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Severe Hearing Loss Care and Restoring Sound Outcomes

Presenters: Lawanda Chester, AuD, Annie Rodriguez, AuD

All right, so welcome everyone. We'll go ahead and get started with today's course. I am Dr. Lawanda Chester, Education and training audiologist with Starkey Hearing Technologies and I will be your host for the first portion of today's course. It's a two part course, care for severe hearing losses, restoring sound. We do have a little bit of housekeeping to go over before we dive into the content.

So Here are some FAQs for today's webinar. Feel free to ask any questions you may have about the content by using the Q and A box. You can type in your question and we will address questions towards the end of the course. In addition, there is a handout that's available to you that has the slides that we're going to review so you can download that and have that for your reference. And then CEUs are available for this course with a paid audiology online, unlimited CEU Access membership.

So you do need to complete the course, go to your pending courses and complete the multiple choice exam and pass that exam in order for you to receive credit. Credit if you are a member. Finally, if you're having any difficulty, technical difficulties with the course, you're having trouble hearing or signing on to the course, feel free to call Audiology online at the number shown here. Or you can email them or use Excuse me or use the chat box. They'll be more than happy to help you with your issues and get you going again with today's course.

So here are the risks and benefits associated with today's course. All of this information can be found in the course handout. If you'd like to review these in more detail, I'll leave this on the screen for just a few moments here while you take a peek at that.

Okay.

And then the learning outcomes for today's course will be. At the end of today's course, you'll be able to describe audiometric criteria that suggest frequency lowering benefit, describe three programmable cross modes or configurations, and identify at least two criteria for recommending a cochlear implant

evaluation.

So let's go ahead and get started. As we all know, it's so important to care for those with hearing loss. It's what we do day in and day out. Right? And I think this quote covers it all.

Hearing loss may decrease older adults participation in social activities and increase the likelihood of developing depression and anxiety. This in turn may affect cognition, reduce physical activity incompetence and increase risk of falls. So it's very important for our patients quality of life in so many different arenas or areas that we treat their hearing loss so that they can live their best lives.

Now, here's some data I found interesting because it deals with memory, which we don't talk about enough in my view. Here's a study from 2018 that was published in the Journal of the American Medical Association Otolith Laryngology. The goal was to look at and measure the memory in people with hearing loss. At the top of the chart, the gray line represents the average memory function. And so a memory deficit is any data point below the gray line.

So the first group that the study looked at was people with hearing loss who do not use hearing aids and people with mild hearing loss and moderate to severe hearing loss who do not wear hearing aids. There's a significant degree of memory deficit compared to those with without hearing loss. However, in a similar group of people with mild and moderate to severe hearing loss and those who did wear hearing aids, their memory function was significantly better and much closer to normal. So this shows the silent value of hearing aids and treating hearing loss. And again, I focused on this one just because memory isn't something that we talk about a whole lot.

And I thought it was a really, really interesting study.

So when you're seeing a patient with more severe hearing loss, how do you approach it? Are there special considerations to ensure the best outcomes? Yes, yes, there are. And that's going to be the focus of our time today. So here's today's agenda.

We'll review the following topics as it relates to severe hearing losses, testing considerations, hearing aid selection fitting considerations, when to consider CROs, when to consider frequency lowering, and when to consider a cochlear implant evaluation referral.

First, let's discuss a few testing considerations.

Of course, you will conduct your standard audiometric testing, including air and bone conduction and speech testing. I would also encourage you to test uncomfortable loudness or loudness discomfort levels in addition to documenting their most comfortable listening levels.

I would also encourage you to consider speech and noise testing if you're not already doing so. Speech and noise testing really allows us to understand and quantify the most common complaint of patients with hearing loss. It's easy and fast to administer, provides reliable test results, and can help predict hearing aid benefit. It also assists us in making wise technology choices as far each patient and justification for the recommendations we make. Speech and noise test results can help us provide our patients with realistic expectations and identify patients who may need additional counseling.

The results can also help us fulfill professional responsibility and be compliant with best practice guidelines that dictate the need to validate hearing aid performance and benefit. And then ultimately again, because we are measuring one of the most common complaints of patients with hearing loss, doing this testing can contribute to patient satisfaction. So they can see that you're actually measuring what is concerning to them the most. Now, going into specific tests is beyond the scope of this course, but a couple of fast, easy tests are the acceptable noise level test and the Quicksand are some of my

favorites.

Now again, there's data that shows that speech and noise hearing impairment is associated with an increased risk of dementia. A 2021 study from the Alzheimer's association showed that even a moderate degree of speech and noise impairment increase the risk of dementia by 61%. And as that progresses to a severe degree of signal to noise ratio deficit, it's over 80% increased risk of dementia. The good news is that treating speech and noise and addressing the cocktail party problem early really does have the potential to decrease the risk of dementia for all of our patients.

Now let's take a look at some key factors to consider when selecting hearing aids for this population.

Now, the audiogram is instrumental in selecting the best receiver size. Use the hearing threshold at 2000 Hz to determine the gain needed. 2000 Hz directly impacts the receiver selection because this is where the hearing aid receiver responses peak or provide the most gain. The better the thresholds at 2000 Hz, the smaller the receiver should be, the poorer the threshold at 2000 Hz, the larger the receiver should be.

Now, outside of just looking at their hearing threshold at 2000 Hz when choosing a receiver strength, two other measurements can be important considerations. Their preferred loudness and the tolerance measurement can both help with receiver choices. It can help to know if the patient has recruitment and which of the power receiver matrices may be most appropriate. For example, if a patient has a UCL of 85 and an MCL of 65, they have a small dynamic range. So we would recommend a lower matrix receiver because they can't tolerate loudness very much if they have a 100 decibel UCL and an MCL of 65.

We could easily go with a more standard matrix receiver if size of the ear anatomy permits.

Another important best practice when it comes to choosing the matrix is consideration for poor high frequency thresholds above 2000 Hz. Poor high frequency thresholds really don't need to be part of the equation when determining the amount of gain needed. We don't want to chase the high frequencies and then have the high frequency gain overpower the low frequencies and introduce distortion that will impact sound quality. So frequency lowering is usually a good option to consider for patients with precipitous or significant high frequency hearing loss and we'll discuss details later in this course.

Ear Mold Selection now, with higher degrees of hearing loss, you're less likely to be able to use domes without running into feedback or being unable to meet gain requirements. So here's a nice snapshot of Starkey's RIC offerings ranging from snap fit ear molds to custom cased embedded ear molds.

Similarly to our RIC ear molds, we have a variety of options available to patients being fit with BTE devices. Here you see we have different styles separated out by a traditional tube fitting or a thin tube option. Once again, you take advantage of whatever style may be best for your patient based on their hearing loss anatomy and of course, dexterity and comfort.

Now let's consider canal length of whichever ear mold you choose. Studies have shown that the canal portion of the ear mold contributes the most to the occlusion effect and maximum gain requirements of the bte. The shorter the canal length, the greater the chance of occlusion, while the longer the canal length, the greater the amount of gain potential. So getting the right balance for a patient's hearing loss is important to maximize the fitting.

And when it comes to earbud material, you're again considering the hearing loss. The hard ear mold material, often acrylic, is the most used material and can be used for a range of hearing losses from mild to severe. Soft material like silicone offers superior acoustic sealing properties and is more suitable for severe to profound hearing losses. When we're looking at the audiogram, we're typically considering the hearing thresholds and the pure tone average of looking at 500, 1000 and 2000 Hertz. When you're

looking at considering your ear mold material.

Vent Selection so the hearing threshold at 500 and 750 Hz is directly impacts your vent diameter selection because if you get this wrong, you not only prevent the transfer of the right amount of amplification into the ear, but you can introduce the occlusion effect. So the better the thresholds at 500 and 750Hz, the larger your vent should be. The poorer the thresholds at 500 and 750 Hertz, the smaller the vent should be, ensuring adequate amplification is provided at these frequencies and minimize low frequency loss.

Now, if you're looking for a partner in ear molds, please consider Starkey as your premier ear mold lab. We have a number of solutions available for your RIC and BTE patients and I just sort of scratched the surface here. The amount of styles we offer along with the material choices we have make them suitable for a wide range of hearing losses. We do have an ear mold guide found on starcupro.com and you'll have everything you need to make the right choice for your patient using this guide.

Now in this section we'll have a very high level overview of fitting formula choices and this fitting considerations section. We could spend a whole hour on this topic alone, but because we have our time limit, time limitations, we're just going to scratch the surface and do a high level overview. Like I said.

Now one of the first things to think about in fitting severe losses is the presence of a reduced dynamic range. The dynamic range is the number of decibels between the threshold of audibility and the loudness discomfort level. Here we see a person with normal hearing can have a dynamic range as wide as 110 decibels. So this is indicative of a healthy inner ear.

Now relating this to an audiogram of a flat mild hearing loss, you see in this case the loudness discomfort level has not shifted, although the threshold has in comparison to the normal audiogram that

we just saw, illustrating the reduced dynamic range. The more severe your hearing loss, the smaller the dynamic range.

Now the goal of hearing aid fittings, especially when it comes to compression, is to mimic the dynamic nature of the intact auditory system, which is an extremely difficult task because it's a little bit like squeezing an elephant into a suitcase.

The goal of a hearing aid fitting then is to reproduce the full dynamic range of everyday sounds within this narrowed dynamic range of the listener so that soft sounds are audible, average level sounds are comfortable and easily heard, and loud sounds are loud but not uncomfortable. And different fitting formulas have various strategies for doing so.

Now, NELR was one of the first standardized evidence based fitting formulas. It is a linear fitting formula of which many future nonlinear compression formulas are based upon and utilizes a loudness equalization rationale. That is all frequency bands of speech will be amplified equally and equally contribute to the overall loudness of speech. NELR is one of the fitting formulas those with more severe hearing losses tend to prefer.

Now, Nel NL1 is a compression formula that was developed based off of NALR. The fitting rationale of NAL NL1 was different since it's a completely different strategy. It utilizes a loudness normalization rationale. What this means is it uses wide dynamic range compression which allows for the overall sound to be normalized so that loud sounds are loud, soft sounds are soft and so on. Relative loudness of different frequency components are preserved rather than just emphasized equally.

Theoretically, it maximizes speech understanding by applying this type of gain frequency response.

NAL NL1 had the goal of restoring low level speech audibility, but also caused its main complaint that NAL NL1 was too loud, especially for softer inputs. So professionals at the time found they were constantly taking gain down. So NAL NL2 was created based on that feedback and empirical data collected over a decade of using NAL NL1 and recently NAL NL3 was introduced as well.

The value of a proprietary formula is their ability to optimize fittings and deliver sound quality with consideration for the manufacturer's approach to signal processing. ESTAT 2.0 is Starkey's proprietary fitting formula that was developed to work in conjunction with our additive compression architecture. This fitting formula was designed to provide more gain for soft speech, better audibility at high frequencies with a broadened response curve, and of course to achieve the best performance of Starkey hearing aids. ESTAT was originally developed based on NAL NL1 and like NAL NL2 it was in response to the feedback regarding NAL NL1. So now Starkey, being a privately owned company, could develop and produce a fitting formula that addressed the issues of NAL NL1.

Starkey can also consistently empirically optimize ESTAT based on provider feedback and clinical product research conducted at our Starkey headquarters. So it's an ever evolving formula being tweaked for the patient benefit. Now your fitting formula choice can be found in the upper right corner of the fitting software, but you'll notice that it's part of a dropdown menu. That dropdown menu allows you to select from a variety of fitting algorithms, providing you the availability to select the best possible option for your patient. Why the dropdown?

Because we know that no two patients are alike and we need to provide the best algorithm to ensure the most success for each patient.

Now our next topic is when to consider cross.

Now a person is a candidate for CROs when one of the following criteria is met when someone has a total unilateral hearing loss, often referred to as single sided deafness. Other potential CROs candidates are those who receive no benefit from hearing aids on their poor side. That includes those with very poor word recognition and hyperacusis, which is a reduced tolerance to sound, as well as those who have poor word recognition on the affected side when presented binaurally. These are individuals who would otherwise receive no benefit from traditional amplification and so could be good Candidates for CROs.

Here's an audiogram of an individual with unilateral severe to profound hearing loss. These are your classic or textbook cross candidates.

Now let's get into some terminology. The simplest configuration in this system is the CROs. It stands for contralateral routing of signal. A microphone and transmitter are on the affected ear and the receiver with no mic pickup is on the better ear. This system simply transfers sound incident on the poor side over to the better ear.

BICROS stands for binaural Contralateral routing of signal. Bicrost is for patients with one ear that does not benefit from amplification and a better ear that needs amplification. So there is mic pickup on both sides, but sound from the poor side is transmitted to the better side in addition to that better ear getting amplification.

Now, the wireless CROs system consists of a transmitter worn on the unaidable ear and a receiver worn on the normal or better ear. In this context, receiver refers to the wireless connection, not the output transducer that is used with receiver and canal hearing aids.

At Starkey, we have a CROs system that's available in two different styles with great battery life. There is a simple fitting process that allows you to customize settings to meet each patient's needs. In

addition, the CROs system is fully compatible with our 2.4 GHz accessories as well as the My Starkey mobile app.

There are three configurations or modes you can set up in your CROs system. Programming the CROs mode may be chosen to send signals picked up on the poor side to the normal hearing ear. In this case, the receiver microphone is off and the transmitter microphone is on. An example of when this mode would be especially helpful is for the patient whose audiogram is shown here. Perhaps they're in a meeting and someone is speaking to them from the right side.

The CROs mode allows them to hear what's being said on that poor side.

Bycross mode is most often utilized when the user has a hearing loss and needs amplification in the better ear. Yet they would also like to hear sounds from the poor side. In this case, the microphone for both the transmitter and the receiver are on. Now, question for you. Do you think a traditional CROs candidate, that is someone with normal hearing on one side, could benefit from a bycross mode?

Yes. Yes, they can. Absolutely. An example of when you might utilize bicross mode for a patient with normal hearing in their better ear would be if you have they find themselves in challenging environments and they would like to still benefit from the cross System independent directionality and noise control that can be of benefit on both sides. That I think can derive from both sides.

Finally, of your three modes, you have the hearing aid only mode or configuration. A hearing aid only mode may be something that the patient uses when they don't want to cross audio stream. In this case, the microphone of the transmitter is off and the receiver functions simply as a hearing aid. Example of when this mode may be helpful includes when a user is in a car and their poor side is near the window or maybe they're in noisy situations. Both CROs and Bicros patients can benefit from this setting in certain situations.

One of the other uses for a hearing aid mode are times when a patient might want only the hearing aid and we're concerned that they may lose their transmitter if they take the transmitter off. With the hearing aid only mode, they can leave the transmitter on, but just simply have that particular program where the hearing aid is working. The receiver is working only as a hearing aid and they can still leave that transmitter on and not be at risk of losing track of that transmitter.

Now there are two ways to select that CROs configuration or mode. First, you can navigate to the cross by cross screen in the software and make the selection on the lower left hand side. Modes can be set on a per program basis which allows for nice flexibility for the patient in multiple environments.

Another way to change the mode is by selecting the program on the program bar and then the flyout menu will allow you to select the configuration.

Now, when in bicross mode, you have access to balance control. The balance control will allow you, the professional, to make a global adjustment that applies to all Bycroft programs. It will adjust the level of sounds coming from the transmitter relative to the receiver. Select the balance control pin and move it closer towards the transmitter side or the receiver side to set the default balance control. Each step results in a change of plus one decibel on one side and minus one decibel on the other side resulting in a two decibel step size.

The maximum difference between the transmitter and receiver is 10 decibels. So this control adjusts the microphone sensitivity and does not affect the gain or hearing aid response.

You can find the balance control on that Crosby cross screen and as I said, it's available in any Bycross program.

Now let's take a look at features of the receiver and transmitter. Our receivers are standard hearing aids and can function as such with an Omega AI. Cross patients have full access to sensor technology, for example activity tracking, fall alerts and double tap. The transmitter is a universal transmitter, meaning it's tier agnostic and as long as it's the same style either ric RT or ric312, it can be paired to any technology tiered receiver. The transmitter has independent directionality and noise control to provide additional benefit in challenging situations.

Now let's take a look at when to consider frequency lowering.

I'd like to start off with an audiogram that we have all likely seen before something really close to this. This type of precipitous high frequency hearing loss can especially be challenging to treat as advanced as technology is today. Feedback potential for some manufacturers, reduced bandwidth limitations and distortion within the cochlea can still interfere with the ability to make the important high frequency sounds of speech audible to the ear, meaningful to the brain and advantageous for good communication. It's these three challenges that led to the development of frequency lowering technology.

The Smart Candidacy criteria were developed from research and help identify individuals who are likely to be ideal candidates for frequency lowering. These include all thresholds below 1000Hz should be 55db or better any slope of 25db or more per octave between 250 and 4000Hz, any threshold from 1000 to 3000Hz is 55db or worse and 4 all thresholds between 4000Hz should be 55db or worse. If all four of these criteria are met, frequency lowering will default on automatically in Starkey software. These requirements help ensure that the feature is not enabled for an individual that likely doesn't need it. I will note that if there is even a minor asymmetry, profit will not default this feature on.

So we recommend reviewing the audiogram for these criteria in mind in case you need to manually engage frequency lowering. For someone with this hearing loss who happens to have an asymmetry,

There are two shaded regions that populate on all fitting graphs when frequency lowering is engaged in the Starkey software. The green shaded region is the source region. This area shows the range of frequencies where the algorithm is dynamically searching for high frequency speech information to copy. Once identified, spectral cues are copied to then be recreated lower in frequency where hearing sensitivity is better.

The target region shown in yellow displays the location where the copied high frequency speech information will be replicated.

Now let's take a look at the professional controls available in the Profit software. Frequency lowering on off, frequency lowering bandwidth and frequency lowering gain. These controls can be used to enable or disable the feature and adjust the signal processing characteristics. Let's examine each of these in more detail.

Smart candidacy criteria and default logic are trustworthy starting points for using frequency lowering, but professional judgment calls require flexibility for managing the features. That's why we've given you the ability to engage or disengage frequency lowering globally in all programs or on a per program basis, as well as the ability to adjust the frequency lowering bandwidth and gain controls. The frequency lowering bandwidth adjustment is a multi parameter control that allows the professional to set the frequency range of the source and target regions where high frequency information will be copied and replicated respectively, and the frequency lowering gain control regulates the amount of recreated signal energy in the final output.

As mentioned before, the frequency lowering bandwidth control is a multi parameter control that allows you to adjust the range of frequencies comprising the source and target regions. There are seven discrete settings based on audiometric values. Here you can see the effect of changing the bandwidth setting from 1 to 7 and the subsequent adjustments to the source and target regions.

The frequency lowering gain control regulates the amount of recreated signal energy in the final output. The Range extends from 0 to 10 decibels and can be changed in 1dB increments. Changes will be reflected in the high frequency speech output or dark green curves on the frequency lowering fitting graphs.

When frequency lowering defaults on the most appropriate best fit settings are implemented based upon individual audiometric information. Frequency lowering bandwidth and gain settings are customized for each patient and provide an excellent starting point for feature settings. A bandwidth setting of 3 and a gain setting of 3 are the default settings for moderate to moderately severe high frequency hearing losses where Any threshold from 4,000 to 8,000 Hertz is between 55 and 65 decibels and a bandwidth setting of 5 and a gain setting of 3 are the default setting for severe to profound hearing losses where the hearing thresholds from 4,000 to 8,000 Hertz are 70 decibels or greater. The bandwidth and gain settings may be adjusted as needed and if you're manually engaging the feature, you can use these parameter settings as a starting point.

Now, while we do have these professional default criteria to help manage frequency lowering, there are oftentimes extenuating circumstances or unique factors we need to consider to best serve our patient. Well thought out. Professional judgment is always one of our most valuable tools. Remember, the default logic will disable frequency lowering even if there is an asymmetry at a single frequency between the ears of 10 decibels or more. So where is that frequency?

Will it really have a negative impact or would it benefit the patient based on all the other findings for you, the professional to enable frequency lowering yourself. So several factors consider or for some patients, you can absolutely rely on the default settings most of the time. But always consider what's best for the patient. And consider that you may need to manually engage frequency lowering. So is it if it doesn't default on automatically, but manually engaged bandwidth and gain settings will populate to

minimal values.

The most appropriate start settings can be determined by the degree of hearing loss in the high frequencies. So if you're manually engaging to level 1, your gain will default to 0. If any hearing threshold between 4000 and 8000k is. Excuse me, 4000, 8000 is 55 decibels to 65 decibels use a bandwidth of 3, gain of 3 and if hearing thresholds from 4k to 8k are above 70 decibels, use a bandwidth of 5 and a gain of 5. So the more severe the hearing loss, the higher your settings are going to be.

Now, one thing I want to mention is we do have some great resources on frequency Lowering available on StarkeyPro.com this is one of the features that aren't used every single day. So sometimes when it's time to use that feature, you need a little bit of a refresher on how it works. So we have our frequency lowering quick tip that walks you through how to use frequency lowering and makes recommendations for how to set it if you're manually setting it. We also have a frequency lowering validation quick tip that walks you through how to validate frequency lowering to assess the benefit to your patient.

So now we're going to transition to our next speaker and I'll go ahead and take the backstage.

Hi everyone, My name is Dr. AnnieRodriguez. I'm an audiologist and market development manager at Med El. First, I'd like to thank lawanda and Starkey for inviting us to be part of today's program. I truly believe our presentations are going to complement one another because we all share that same goal and it's helping patients achieve the best, best possible hearing outcome. And since launching our partnership last year, we've had the privilege of working together.

I've presented a couple times with lawanda and really we've been had that opportunity and privilege to help patients who have reached the limits of what hearing aids can provide. And through that Sarkia Meta collaboration, we've helped many individuals reconnect conversations, especially reconnect with

their families and the world around them in ways that they didn't think were possible. And today we'd like to build on that great foundation that just provided taking you on to the Next step of the Asian journey. So really looking at recognizing when it's time to look at and what options are available as part of the hearing health care continuum, cochlear implants should be a part of the conversation and an option for our patients. Of course, as we all know, hearing aids are usually the first line of treatment for a vast majority of patients with hearing loss.

But despite excellent technology and appropriate fitting, there is a smaller group of patients who continue to struggle with speech, understanding and communication. So today is to help you as hearing healthcare professionals recognize what patient may benefit from having station 9 minutes time evaluation and referring your patients for one. Because truly, sometimes the greatest gift we can give our patients is just the knowledge of the different options that are available that can positively impact our quality of life.

Okay, so now I'd like for everyone to think about the patients who we see over the next week. Not your obvious cochlear candidates, but think about the patient who keeps coming back for another hearing aid adjustment. Their hearing aids are appropriately fit and verified. Maybe you've changed the programming, adjusted the domes, their ear modes, their custom fitting. Counsel don't realistic expectations.

But they still tell you, I can hear people talking, I just can't understand what they're saying. So those are often the patients who deserve a closer look. And perhaps their particular case could lead to a programming conversation. And I want to emphasize something that's really important. Referring a patient for a cie, it's not the same as qualifying and referring to them for surgery.

A referral is simply just an opportunity for the patient to learn more, undergo a comprehensive evaluation, and then determine whether cochlear implant is an appropriate option. The goal for us is

just to recognize who deserves the opportunity to be evaluated. And as we go through today's presentation, I want you to keep all of those patients in mind. And our hope is that you'll feel confident knowing whether that patient is someone should be referred for a closer look and to evaluation.

One of the biggest misconceptions about cochlear implant candidates is that they walk into our offices asking. They come in, talk about communication and their issues. They tell us something like, restaurants are impossible. I can't eat dinners because I can't follow conversation. I'm exhausted after social events.

My spouse is frustrated because I keep asking them to repeat themselves. I keep turning my hearing aids up, but speech still isn't any clearer. So you'll notice that none of these patients or these common complaints are saying everything is quiet. They're telling us that they can hear speech, but they can't understand it. So that's an important decision.

These aren't complaints about loudness, they're complaints about communication. And when communication continues to break down despite appropriately fit hearing aids, that's often the moment to begin thinking about a cochlear implant evaluation. So why does that matter? Because hearing loss, of course, impacts so much more than just audibility alone. So when patients stop understanding speech, we all know that that begins to affect their lives, multiple sets of their lives.

And one of the misconceptions about code test results or a specific in reality, cochlear implant candidacy is much broader than that. When we're evaluating whether someone may be an appropriate candidate, we're certainly looking at traditional audiologic measures, such as our undated thresholds, aided speech understanding, and the amount of benefit they're receiving for hearing aids. All of those factors remain important. However, candidacy extends beyond that audiogram itself. We also need to understand the patient's hearing loss history.

So that includes factors such as duration of hearing loss and previous hearing aid use. Medical and surgical considerations are part of this discussion as well. And equally as important are patient so what are the patient's communications challenges? What are their goals? What situations are they struggling in despite of amplification?

Are they motivated to pursue additional intervention? And do they have realistic expectations for outcome? And then finally, practical considerations such as insurance repair requirements play a role in determining the path of treatment for patients. But the key takeaway is that cochlear implant candidacy is really a comprehensive evaluation of the whole patient, not just their hearing test. By looking at all of these factors together, we can better identify individuals who may benefit from a CI or for cochlear implantation and just ensure to refer for a full evaluation at the appropriate time.

So rather than asking does this patient qualify based off of one number, A better question is could this patient benefit from a cochlear implant evaluation?

So when patients stop understanding speech, the impact, as we know, far extends hearing. We begin to see kind of those ripple effects throughout our daily lives. Conversations with them becomes frustrating. They avoid restaurants, social gatherings, and even phone calls become communicating makes communication just feel exhausting. At work or in school, they may struggle to keep up, lose confidence, or even withdraw from participating altogether.

And many just tell us they're simply tired at the end of the day, not because they're physically active, but because they spend every conversation working so hard just us to understand. And that's what we all know as listening effort. And it's something many patients don't even realize they've been living with. The issue is, or often no longer is just being able to hear audibility. The issue is that clarity, especially in those high frequencies when those are affected and when hearing aids have been optimized, the communication continues to be continuously decline.

That's when it's time to start thinking beyond. The unfortunate reality is that many patients continue living like this for many years before anyone even talks to them about a cochlear implant. That's why, as we all know earlier, recognition and referral matters so much when it comes to outcomes of our patients. And as we just discussed, when communication begins to break down, the impact nature far beyond the hearing. Again, unfortunately, many patients continue to struggle for years before ever learning that another option exists.

The good news is that today's challenge isn't really the technology itself. Cochlear implants have transformed the lives of hundreds of thousands of individuals worldwide. The technology has advanced tremendously. The challenge lies in recognizing the patients who may benefit from taking that next step and ensuring they have the opportunity to timely referral and evaluation just to know their options. And many of these patients also may assume their hearing is not bad enough.

Others believe that they're maybe too old or that age is a factor and barrier to CI. And as hearing healthcare professionals, we're all uniquely positioned to change that. We're often the first to recognize when a patient has speechless limits. And by recognizing those patients earlier and then starting that conversation, we can help them connect to a patient, Just giving them the opportunity to learn whether it's a right option for their particular communication needs. And this challenge isn't limited to adults.

Our kiddos experience this as well. Despite decades of evidence demonstrating the benefits of cochlear implantation in children, only about half of eligible children in the United States receives sti. Again, the technology isn't the barrier and opportunity lies in identifying children sooner, recognizing when hearing aids are no longer providing enough access to sound and speech, and making sure that families are aware that grant evaluation is an option. Whether we're hearing from adult or a child, the goal is the same, you know, helping patients receive a right technology at the right time.

All right, so the question becomes, well, how do I recognize these patients in everyday practice? And the good news is that you don't have to rely on your instincts. There are simple evidence based guidelines that have been developed to help you and to help identify candidates and patients who may benefit from learning more about cochlear implants. One of the most widely recognized schools is known as the 6060 guideline. And it's designed to do exactly that.

Help guide and recognize patients who deserve a competence that Cochrane evaluation.

So how do we recognize patients who may benefit from cochlear implant evaluation? Again, fortunately, you don't have to rely on aspr. One of the simplest and most widely used tools available is that 6060 guideline which is an evidence based tool to identify patients who may benefit from a Cochrane. This was recently revised and updated and I find it very easy to remember. So refer any patient with an unaided care tone average of 60 db HL or greater at 5, 1 and 2 or an unaided recognition score of 60% or less.

So this suggests that the patient may benefit from a comprehensive over evaluation. And I do want to emphasize one very important point. The 6060 guideline is not a candidacy criteria. It doesn't tell us who should receive a cochlear implant. It's simply an evidence based screening tool that helps us recognize, okay, this patient deserves a closer look and should be referred for cochlear implant evaluation.

It's an opportunity for the patient to receive additional testing, learn about their options and determine whether cochlear implant is the appropriate path forward for them.

And just as the 6060 guideline gives us a simple way to recognize adults who may benefit from a cochlear implant evaluation, we now have a similar evidence based guideline for children and it's called the pediatric 360 guideline and concept is just as straightforward. So if a child meets any of these three

criteria, it's appropriate and a cochlear implant evaluation should be considered. So these criteria are an unaided 4 frequency pure tone average of 60 dB HL or greater, an aided speech intelligibility index of 0.60 or less, or a word recognition score of 60% or less. Again, the goal isn't to memorize these numbers, but really truly understand and being able to recognize when a referral for a cochlear implant inauguration is appropriate. And the takeaway is that now we have clear evidence based guidance to help identify children earlier before any delays in speech and language development become more difficult to overcome.

All right, so now that we know how to recognize a patient who may benefit from a cochlear implant evaluation using that 6060 guideline for adults and a pediatric 360 guideline for children, let's say you've identified a patient and they've been referred for comprehensive cochlear implant evaluation, what's next? A Question we often hear is what actually makes someone cochine candidate? And the answer is that candidacy again is comprehensive. It goes beyond that omnogram. So let's take a look at factors that are considered during a cieva along with Med El's current FDA approved indication.

And one of the reasons earlier evaluation is more important than ever is because cochlear implant candidacy has continued to evolve. Many adults who may have not qualified years ago may qualify today under our current fda. So candidates now with moderate to profound sensorineural hearing loss can benefit from men else industry leading cooperation implant algae. So when considering men for your adult patients, candidacy generally includes adults 18 and older with moderate to performances to neural fear loss who demonstrate the minute benefit from really fit hearing aids with a low frequency PCA at 2, 5 and 1000 Hz, greater than 40dB and no better than 65B HL at 3000 Hz. Parents and message understanding that also plays an important role with FDA approved indications including CNC recognition scores of 50% or less in the year implanted and 60% or less in the opposite year.

So again the key takeaway is memorizing numbers is just to simply recognize candidacy has expanded significantly so allowing even more patients to be considered for a cochlear implant than ever before. And just as we just as we've seen expanded access for our adults, we've also seen important advances in pediatric cochlear implants. So MEL is data approved for the youngest and broadest pediatric cochlear implant indications allowing children to be considered as young as 7 months of age. So today's indications also include many angel children with residual hearing who may not have been considered candidates in the past. So why is this important?

Because we know that early access to sounds during those critical periods of speech and language development can have a profound impact on our children's communication outcomes. And the key takeaway is that children who continue to struggle despite appropriate hearing aids should be evaluated sooner rather than later. Further evaluation provides families with more options and the best opportunity to support their child of studying and language development. And recognizing the need for earlier cochlear implantation, Med el conducted a multi sensor study demonstrating that cochlear implantation is both safe and effective in children as young as 7 months of age, which is reflected in this approval that we got. In addition, the approval includes some of the least restrictive speech perception criteria in kidney patients.

So for children a year and older with residual hearing candidacy has now expanded so allowing us to consider implantation earlier for patients who may not be receiving sufficient benefit from hearing aids and thinking for about children 6 years and older. Pediatric candidacy now aligns with our expanded adult indications. So again creating just more consistency and access across age group groups. And at a broad glance this is what all of our indications look like cover a large age range and hearing levels. So our pediatric indications are for seven months.

So we're thinking about seven months to 12 months is profound sensorineural hearing loss. From one to six years it's moderately severe to profound sensorineural hearing loss. And then from 6 to 18 years it's moderate to profound sensory neural hearing, talking about speech. So a child without language skills, we monitor that as limited progress or plateau in others for skill development. And if they have language skills, children from 1 to 6 years old it is less than or equal to 40% word recognition.

And then children from 6 to 18 years old is less than or equal to 50% word recognition. All right, so now let's take a minute to focus on SSE or the SSD part of this slide.

So single sided definite is often called ssd. As we know, an asymmetric hearing loss is referred to as ahl. Many of these candidates may consult their qualify for a Cochrane plan and they stop inquiring about it. After disappointed trials with hearing aid or cost solutions, they still report real struggles in background noise and localizing environmental sounds, two very well known benefits of biomarker. So SSD or ahl of course as we know also impacts quality of life for social interactions to strengthen the teeth, especially those that invoke a sudden sensory hearings.

And in 2019, Med El received new and groundbreaking FCA approval for in quarantine persons 5 years of age and older who has synthesized deafness, SSD or asymmetric hearing loss. And note that the fitting criteria for ground loss includes a pta rated at 980 dB at 512 and 4000 Hz.

And another question we often hear is what about patients who still have some musical hearing? Historically those patients may not have been considered for a cochlear implant, but today that's no longer the case. Med El's Electric Acoustic Stimulation, or EAS for short, combines a hearing aid and a cochlear implant in the same ear or the same technology. This allows patients to continue using their natural frequency hearing while receiving cochlear implementation for the higher frequencies where they need it most. Approved in the US in 2016, EAS candidacy for adults with more residual hearing and aided word scores of 60% or less.

So when using our Flex series electro portfolio flex 20 and flex 24 electrode arrays. MED El has demonstrated long term hearing preservation, allowing many recipients to continue benefiting from their natural hearing even after implantation. So this is just another example of how cochlear implant candidacy has expanded. Patients with residual hearing who continue to struggle with speech understanding, despite appropriately fit hearing aids may still be appropriate candidates for comprehensive cochlear implant evaluation. Again, the key takeaway is that residual hearing doesn't necessarily exclude someone from cochlear implants.

And as candidacy expands, we increasingly see patients with meaningful residual hearing. Right. So preservation, separation of that hearing becomes extremely important. This is where electrical design and surgical technique play an important and critical role. Med El's electrode design was specifically developed to maximize preservation of that existing low frequency hearing possible.

With that being said, with our electrical design, Med El is the only company to be approved by the FDA to preserve existing hearing. So the conversation is no longer hearing versus no hearing. It's about preserving what patients have while providing access to what they're missing.

Coverage criteria are another important piece to this puzzle. So it's important to realize that Medicare has its own guidelines for CO and candidacy. And Medicare criteria allows coverage for patients with best aid scores of 60% or less with a bilateral moderate to profound sensory hearing loss. They also take into consideration hearing benefit, communication challenges, medical stability, and then the patient's ability to participate in rehabilitation.

All right, so as we wrap up, I'd like to leave you with just a few practical takeaways. Remember, hearing aids have been. Communication continues to be a struggle. If patients continue to have difficulty understanding speech, if their employees are expressing concerns, if you see them qualify for a 60, 60

or pediatrician, or you simply find yourself wondering whether someone may benefit, that's exactly the right time to consider a cochlear implant evaluation.

And I'd like to leave you with my final thoughts. Truly, the best outcomes isn't choosing period or cochlear implant or hearing aid versus a CI. The best outcome is ensuring that every patient receives the technology that provides the greatest opportunity for communication success. Sometimes that's hearing aids, sometimes that's cochlear implants. And as audiologists and hearing healthcare professionals, our role is recognizing when communication is breaking down and starting that conversation early.

So earlier identification, earlier referral, earlier access, and then ultimately that's going to lead to better outcomes for the patients and the families we serve.

On behalf of Med El and Starkey, we would like to thank you for coming to our program today. Yeah, thank you so much, Annie. And thank you to all our attendees for joining us today and taking time out of your busy schedules to attend this course. I've been monitoring the Q and A box and I don't see any questions that have come in. So we will go ahead and take that opportunity to end the course.

And once again, thank you all for signing on and joining us today.