now, I did my best to do my own type of figures. So what you'll notice is that here the purple ear will mean that that's the ear with the unilateral hearing loss, and the green ear is the ear with normal hearing. I obviously stayed away from red and blue.

To make this clearer for us all, let's first talk about a hearing aid. If we place the hearing aid into that ear with the hearing loss, it has the potential to help that student with localization. It has the potential to improve word recognition because what it's doing is stimulating the auditory nerve of that ear. So what we're looking to do with the hearing aid is make that ear usable. Make it.

So we're giving that ear access. Now, across device does not do that. So what we're doing with a cross device is we're placing that microphone on that poor ear and we're sending that information to the good ear. So the student's wearing two devices. But truly, everything is going into that typical hearing or

normal hearing ear.

Across device will not help with localization. It will not give speech perception to that poor ear, and it will allow access on that side. But again, it's not as if that student is hearing from two ears. So it's not giving back any of those binaural skills or those binaural abilities that we had discussed earlier.

Typically, we don't pursue a cross aid unless that poor ear doesn't have sufficient hearing with that traditional hearing aid. So I just want to mention that as well. And the research, I think, has been there isn't as much research on the CROs device and the success with it. Again, case by case, I have maybe a handful of kids that prefer the CROs device. And really, it's because, just like that student had said, they want the access on their own other side.

They want the access on the ear that they know they're missing information from Their friends. Now, when it comes to bone conduction devices, it is different with regard to the conductive hearing losses versus the sensorineural hearing losses. When you have the conductive hearing loss, the bone conduction device could have the potential to help with that localization ability because you are able to stimulate the auditory nerve that's underneath that conductive hearing loss. It also has the potential to improve word recognition as well. Again, from that side.

Now, when you have the sensorineural hearing loss, it's similar to the cross. So what it's doing is bringing the information from that poor ear over to that good ear. So that way that student has access to the information that's on that side, but it's not giving speech perception, it's not giving localization ability by giving information or by being on the poorer side.

Now, with bone conduction devices, it's also important to note that a lot of the surgical candidacy has changed. When we have our younger kids, we're still using either softband or sticker options, whether it's the cochlear baha, the Med El Head here, or the Oticon Medical Ponto. The surgical options

currently are still the Baha, now the Asea 2, and both are now approved for age 5. The Med El Bone Bridge, which is age 12, and the Ponto and the Sentio, H5 and H12. You can see that we're making decisions about surgical bone conduction options at a younger age than we ever have been.

Initially, I think my youngest bilateral bone conduction device was at age 8, and now we're seeing this option being considered for age 5.

Finally, as far as personal devices are concerned, the cochlear implant is the last option. This again aims to stimulate the auditory nerve of the poor ear. So we're looking to make that poor ear an active ear. And it has the potential once again to help with localization, and it has the potential to improve speech recognition in quiet as well as in noise. When you look at the research, and really we're going to see, I think, a lot more of this research coming out, that most children are showing some type of clinically meaningful improvement in one of these areas, whether it's localization or whether it's speech perception or just having access on that side, I will say there's a lot of variability in what I'm seeing about how children are benefiting from the cochlear implant.

Of all the students that I've had that have received a cochlear implant on that unilateral side, they all wear the device. However, again, there's significant variability in regard to how much speech perception they actually get from that cochlear implant. I will, again, I will say I've been surprised at how many of them. I think all of them, again, have been able to wear that device in school with little difficulty. I think we just have to be mindful about what that performance is, what that implant is doing for them, and again, be considerate of what that means in the classroom and whether or not they need additional supports in addition to that cochlear implant.

But again, I think this is an area we're going to see significant amounts of research in the near future.

Okay. Now, of course, we have options when it comes to assistive tech and supports for access. So when we think about microphone systems, remote microphone systems, or remote microphone technology, we think about either the personal device that the student wears, or we think about a sound field system or a system that can sit on a desk. So with the sound field, you have the microphone that the teacher wears, and that information is then coming out of a speaker speaker. And really, all students are hearing that information throughout the classroom.

And that can be from speakers that are coming up from the ceiling, that are set inside a classroom, or from a purchase speaker. And really what we're considering, in addition to the sound field setup, is also the location of the student with regard to that speaker. Are they getting the benefit based on the ear that they have the hearing loss in? Is that sound field giving them enough of a boost in the information being presented by the teacher to be more successful to reduce that auditory fatigue? Now, when it comes to personal FM and DM technology, there's options, right?

So again, looking back at my amazing figures that I've created, I came up with, you know, thinking about three options. So one is, is that the teacher is mic'd. And what happens is, is that microphone information, that information from the teacher is going to that poorer ear. So it's the ear potentially that has a hearing aid or a baha on it. So that signals going directly to that.

And that's what this figure with the purple ear and the lines denotes here. Now, we also have the option of placing the FM receiver into the good ear. So teachers talking through the microphone, the student's wearing that device in their good ear, and they're hearing it directly through there. It's not blocking anything coming from their environment. What it's doing is just bringing that teacher's voice directly to that better hearing ear.

Of course, for some students, they have an FM system that goes Both to the better hearing ear and to the poorer hearing ear. They're set up with their hearing aid and FM attachment as well as the receiver

or the focus in their better hearing ear. They're getting the FM from two sides. And we're going to talk about how to make some of those choices and recommendations in a few moments. With regard to access supports, we always think about preferential seating.

Many years ago at a previous conference, I had heard about the term strategic seating and I fell in love with that phrase because it's not always preferred and it's not always front and center. I consider it strategic thinking about where the background noise is, is in the classroom. What are the noise sources, where should that student be placed so their better hearing ear is facing the majority of their peers. So to me, that's more strategic than preferential. Even though, as Dr.

Jablinski will talk about, there are recommendations on those IEPs and 504 plans that have specific wording and that we need to follow. Also, recommending noise reduction strategies be utilized in the classroom is fantastic. That's something that needs to happen. It reduces the amount, again, of difficulty that student will have, reduces their auditory fatigue. There's a lot of variability in our students with unilateral hearing loss.

So with regard to academic supports, those will be considered at an IEP or a 504 meeting. And of course, access to visual supports, things being written on the board, access to visual transitions, meaning that the teacher flicks the light versus plays a chime. Captioning for all media. All of these things are important recommendations.

Now, how do you gather the data for individualized recommendations? So what I'm going to challenge all of you to do is think about some of your practice and what you do with regard to having data for schools or having data for families to show what device or what setup is most appropriate for them. Okay? So you, as the clinical audiologist, are extremely important in any child's educational plan. You're making all the recommendations for any personal devices for that child.

And this directly impacts the school options for any type of assistive technology. So I want to put that forward to you because. Because again, wearing my educational audiology hat, oftentimes I have a student come into a district I'm working with, and it's a hearing aid that I didn't necessarily choose, but that hearing aid limits what that child is able to have access to. So then I have to think about what does this child need in this classroom? How do I make that happen for that child?

What setup's important. So whenever I can, if I'm not the educational audiologist for a district and I'm working with a student in, in another district that has an educational audiologist, I will reach out to them ahead of time and have a quick discussion about, you know, what technology is currently in district, what do the classroom setups look like and what do we need to consider when we're making that personal recommendation? Okay, not only that, but like I said earlier with the school's initial thoughts on reports. Your report is often the first and possibly the only that's presented to a district and it's going to be read by any member of the team, any person that's at these 504 or IEP meetings. And that includes parents, SLPs, teachers of the deaf, the administration, psychologists.

I have administration twice. Obviously that was very important. Nurse nurses and teachers. And so what you say does matter and they will take from it. You know, based upon their level of understanding of hearing loss, they'll take what they can from it and then try to make those recommendations and make an educational plan for that student.

When you're making device recommendations, of course, the goal is to optimize the student's function. Okay. So the questions that you should be able to answer are what are the child's listening environments? So for example, when I have a child that's transitioning from birth to three to preschool, I want to know what type of preschool they're going to. Are they going into a preschool with 18 to 20 kids or are they going into a preschool that has only six to eight in the classroom?

That makes a difference about my initial recommendations. What is the child expected to listen to? Maybe this child will be at home until five. Maybe they're in a specialized school, a Montessori school versus a public school. You know, what does that look like?

What is the expectation? Is it a peer focused program where they're going to have to listen more to their peers than the teacher? We're seeing a lot of flipped classrooms as well, lots of technology, access. Let's think about what they might need in those specific environments. In addition, what are the goals of the family?

So is it just for the child to detect sound on that side? Is it speech perception? What is the family looking for? So some families just want that child to have some access. Some feel, you know what, my child's doing great, I don't want anything else.

And some think, I want that ear to be an active ear. I don't want to waste time, I want to move forward quickly. Okay? Again, who are the team members that you, you're going to be working with or that will be reading your report? So what are the educational options?

Who is there to support the student when they get to school? And then of course you're going to be determining will a personal device be beneficial for this child. And no matter what, whether it's for the family or for the educational team, you need to get by it. You need the data to show why you're making that recommendation, why it's important, because even if you make the recommendation for the hearing aid, if the child goes to school and takes it off and the team doesn't feel that it's important for that child, they're not going to help support your recommendation. So it's very important that you're very clear why it's being recommendation recommended and why this student needs that.

As I mentioned before, do we work toward making the ear with unilateral hearing loss usable? Do we recommend a hearing aid or a cochlear implant? Do we send information to the better ear? Are we

looking for a cross or a bone conduction device? Do we use assistive tech?

What about for students that are doing so well, is no device. Okay, so when we're thinking about determining functional listening ability, okay, you need to think about the types of tests that will help you make that determination. You need to think about what would be useful for the school and for the family. So what is the child's performance with the device or devices that you might be recommending and how you evaluate? And the test choices you make, of course are going to be individualized per child because it'll be different based on the child's age, their language level and of course if there's any co occurring diagnoses that you have to think about.

Now when I'm determining functional listening abilities, I always want, you know, word recognition skills. And so I'm looking at unaided scores versus aided. If I'm doing a hearing aid or any type of device. So I'm looking at just the typical hearing ear, the normal hearing ear. And then what happens when I'm adding, you know, I'm doing testing in the sound field with and without that extra device on for students, I might have to do open versus closed set tasks.

I do like to demonstrate differences in access when there's typical conversational speech versus soft speech. So I will change my levels because a lot of times what the students are missing is things that are happening at a distance from them or when their peers are talking quietly. I Will look at recorded versus monitored live voice. And then I do do testing where I'm directing speech information to the good ear. So direct or toward the bad ear, which is indirect.

And I'll show you some examples of that in a few moments.

Okay. Testing in noise is critical to demonstrate the need for any type of assistive technology in the school. So we have the luxury of testing with different, different configurations. So I trial different FM setups if possible. I try to simulate a sound field setup versus a personal FM setup.

I have equipment in my office that I use to be able to demonstrate that as well. And I also try to test at different signal to noise ratios. So maybe a plus 10 and a plus 5 or maybe a 0 depending on how difficult the listening environment is for the child. If there's a lot of complaints about the cafeteria, for example, and I'm recommending that this child maybe have a lunch bunch twice a week, I need to show how difficult it is for them in a situation that's very noisy. The school looks for that data to be able to make that recommendation to have that support on their plan.

So looking at speech recognition in noise, I think it's preferred to use a multi talk or babble because it's yes, there's noise sources that are consistent in background in schools. But most of the time the hardest and most difficult situations for kids are when their peers are talking. So during those small groups scenarios where there's multiple groups in the classroom, during the cafeteria, during recess, and it's really students talking that are making that background noise that's hard to hear in. Now I test words and sentences when I can. So with words, again, that will be determined by the language level of the student.

So whether it's a repeat back or a pointing option, it truly depends on their speech and language abilities as well as their age when I make that choice. Same with sentences. So I'm very partial to the pediatric and adult AZ bio sentences because I feel like there's enough sentences that have context and sentences where they can't rely on the context. So I can really look at how well they're able to, you know, process different lengths of sentences, different sentences with familiar and unfamiliar words for them. And I can comment on that in my report as well because, you know, sometimes with regard to the scores, I'm watching students that are able to repeat back four to five word sentences very easily in quiet and then in background noise, they're only repeating the first two words of every sentence sentence.

So it's interesting to look for Those patterns and to be able to report on that. I do like to also use the BKB SIN as that helps indicate how well their performance is in noise. And I can compare BKB SIN scores with a hearing aid or with a BAHA or with a cochlear implant and without in the sound field. So again, I'm. I'm looking at the personal recommendation I'm making.

Is that beneficial to them when they're listening in noise? And then perhaps what that FM recommendation might be, Is there an optimal FM or DM setup that will help this child?

Okay, when I'm testing in noise, I'm testing with the noise coming straight on at zero. And then I'm also flip flopping speech and noise to demonstrate what's happening and what the access is with and without the device. So testing with noise at the good ear and speech at the poor ear, that indirect setup that we talked about earlier, and testing with noise at the poorer ear and speech at the good ear that direct so giving more of that optimal scenario. And again, what this helps me do is speak to strategic seating. So showing that when background noise is placed toward that poorer ear, perhaps that student does do better.

The importance of where they are, you know, and how that impacts their access in the classroom.

Now, of course, there's many functional surveys and questionnaires that can help out. So for example, you know, having the SSQ for looking at localization for listening difficulties and educational concerns using a Sifter or a life questionnaire. And then there are fatigue scales like the Vanderbilt Fatigue Scale for children and adult and for parents to fill out. That's also very helpful. I like having more than one person fill out the survey and looking at what the student reports versus the parent versus the teacher.

That's always eye opening and very helpful with regard to what recommendations I'm making. And of course, I do a lot of listening to the parents when I can. I try to get the speech and language evaluations or teacher reports if possible. So I have an idea as to whether or not all the adults are on the same

page or if there's a mismatch in how people are feeling that the student is performing. And it could be behavior, academics or speech and language development.

And I'm looking at those skills for that child and whether or not we need to make changes to whatever devices we've recommended in the past or what supports that we've recommended. Maybe those things do need to change as they've gotten older or there's been a change in their classroom environment and we need to update what we have and provide new data.

So I encourage you to individualize your battery and your recommendations for every child, because it does matter. Decisions regarding remote microphone systems should be made on an individual basis. And when you're not individualizing your recommendations and you're making standard recommendations, it can be detrimental to the student. They can end up in the wrong place. In the classroom, they might have a device that's actually making it harder for them to hear.

So you have to think about what the that function is, provide that data. And remember, too, that you alone are not the only person working with that child most of the time. Again, you're a small part of their plan, but you're making big recommendations. So you are very impactful. And it's important to be a member of that team and think about that child's life outside of the clinic.

And as we mentioned before, as I mentioned before, reevaluate. Reevaluations are important because listening demands change for these students as they get older. Oftentimes, you know, they're getting into environments that are constantly changing. You think about elementary school, where they're in one classroom. Most of the time they transfer to middle school, and now they have six teachers, and they're in multiple listening environments, and there's more unfamiliar talkers with more people coming in.

A lot of times the students lead the reevaluation process and that they're requesting access to more in their environments, they're noticing that they're missing more. There are kids that don't notice this, and there are kids that do. But again, I have had students that know that they want to hear the kids on their poor side, that they know they're missing information in the classroom, that they know that they're having trouble socially because the environments are just too difficult. So listening to them and being open to reevaluation and letting the team and the parents know that reevaluation is very important, that things can change and that things should not stay the same, that these kids need to come back and be followed in order to make appropriate recommendations. Now, I'm excited to present some case studies.

And when I was going through this, I was thinking, gosh, I'm looking at all these audiograms, and they all, again, are, not surprisingly, have that normal hearing in one ear. However, they're so different. What happened for each of these students was very different. And it was because of the conversations with family, with school, and the data that we were able to show in the clinic that we were able to individualize those recommendations, make things that were or make suggestions that were appropriate for the students. And we are continuing to evaluate these students and adjust as necessary.

So let's start with case one. So case one is a five year old. She has microtia atresia of the right ear, so she has a maximum conductive hearing loss in that side and normal hearing in the left ear. Now, initially for this child, we recommended a bone conduction device. And we should note that the child has above average speech and language scores and she has this entire time.

So when what we did was we looked at the BK Beeson and we did ADed with the Baha on unaided Baja off, and we did it in the sound field. And what you'll excuse me see right off the bat is that she performed better without the baha. And if you look at some of the literature, again, there is literature to

support that. Sometimes when you're using that baha, it can be too much that you're not only again, taking in the sounds you want to hear, you're taking in the sounds you don't want to hear. So noise is also being amplified, which can make it harder for some of our children to hear, et cetera.

Now, when we looked at word recognition with monitored live voice at a typical level and at a soft level, you'll see that while the scores are pretty similar, she still performed better without the device. And so that was a red flag for us. We trialed a Baha 5, we trialed an Adhere, we trialed a Ponto, we trialed an Edomite, and at the end of the day, the testing all came out the same, that she performed better without a bone conduction device. And so right now she's enrolled in a program within her school district that has multiple grades in one classroom, again, a very difficult listening environment. And we even trial these devices with her at school, and she rejected them all.

And so we discussed options with the school team. And so far, as of right now, she's been most successful with having a sound field system for whole group learning. She performs well during her small group learning times. She is placed in a separate area. They move her to her group, to a quieter area of the classroom or outside the classroom.

And she's doing quite well and she's quite successful. But this is a case where we really felt strongly about her having access on that poor ear. And we really felt that the BAHA would be the right device for her. And she was complaining about it. And the testing also supported that we should take off that device and try something else.

Okay, Case Number two. So this little girl was in our Birth to three program as well. And she has ANSD in her left ear and she has normal hearing in her right ear. Now, for her, we've been able to get her responses to tones, but she has never had any recognition or responses to speech in that left ear. And we have been discussing device options since day one.

And her family has never been interested. They have always felt that she responded like a normal hearing child. She has numerous brothers and sisters. She's functioning extremely well at home. Her speech and language has taken off.

There's no concerns. She does not qualify for special education based upon all the academic testing that was done prior to her enrollment into preschool and again with her scores. When we looked at her scores in quiet and in noise, what was interesting was we decided to try an FM system before she left her private preschool. And the reason we decided to do this was because as part of Bertha 3, I was allowed to go in and observe the classroom. And I noticed that all her teachers were reading to her poor ear and that she sort of kind of like was looking around and.

And even though she appeared to be paying attention, it was almost like she had this blank look on her face, like she didn't know what was going on in the classroom. So I had suggested to mom that we come in and we do some testing within without an FM system to just see if there would be any benefit. Now you'll notice that her score in quiet was 90% for word recognition. It went down to 80% in background noise, and it stayed 80% with the FN. However, there was a huge difference in her behavior when the FM was placed in her better hearing ear.

And so we placed a focus system in her better hearing ear and she lit up and then she responded very quickly. So there was no hesitation, no question. And we didn't even notice the behavioral difference when we were originally doing the testing and noise until we added the FM system. And mom saw the same thing because she was in the booth with her. And the parents still did not want a device at home.

But after that, they agreed to trial this system in the daycare preschool before she transitioned into her mainstream preschool. The report from the team was extremely positive. She asks for it when she goes to school. They've noticed a huge difference in her willingness to participate in whole group activities. They've noticed that she lights up on the playground as soon as the microphone is turned on and she

can hear her teacher.

So it's been very positive. And so the recommendation, recommendation for her Mainstream preschool now is to start with this touchscreen and focus system and we'll be coming in to do an in service and things like that. But again, this is a child that hasn't had a device and we weren't sure how it would go with the family. And sure enough, this has been a quite successful trial and quite successful testing. Okay, so my third case and final case before we go back to Scooby is a 12 year old and he has Wardenberg syndrome.

And he came with a superpower BTE in his left ear. And there were concerns from the school regarding adhd. He was reporting no benefit with the FMDM at school. And when he came to the clinic, we realized that the FM was only placed in the hearing aid. And so when we were doing wordrec, you know, great perception with his typical hearing ear, normal hearing ear with the hearing aid, he only had 7%.

Correct. So you think about access with the FM system, he was only hearing about 10% through that microphone in school. We completed additional testing at a follow up visit because that was our first visit together. We recommended continuing use of the hearing aid after the visit because there was some benefit for him having that hearing aid on. And then when we done testing and we had looked at placing an FM in his better hearing ear, we saw a significant improvement in his access.

No surprise, of course, but still we were able to show the school that data set him up with a different system. And then in following up with the team and with him and his family and those concerns regarding ADHD had gone away and he felt like he was getting the access he needed. Needed.

Okay, so let's bring it back to Scooby. I told you we would circle back. Scooby presented again with that moderately severe hearing loss here in the right ear and normal hearing in the left ear. And here were

those standard recommendations that we found. Now if we had done some of our functional testing, okay?

And we look at scores. So look at score from a bk, B, sin. We look at scores from CNC words from that right hearing aid. Okay. From both ears and at a normal level and from both ears at a soft level.

Okay. In talking with Scooby too, you know, he had indicated to us that he wasn't comfortable wearing a Focus in his left ear. He did not want something blocking his good hearing. He felt like it was a distraction because we had trialed it at school and so we had discussed, why don't we do some of our testing with the FM just in your hearing aid and see how it goes. When we did some of our testing, you can see the scores here.

We did normal recorded and quiet monitored live voice and quiet monitored live voice soft. But then we placed the speech and noise in different areas. With the speech and noise from the front without any FM system, he scored 76%. But with speech and noise from the front, with the FM system in the hearing aid only, he ended up scoring 100%. Originally, again, that FM recommendation had been actually the focus in his left ear.

And having that FM attached to his hearing aid in the right ear, we ended up making and changing that recommendation to just having the FM in his hearing aid ear. You can see here, we suggested strategic seating, that his left ear has given preference to his teachers and peers in the classroom, that he seated away from any sound sources, that his small groups are placed in a quiet area, and that he should be seated toward the right and front of the classroom to make sure that that left ear, that he only has to turn in one direction to see all the peers in his classroom, especially during classroom discussion. And then we made the recommendation for that FM system to go directly to his hearing aid only. And we're trialing this at school now.

So what are the take homes from this last hour? Well, I hope that you take home that you don't have to only focus on fitting a personal device for students with hearing loss, that you play an important role in providing educational recommendations and you should make recommendations for the classroom because again, sometimes your report is the only one that's addressing the access concerns for this student with unilateral hearing loss. Your report sets the stage for the plan that's put in place and gets the ball rolling. For any plan that that child will have and every child that you see, you should have those individual data scores on. They should have individualized recommendations.

Not one device fits all kids. The testing is critical to provide that data to family and to the school teams to make sure that you're showing the benefit with the device or devices that you're recommending. You want to coordinate and work with the educational audiologist in district. You want the parents buy in, you want the school teams buy in. So you need to think about how these devices that you're recommending are going to impact that child's function and demonstrate that change to function for different listening types of situations.

And I think a lot of times, you know, we forget that our reports and information are very much valued. Schools will value your information and expertise and perspective. And when you work collaboratively, collaboratively with them, it's an Amazing outcome for the student.

So I thank you very much and I look forward to your questions. Thank you for being here.

Thank you so much. Dr. Delai, we'll go ahead and open up the floor for any comments or questions that you might have.

And Dr. Delia, I don't see anything in the queue. We can leave it open just for another moment. Here we go. We have.

We have a question here from Michelle. Michelle said some school districts have limited resources and sometimes there is pushback from when we recommend FMDM systems in the classroom because then they are obligated to provide them. So how would you go about approaching that? That's a great question. Thank you so much for asking it.

And I think that's where the data really comes into play because I don't think school districts always realize what the access are for our students with unilateral hearing loss. And I've become much more aware, like you said, of the politics behind these recommendations and how that impacts school budgets and how that impacts, you know, the school's feelings toward a plan for that student. But if I have the data that really supports the need for that FM system, I will approach it with that regard. Just saying, you know, I'm demonstrating that this student is truly missing information in the classroom and access is a large concern. If we can provide this system, that's going to minimize the amount of access and fatigue concerns that this child has.

And that's why I'm making this recommendation. And I think, like you've indicated too, it's important to be thoughtful about that piece and perhaps thinking about what system schools already have and when I can work within those kind of confines and I indicate that to them, that I want to make a recommendation that makes sense for all parties, but at the same time, it's so important for that access piece for that student. And so that's why that recommendation is being made. And I think too, when you are individualizing those recommendations and the school see that it's not the same recommendation for every student, it's not a blanket recommendation. They're also more willing to have that discussion with you and to make you a part of that conversation.

Thank you for your question. Michelle. We have another question here from Kim. Kim asks who is testing and suggesting devices if it's not an audiologist? Ah, okay.

So that's a great question. So I have had districts where I've had an evaluation or I've walked or come into an evaluation, or they've taken an evaluation from me and they have not requested a specific microphone technology or they've made the choices on their own because of what they've had. So I've been really doing a lot of counseling with families just indicating that it's important for an audiologist to be a part of the team because some districts have tried to shut me out in the past and made their own recommendations. I've come into districts where they called, you know, for example, Phonak on their own and it wouldn't have been the recommendation that I would have made. And then we are working to figure out what makes sense based upon what has been ordered and recommended by an administrator in that district.

So I have had that happen.

Thank you for your question, Kim, and Dr. Delight. I think that would be our last question for today's presentation. We'll go ahead and close out the classroom. I want to thank you for your time and your expertise, as well as the Educational Audiology association for partnering with Audiology Online on this two part series.

We hope that you will join us next week for our live webinar for part two. Thank you so much, everyone. Thank you.