

Date: 4-22-13

HOPE Red Flags: Barriers to Optimal Auditory

Development Part I

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>> Cathy: This is Cathy Luckoski with Cochlear Americas. I'm a HOPE specialist and welcome you to the online classroom. We will begin in five minutes, and I can see that there are many people who are joining us today for the presentation, this is very exciting. Just before we begin I have a couple things that I would like for you to do. First is to respond to the two questions or polls that Melissa Freund from AudiologyOnline has put on the screen and leave these up for a few minutes. I think there might be something with the audio. I think my microphone may be a bit loud. We try that now. I apologize if I have a little bit of feedback for a minute, made adjustment to my microphone, however, so if you are having any trouble with the audio or with viewing content on the screen, please just let us know and we will get in touch to work

out technical issues, but in the meantime after you have answered questions for the two polls that are on the screen, I want to encourage you to download the two documents that we have available in the file share box on the left-hand side of the screen. One is a handout for today's presentation, and the other is a certificate. We will be back on the air to get started. Thank you for coming here today.

>> Melissa: I saw a note come through. Let me know if you still hear that breaking up the sound. If anyone is having audio issues while listening to my voice, make sure you have other web-based applications closed. Goes for e-mail, Skype, instant messenger, web-based phones, whatever it may be, turn those off. There are many speakers today and they are all over the country, so we are completely honored to have them here with us and make sure everyone has a very good talk. Again also it is best to be hard-wired if possible and we are recording today's two classes. So for whatever reason if anyone should run into any issues, the recording courses will be available by tomorrow afternoon and on AudiologyOnline and also on the Cochlear HOPE website. Again, if anyone has any comments or questions, please type them in now, and if you are having technical issues contact AudiologyOnline at 1-800-753-2160. Thank you so much.

>> Cathy: Hello, everyone, and welcome to Cochlear Americas HOPE presentation. My name is Cathy Luckoski and I'll a HOPE specialist and moderator for today's event. Today's presentation is unique from other HOPE Online discussions in that it is occurring in two parts. Both are each 1 hour and recorded today at separate times. You're encouraged to view both parts either live with the presenters today or from the HOPE Online library at [hope.cochlear.com](http://hope.cochlear.com) and just a few minutes I will turn the microphone over to the guest presenters for the first part of Red Flags: Barriers to Optimal Auditory Development Part I, but first there are a couple things to go over in the online classroom. I want to point out in the upper left-hand corner there's a Q-and-A box, and this is where you will type your questions or comments at any time during the presentation today. We to have a full classroom, and I was pleased to see that we have a nice mix of professionals, audiologist, speech-language pathologist and auditory-verbal therapists as well as a few family member of someone who might have hearing loss. But that also means there will be possibly many questions coming through today, so be patient, we will get through to the question as quickly as we can and possibly we will save many of them for the end of the presentation. Just below the Q-and-A box there's a file share box and holds two handouts for you, one is particularly on the

content being presented and the other is certificate of participation for you to download, complete and keep for your records. Continuing education credits are being offered for our presentation, and these are managed through AudiologyOnline, so just before the file share box you will see a note box with information on contacting AudiologyOnline to get more details about continuing education units. We are proud as a company to offer a collection of resources through the HOPE program. All of these resources are designed to help cochlear implant recipients achieve the personal best in listening, and there are many resources for all age groups that you find at [hope.cochlear.com](http://hope.cochlear.com) and I encourage you to view the web page after the presentation to see what we have scheduled for upcoming events. Now, it is my pleasure to introduce our three guest presenters today. Jane Madell, Sylvia Rotfleisch and Joan Hewitt. Dr. Madell is an audiologist, a speech-language pathologist and certified auditory-verbal therapist for clinical research interest include pediatric issue in hearing loss, in particular severe to profound hearing loss and also treatment options. Dr. Madell has published several books, book, chapters and articles related to pediatric hearing loss and consults nationally as well as internationally on issues related to this topic. Sylvia Rotfleisch is private practice audiologist and auditory-verbal therapist in

Los Angeles. She has nearly 20 years of experience in pediatric hearing loss and also published on related topics in journals and in instructional books and in addition to working as an instructor at several universities in southern California. Dr. Hewitt is a pediatric audiologist with 25 years of experience in diagnosing and treating infants and children with hearing loss. She has advanced degrees in audiology and also auditory oral education and board certified with the specialization in cochlear implants. We are fortunate to have all three experts in the HOPE Online classroom today and turn the microphone over to Dr. Madell.

>> Jane: Hello, everyone, thank you for joining us today. We have had some technical problems both -- both Cathy and I had internet problems and so far I assume you can hear me and everything is okay. We will try to move ahead quickly because we have a lot of things to cover. Two part workshop and had hard time doing this as two separate workshops so hope that everyone attending will do both of them and discussing primarily audiology issues and speech-language pathologist and teachers and families and part two discussing primarily speech language issues but again intended for both audiologist, speech-language pathologist, teachers and families. So ideally it should would be hours and we are hoping that everyone will

attend both of them. So let's get started and talk about what our goals are here. You know, we all work with lots and lots of hearing impaired kids, and things are fine for most kids, but some kids as you know are super stars, they just seem to really shine and other kids really struggle so why is there such a huge variation.

Sometimes we know what the reasons are but sometimes we have kids with hearing aids, are in a good therapy program and kids airports doing well, and we know all kids are not equal but why are they not equal and what are the things that we do know about what's making it work? Sometimes we know exactly what the problem is. They are not hearing well with the technology. If you have threshold of 40 decibels with technology you will not be hearing soft speech, missing more than half what is said around you so we know that's a problem. Sometimes you're not getting appropriate therapy. Kids that don't get any therapy and we have kids who get therapy that's visually based and not auditory based and in that case we can't expect them to develop auditory skills. And sometimes we have therapy in which the parents aren't involved, kid goes to therapy twice a week and hope the parents know what they are doing and other kids with developmental issues and impede with what they are doing and sometimes kids hearing 20s dB across the board, good auditory based therapy, parents around

involved and aren't any other issues and still aren't making progress. Need to know what it is. Our philosophy we believe firmly if a child is not making progress, there's a reason, and it is our obligation as professionals working with children with hearing loss to figure out what that reason is. We can't as clinicians say I did my cochlear implant mapping or doing job with therapy or doing a job in the classroom and I know that -- so I have done my job and that's the end. We have to work as collaborative team when child is not doing well to figure out what the problem is and to figure out what has to happen. We need to include parents because parents are a critical part of the time. No matter how many hours a day kid is in therapy, not as many as kids are home with the parents and believe it is almost always possible to succeed we work together and figure out what is wrong. So just as reminder about why audition is important we know all the research hearing is best way to develop speech and language skills. Cannot develop spoken communication well if you don't use audition. We also know that hearing is not about the ears, it is about the brain. Hearing is avenue to auditory brain development. Technology -- the reason we use technology, reason we use hearing aids, cochlear implant and FM systems is because they are brain access tools. Our goal is to get the technology so that

to work well so that child's brain is developing. We want them to have a developed auditory brain. We also know that in order to develop auditory brain you have to have access to intelligible speech. It is not enough for it to be loud enough. It also has to be clear. And we know that the auditory cortex is what is critical for making sure that the -- that speech and language is clear and developing. So let's talk about what the very basic red flags are. If a child is not tolerating their technology, if they are not -- if they are not comfortable wearing it, that is obviously a very big red flag. It may be that it is too loud, so uncomfortable and maybe that it is too soft and child not hearing with it and not tolerating it. It may be -- lots of times I hear people say well, the child -- it is a behavior issue, just not cooperating, but before we say it is a behavior issue, we better really know for sure it is a behavior issue and better really make absolutely certain that we can get this child to hear and to hear well. If the child has behavioral responses, are the responses too poor so we know the child is not hearing, is he hypersensitive, eye blinks? A child doesn't pull hearing aids off for no reason at all, so if they are pulling them off, our job to figure out why. So children hear well with their technology, we expect them to want to keep it on. If they're not keeping it on, there's a reason. And if their parents are concerned about their development, there's a reason. Parents

want to believe everything is good. We all know there's some parents who may say he got implanted last week, why isn't he talking in sentences today? That's not what I'm talking about. If a child has been in therapy and mother saying you know, he is is not learning, he is not developing new things, having trouble getting him to hear, we need to listen to those parents. We need to, first of all, figure out if it is possible this is a realistic concern and we need to give the parents the benefit of the doubt and assume it is a realistic concern and pay attention to it. So let's start off by talking about some of the interventional red flags. Audiologists need to pay attention to more than audiology. The good pediatric audiologist are people who also know enough about intervention to know when intervention is appropriate or when it is not appropriate because if the intervention isn't appropriate, it doesn't really matter how much technology we have and how good the technology is fit. If the intervention is not working, the technology alone is not going to meet the child's needs. Audiologist need to recognize when intervention is good and also when it is not good. Intervention is ineffective, it is not appropriate if parents and family are not involved and they don't know what's happening. When I say to a parent, what is speech therapist working on, if the parent can't tell me, that's ineffective intervention, don't care how good the therapist is, if patients can't follow it

up, it is not effective, does the teacher in school know how to, who is monitoring the technology and are we sure they know how to monitor it? Is the therapy following a normal developmental model and are we sure it is stressing audition as basis for speech and language, not sure it is visually based therapy?

Audiologist can support effective intervention in number of ways. We know that hearing loss limits access to speech and language and hearing loss will create a speech and language delay if there isn't appropriate intervention. We want to know that therapies affected because combined auditory component because it follows a normal auditory developmental sequence because they are developed through the auditory modality, because the child has -- the family has parental guidance and coaching so they can do all the intensive work at home. The therapist should really be the coach and the parents are doing most of the work.

Audiologist can be -- can take a big responsibility by checking and making sure that everybody knows that the -- how to check the equipment, how to make sure it is working and what to do when it isn't working. And that's got to be more hello, do you hear me? We have to know it is clear, hearing low and high frequency sounds and has to be more than the Ling sounds which is critical but not sufficient. Audiologist can help by making sure -- by teaching people how to check. The

Ling sounds are good, they provide low, mid and high frequency stimuli, but we also need to know that the child can perceive a sentence which is a more complex message. We need to know whether they can hear when standing close to them and when standing ten to 15 feet across the room. We want to know that the people who are testing the equipment everyday can identify what the child is hearing and if the child has a drop in function we want to be absolutely sure that the person that's listening can identify the drop in function and can notify the audiologist. We want to know who's helping teach the child how to monitor equipment and how to tell us when something is wrong. Audiologist should also be very well aware of problems that a child might be having and need to encourage both the parents and the clinicians to report to us. Sometimes this is done through a checklist that we can give them to bring when they do an evaluation and sometimes just by discussion. Is the child hearing high frequency sounds? Child may be responding to voice and repeating some basic words but not hearing in the high frequencies. This child may have aided threshold of 4,000-hertz of 40 dB, will not hear TH and all kinds and want to alert the people who are testing the child everyday and doing therapy with the child everyday so that they can tell us whether the child is hearing high frequency and distorted vowel production and whether

they are dropping consonant on a consistent basis and want to know if the speech reduction is deteriorating or speech perception is deteriorating and if kids are saying what more often, reporting interference in the equipment or if you see big changes in performance we want everybody to be aware that every single person working with this family is responsible for knowing how the child is performing in every situation and for reporting it. We want to be sure that parents are involved. We need to ask parents how they know what's going on, how does therapist at school communicate with them. Are they involved in therapy and how often are they involved in therapy? So we really want to know what's happening and want to make sure the parent understands that in our point of view they need to be involved in therapy. When we have questions about whether the equipment is working, we need to be sure that we act on it very quickly. When in doubt, change it out. Ensuring that we need to -- we the audiologist need to be able to ensure that the child hears throughout the frequency range including four, six and 8,000-hertz. We want to be hearing soft speech because if they don't hear soft speech they will not overhear conversations, they will not have incidental learning and more than 70% of what children learn, they learn incidentally. If our children aren't adhering soft speech they will not learn incidentally. Also want them to hear a noise and like

them to say they have controlled the world and world not a noisy place, that is not -- the world is a noisy place and need to be able to hear that way and discourage kids being visual and saying don't use the eyes to learn but saying you should be getting most of what you're getting by listening and work with kids and have them playing with whatever we are playing with and have us talk to them without them looking at our face. Make sure whoever is talking to them talking in a natural voice, not exaggerating, not speaking in a way that sounds funny. If sounds funny to you, surely sounds funny to the kid. I will turn this over to Sylvia now that talk about speech and language red flags.

>> Silvia: When we are looking at speech and language we really need to make sure the things are developing an appropriate manner. When we are looking at and listening to a child make sure that with technology we have seen improvement in the voice quality and that we have a good voice quality and poor voice quality is red flag when they have appropriate intervention and also looking at the development of the speech sounds.

Looking at variety of phone seems and looking developing in the appropriate sequence and we are also trying to make sure that the we are not getting any gaps in the development of consonants at ages when they should be appropriately developing, and also looking at abnormal or inappropriate developments of consonants

and consonants in an incorrect order or something like a nasal emission or a lateral S or other sounds that really are not developmentally appropriate. This is a chart we have seen and reference below, and gives you basic understanding what sounds should be developing and sequence. Those that aren't familiar with the table, the bar for each phoneme begins when 50% of children in that given age able to produce the sound and terminates when approximately 90% of children have developed that sound. So this just gives a basic understanding of the sequence of development. So if you have a child who's developing more advance sounds and not consistent initial sounds like B's or M's that's certainly a red flag. In terms of language development the standard is that we are expecting one year's growth in one year's time and we also are looking for accurate measures to assess that and we should be collecting data to determine that. Also whenever you see a determination of speech skills, that is not an acceptable thing to be happening in therapy. We are talking about either a criminal nation issue or production issue and again in terms of a change regression, regression is never acceptable and that would also include in language development so if you're seeing development in plateau or regression in the language that should certainly be a red flag to you and what we say is to collect the data points. Parents, teachers,

clinicians, all the informal and formal testing, need to make sure that we are assessing all different areas so that we can look at what's making -- where the child is making progress and where the child isn't and we really must test to begin to determine what is affecting the progress.

>> Jane: So if a child has appropriate parental and intervention support red flags point to technology issues. Said several times is speech and language perception. Very simply speech and language -- having a problem with speech and language there are four possible reasons, I didn't understand it because it was too quiet, I didn't understand it because it was too loud, I didn't understand it because it wasn't clear and didn't understand it because don't have the language development to do it, so how do you know the technology is working?. This may be the most important thing I want to say today. Measures and cochlear implant mapping don't tell us what the child is hearing. As I jokingly say get real air measures from a corps and how much is reaching the eardrum and doesn't tell you anything about how much sound is reaching the auditory brain and that is what we need to know. Cochlear implant mapping tells us how much electrical stimulation we are providing, it could be blow the child's threshold, way above the child's threshold or anyplace in between. We can't tell from looking how a

child is hearing. So very performance to look at child another way to figure out how the child is hearing. If child has hearing aids and -- if a child is hearing well, we will know more about what they hear and children tell us what they hear. As Dan Ling said children listen to what we say and we can find out exactly what child is hearing. When I was in graduate student when I interviewed child we draw audiogram from listening to the child's speech, and that may be one of the most valuable lessons learned and tells me something about what I expect is happening with this child and when we observe and understand and complete detailed audiological information from both -- working with the child and from all the people working with the child, we can figure out what the child is hearing. First we need detailed audiological information. We need unaided audiograms because we just do, although that's not how we man for the child's life. What we really need to know is how the child is performing with technology. Aided threshold 250 to 500-hertz to 8,000-hertz, maybe only 6,000 but ideally 8,000, certainly how cochlear implant how we know the child is hearing and when we do aided audiograms and find out the child is not hearing well enough so that we can expect them to hear soft speech we know right away we have something we have to fix. I know there are people who don't believe that doing it had that unaided -- that aided thresholds

are reliable but I need to say that I think that's wrong. I have been talking lately with a lot of people and I'm working on an article right now with Carol Flexor about this but there's a lot of research, an article just coming out and aided threshold and speech perception scores, so any doubt whether it is important, let me wage you, it is critical that kids are hearing and adults are hearing at 20 dB throughout the frequency range including the high frequencies. So first we want aided threshold with technology and we want them right and left alone. If you only test binaurally, you will not know if with one of the devices. We also then need speech perception testing. We need to do at least speech perception testing at a normal conversational level which is 50 dB HL right, left and binaural and also soft speech at 35 dB HL, and if you are not hearing soft speech you will not have incidental learning and that will be a problem. At least binaurally and time right and left separately, and we also need to do speech perception testing no noise and we are suggesting 50 dB HL at plus five signal-to-noise ratio because that's typical of what happens in a classroom and the noise should be usable noise which is -- which is going to be in my mind talk or babble. If child hearing too softly we want you to hear, if a child's hearing zero to 15 it will be too loud and some distortion and you want to be absolutely certain the child is hearing soft speech so if you have threshold

at 35 dB it will be too soft. ( whispering. ) and you want to know they are hearing it and able to understand. If they have poor speech perception at normal conversation or soft conversation or poor speech perception at loud conversation, you will have a problem and figure out what the problem is so you know how to fix it and talking about that and if child has poor speech perception for normal or soft speech or for words or sentences around that is a problem and need to figure out why and speech perception testing was done with appropriate speech perception test materials. If you use a -- the kindergarten word list on child in fifth grade, you're not going to get appropriate test results and PBK kids were developed for kids in kindergarten or first grade. Beyond first grade those words aren't testing what the child needs to hear in the classroom. If you're using the new chips which is -- as vocabulary three to five years on a child in fourth grade, you're not using an appropriate test that's going to tell you what the child has to hear in their everyday environments. So you need to know how the child is hearing in all the test conditions and also need to be sure that you have used the appropriate test. Joan will take over now and talk about how to address some of the issues.

>> Joan: Good morning and good afternoon. We are first going to talk about what red flags indicate the speech too soft and how do we address these and as

we talk about them, it is really important that not just audiologist be thinking about these indications and audiologist will correct them with a technology and also that speech pathologist and AVT teachers and parents be paying attention the same things because it is very performance information to bring to the audiologist and program technology more appropriately and talk about when sounds are too soft and under amplification and under stimulation and provided for you charts to use and not going to go over everything in each chart and highlight a few things. First of all, if a -- if a child is constantly removing technology, that can be an indication that things are too soft. And remove it it is something that is wrong. If not benefiting the child, then they will take it off and just a toy or a chew -- pacifier, something to chew on, so that is the red flag. Children who are very visual often are under amplified or under stimulated. If when the child puts on their technology, his or her technology, his vocalization does not change at all. That's a huge red flag, see a change in vocalization and speech quality when the technology is on and finally -- not finally, very importantly we have observed a little bit of difference between voice quality with hearing aids and cochlear implants when sound is too quiet. For children who wear hearing aids when the sound is too quiet, their voice is often too quiet, and so they will actually raise

their voice by making their voice louder, able to hear it better. So for hearing aids red flag is child who is talking very loudly, that may mean that their hearing aid is not loud enough for them. On the other hand, we found the opposite with cochlear implants. When the cochlear implant is under stimulating then it appear to the child that everyone is very quiet or whispering so the child is often very quiet and has a whispered voice because they are imitating what they are hearing, and often raising their voice doesn't change that so their voice can be very quiet and important to observe the distinctions and obviously speech and language are not developing or slowed, this is a big red flag. One of the things to test for in the booth is looking at speech perception, and at 70 dB, this would be instance where we would test loud speech and if we tested loud speech and found out that the child speech perception score improved by at least 12%, which is statistically significant, then we have documentation that sound is too quiet at a normal conversational level and soft speech level and we do need to increase the amplification or stimulation. So what do we do if we it had if we have found that a child that sounded too quite for a child. Well, the first thing is always to check the technology and make sure the hearing aid or cochlear implant is working correctly. We teach parents how to check not only the hearing aids but also the cochlear

implants, and we see a lot of families for second opinions and I can't tell you how many of them were never shown how to check the implant processor initially. So it is so important audiologist that we speech the parents and anyone else working with the child how to check that technology everyday.

Obviously verify unaided threshold to make sure the hearing hasn't changed. We want to check our speech perception after we have done changes, especially soft speech to make sure the child is hearing well. We can also do some phoneme perception testing like the Iowa medial consonant test to make sure there's specific areas of the speech frequencies that were under-amplifying. Obviously we want to reprogram the cochlear implant or the hearing aid if we have tried reprogramming the hearing aid and it is not working, then we may want to try a different hearing aid and if no hearing aid seems to be helping, then obviously we want to consider a cochlear implant evaluation if the child is not able to hear soft and normal conversational speech with a cochlear implant. This is a case of a child we saw a year ago. He was aided at three years six months, he was not identified with newborn hearing screening, he was five and a half when we saw him, and he was referred through his school district. This was the audiogram that the parent had provided to us when we first saw him, so he had a mild to moderate

hearing loss and binaurally thresholds were provided at the center where the hearing aid were fit. As Jane said with the binaurally -- binaural threshold, we don't know if one hearing aid is providing that, if one hearing aid is providing some frequencies and another is providing the other. So we tested him and did speech perception testing. His unaided speech perception for single words was 52% in each year and aided SRT is 25 dB. However, when we did aided speech perception testing, it was 32% in each ear. Now, if he was able to get 52% unaided we would hope the aided normal conversational speech would be as good or even better. He wasn't able to get any soft speech although the HINT sentence scores, word scores were very good, 78 and 80%, so this tells us this is a child who has a good command of language and is able to use his brain to fill in things that he doesn't hear but speech was obviously too soft for him. So we reprogrammed his hearing aids and also got him new earmolds, saw him back two weeks later so he didn't have a lot of time to learn new language. With the new programs his SRT did not change a lot, 20 dB in the right and 25 in the left and huge change in speech perception. His aided normal conversational went from 32% to 86% in the right ear and 84% in the left ear, saw speech which was 0 percent, had no access before. Now 72% and 84%. And even his HINT sentence scores went up because

he didn't have to work as hard brain wise to get the information. So what have we learned under-amplified or under-stimulated and the hearing aid or the CI program to the computer dictates may need adjustment, that's just an algorithm developed by the computer. It does not necessarily mean that it is going to be the best program for that child. Especially with hearing aids. Adult algorithms for some manufacturers are used even for children and they may underestimate the overall gain or especially the high frequency gain that children need. It is also essentially to make sure that the battery can support the program as hearing aids are getting smaller and smaller and we are seeing hearing aids that use 10A batteries, they may not be able to support the program the child needs, especially if we are going to combine that with FM. Also with a cochlear implant it is important to make sure all electrodes are in compliance. It is also important to remember in a hearing aid if we run the feedback circuitry we may be significantly reducing the gain. Also let's make sure that we have good fit earmolds and using CFA or Libby Horn technology when we can. So what happens if speech is too loud? What indications do we have that that might be occurring. Again, children removing their technology. These children do not tolerate their technology often. We had a child in this past week on the case history form parent wrote that they spent the

first 15 days with a cochlear implant holding the child down the entire day while they put it on her. After 15 days the child resigned herself to wearing it. It was now a year later and she would sit on her bed when it was time to put the implant on and silently cry everyday. That is a huge red flag. Any startles crying or eye blink to loud sound is not acceptable. The technology is too loud. These children are also quite etand with drawn. Their own voice can be incredibly painful to them so they can be silent. Again, we can see the difference in vocal quality between the hearing aid children and the cochlear implant children. For the hearing aid children voice can often be very quiet. They are trying to bring down the intensity of the signal and so they will often be quiet or whispering. However, the cochlear implant children are often matching what they hear and for them there is no soft speech. Everything is loud, and sometimes groveling, and sometimes these therapists say the child's voice is always loud. When I tell them to quiet and bring their voice down, they can't. If I whisper, the child vocalizes instead of whispering. These children can have poor consonant development and we can often see receptive language development but no concurrent expressive language development. This is a huge red flag. Again, we can use speech perception testing for these children, their soft speech perception may be better than the normal

conversational speech. Or if we go to loud speech perception, we may see a huge decline or they may not even be able to tolerate being in the booth with a presentation level of 70 dB. So again, we need to check the technology. We need to verify our thresholds again. Let's check loud speech. We can check phoneme perception to see again if the overamplification and stimulation is in specific areas of the speech -- speech banana and then we can reprogram. A case went to present to you is 41-year-old patient who was congenitally deaf, he was one of the patients who had every single solitary drop out of his hearing aiding and did very well with them. He was fully mainstreamed throughout his childhood, went to ivy league school. He was implanted at age 40. And his auditory-verbal therapist had referred him to us after he had been implanted for a few months. He actually had open-set listening very quickly with implant about a month to six weeks but he was having significant confusion with vowels and low-frequency sounds. So when he came to us, his aided thresholds with his implanted are the red C1 thresholds on the audiogram. We ran neural responses and found that his thresholds were 200 to 300 clinical units above his neural responses. He also admitted to us the first day that we saw him that when he had recently gone to a loud restaurant bar that he had had facial stim. He had

had eye twitching when he was in the bar area and told him needed to turn things down. We turned the stimulation down quite a bit and his new thresholds were the C2 thresholds. He initially told us it was too quiet, he didn't want it there. But we suggested he continue to wear it. We saw him back in a couple weeks to do testing. He had had testing with his old map at the first center he was seen at. And he had had a speech awareness threshold at ten dB, SRT was not tested and we did have HINT adult sentence testing word score of 66%. Now, first of all I think it is a red flag when we have a patient -- adult patient who has 66% open-set recognition and we are doing an SAT speech awareness and not SRT. Saw him and put him in the booth with the new program, SRT was 25 dB, we did not do a speech awareness threshold and even though we felt speech was quieter, speech perception went up 22%. So often reducing stimulation can eliminate distortion as Jane said and can make speech clearer. What have we learned? Never assume of the hearing test or loss and make sure testing to do the right audiogram and not all hearing aids can fit hard of hearing losses and long-term hearing aid user, especially with severe to profound hearing loss, that hearing aid has probably distorted the perception of loudness and we have concerns that patients that have been long-term deafened are not very good at rating

loudness because they really don't know what soft, normal and loud should be. And for bilateral patients it is very important to assess both separately because there will be binaural summation, so we need to know about each separately. So what if speech is not clear? First it is important to remember although the Ling sounds are very helpful in assessing across the speech frequencies that there are 44 phonemes approximately in English and we need to make sure patients have access to all of them. We need to assess the majority of consonants and vowels as needed since technology today provides soft and distant speech, make sure we are assessing SLP's and teachers and parents close-up and added distance of 10 feet or so. And then audiologist, we can use frequency allocation charts to identify where we may need to make changes., and we have found that programming changes can and lead to immediate speech perception changes. We do not need to let patients go home for a month and get used to it. So poor clarity, a lot of things to indicate poor clarity, but the basic summary of this entire slide is that unusual voice quality, inconsistent speech production, unusual speech production is always a red flag. So we need to make sure we assess soft speech, normal conversational speech and in noise to make sure that all of those are clear to the patient. So if we have poor clarity, what do we need to do? Always check

technology, verify the audiological speech perception at the different levels and in noise, reprogram and try different technology or proceed with a cochlear implant evaluation hearing aid provide speech clarity. So what have we learned? We learn that it is the speech perception testing which can help us fine-tune that hearing aid program or cochlear implant programming and with cochlear implant and hearing aid and if there are too many lows with cochlear implant we will see problems and mid-frequency gain can help in lots of instances. We have also found that shaping to neural responses can provide improved clarity. Articulation teachers, parents, articulation errors can be hearing errors. We recently completed a retrospective review of 230 mappings of cochlear implant patients to determine the most common errors in programming -- when a child needed programming and the majority of errors were not identified by the Ling 6 sounds. We found if there were vowel errors, significant vowel confusions this indicated an overall need for reprogramming and often need for de-sensitivity stimulation and the consonants noted on the slide were the consonants that were most often misarticulated or misheard when we needed to reprogram and as you can see these are not necessarily the Ling sounds, so we are hoping that people will start checking all phonemes with children

and not just the lings. These indicate some of the errors that we saw, so Z heard as an M can be 69% of the patients seen had this confusion and 84% of the time we were able to correct that right during the mapping. Read through the chart and see the other misarticulation or mishearings that we noted and correct that right during the mapping. Also found that turning up was not necessarily the cure and sufficient errors -- S errors, 48% were decreasing the stimulation what helped, not increasing. Cochlear implant failures, we just wanted to say a quick word about it, these are every parent's worst nightmare and we always want to make sure we done everything else. Less than 1% fail but lots of external parts fail so please think external equipment before you think internal equipment. If a child can hear and any of the red flags that we have discussed, any of the red flags that we have discussed are occurring, then we would recommend programming before any type of integrity test. And one clarification on the previous slide. Decrease in stimulation on the high frequency electro-with S, not overall decrease with stimulation was what we found, and then quickly we are going to talk about binaural balancing, what happens when sound is not balanced. We do know with cochlear implant and hearing aids that patients will have a binaural summation, sound will be louder with two than with one and easily check if it is a balanced. You

can ask very young children which ear is louder, this one or that one. Correct answer is I don't know. Sound is balanced, child shouldn't know. And we do know that if one side is significantly louder, the child may not even be able to hear what's on the other side or significantly louder sound may interfere. So if a child consistently localizes to one side, consistently removes one device, startled when the second device put on, when they don't want to replace the head piece or the battery on one device, then we have an indication that sound is unbalanced. We will go through regular checks, checking each ear separately and also in this point want to check in noise because often in quiet the child can handle the distorted sound or overall intensity but now we may see the decreased significantly in noise. We have to remember that the quantity of -- quantity in quality and loss quality is not the same and quality on both sides is good and children will try to eliminate the poor quality sound and it is always, always, always important to reprogram the second side of hearing aid or cochlear implant if a second hearing aid or implant is added because the child will have binaural summation and will be delayed and sound quality will be good with both implants if both devices are balanced. And very quickly children should benefit from the second implant as long as the devices are balanced, even if the new ear does not have open-set

performance. And now I will turn it over to Jane to summarize things for us.

>> Jane: So let's just talk about teamwork and what we need to do to make sure that all of this is working well. Everybody who's working with kids obviously needs to like kids, but the thing that we think -- you know, you need to like kids, like what you're doing, need to know a lot about audition and you need to -- there are two real things you need to do. You need to not just assume that it is working because you did whatever you learned how to do wherever you learned how to do it. You need to always be thinking outside the box and trying to figure out what might get better and even more important we need to realize that we don't have all the answers about whatever it is that we are doing and that we can only be successful when we work as a team. The reason Sylvia, Joan and I like to work together is because this is what we have been doing, listening to each other, when Sylvia looking at a kid, she can say look, this is what they are not getting and Joan and I can figure out why they are not getting it. We need to respect the other professionals that are working with us and when speech pathologist or auditory-verbal therapist says to us, this child isn't hearing S at more than 3 feet, weigh can't say but I programmed the cochlear implant. We need to say okay, figure out why, need to do the testing withy need to do and all the work

we need to do to make sure that we are providing the child with what this child needs. We need to be collegial, listen to everybody, need to respect each other and listen and don't put the parents in the middle. Can't ask parents to transmit information that's negative. If one clinician says I think that person is wrong, not saying we shouldn't be honest with parents, but we shouldn't be asking the parent to tell the next -- the other therapist if a speech pathologist thinks the audiologist isn't doing a good job or vice versa, shouldn't be asking the parent to tell that to the other professional. If I'm having trouble with the way the other professional providing services, I have to be able to say that that person, something is wrong here, can we talk about it? Not give the parent the job of transmitting it, and when something does good, we need -- when someone doing well, we need to say thank you, you have helped fix what my problem was so that everybody is recognizes that the their work has been appreciated. I mean these are things we all know, but I think sometimes it is a problem. We hear freaky from people that their colleagues are not listening to them when they think something is wrong, and that's what we hope this will fix. So what are we saying, we need to listen to kids. Kids will tell you what they hear and don't hear. We need to monitor everything and check every piece of equipment if the progress isn't

optimal, assume technology first and try to fix it.  
Monitor the technology and change it if you need to.  
Monitor the therapy and change it if you need to and be sure that the parents and children are involved in monitoring everything. It takes a team to raise a child with a hearing loss. This field is constantly changing. I have been in the field for 45 years and let me tell you, it is just -- it has nothing to do with the field I came into many, many years ago. Technology is changing and we all need to change with it because the kids are depending on us and this is why we can offer them. So thank you very much for listening to part one. We hope you will be listening to part two. If you haven't really listened -- if you haven't scheduled part two, maybe you can listen to it at another time. We hope you can. I don't see any questions. Am I missing something or are questions -- well, we -- hard for me to believe that we were so perfectly clear there weren't any questions and don't see any questions right now. So I guess I'm -- somebody -- wait a minute. I see something here. Not able to read it completely. Something about telling you what the child is hearing. Yeah, that's the truth. Real ear does not tell us what child is hearing. Hold on a second. I see some questions. Thank you. That was a good question. I like that one. How do you test to the phoneme beyond the lings? I will take this one and turn it over to Joan to see if Joan wants to

add anything to it or whether Sylvia wants to add anything. What we do is we take medial consonant test and go through all the phonemes, I have a sheet and e-mail any of us, we can mail you the sheet and aba, ada, afa, ata, not only did the child make correctly answer this, but if didn't say correctly, what was his substitution? And then we make a chart, look at all the substitutions and figure out what electrodes need to be changed. It is really a long talk and we did Audiology Online course in which I talked about this and look at that and e-mail us and Joan or Sylvia, do you want to add anything to this question?

>> Joan: I like to add one thing. I just wanted to add one thing. We do exactly what Jane said. Sometimes especially if we are concerned that child is overstimulated, we will do the phonemes originally without the vowels because it is often hard to tell P as Paul or ABA as B as in boy and do P and child gives me B, if on all voiceless consonants, even without a vowel the child is voicing, then that's an indication to me that things are overly loud and everything is sounding voiced. Go ahead, Sylvia

>> Sylvia: With children knowing as they are developing speech perception skills and once we have gone through some of the Ling sounds and initial checking and telling the parents at home, then we will do some simple phoneme babbles with the children and

expecting the children to be able to discriminate manner at this point, then I may very well go through nasal a plosive applicative and play with the sound to see if child is perceiving them appropriately or making errors and also do consonants with a vowel variety, so do it with A, like bababa and neutral vowel do BBB to get high frequency vowel and do BU, BU, BU to get low-frequency vowel and report to the audiologist if there is an error that seems to be across all the frequency ranges when I check with different vowels or if it is really isolated to when really added high frequency vowel to consonant.

>> Jane: How do you tell if binaurally balanced when placement of the processor occurred 11 years after the first. One of the things you can do is get aided threshold and see if they are balanced. Joan, do you want to answer this one?

>> Joan: Sure. Even when there's not open-set speech perception or even limited speech perception, if you ask the patient which one is louder, this one or that one, they still should say I don't know. They still should say that the sound seems to be meeting in the center of their head. And like Jane said then with aided thresholds, they should be fairly balanced. Sometimes we see that the newer ear thresholds are not quite as good but the patient can tell us they're balanced. What we find most often is that patients who don't want to

wear the second implant when we ask them which one is louder, they say I have been trying to tell someone for a long time that this new one is louder than the old one. As long as they don't know which one is louder, they are balanced.

>> Jane: Would you like to answer Tracy Clark's question about balancing? Do you see it on the side there?

>> Joan: I missed the beginning.

>> Jane: There's a question from Tracy Clark, I have several students that have two implants received several years apart, they do not like to use the second implant, could that be a balance issue and audiologist told her it is not unusual with second implant. Let me say something first about that. You also have to work at teaching the child to learn to use the second implant. We had in one of the slides -- Joan had us in one of the slides toward the end, she said that child should -- when you get a second device, especially if there's a long time in between, that child should be spending at least three hours a day, not during school time wearing the second device so really learned to use it, may not do as well with the second device if it is a very long time apart, but they should be able to hear well with it. I think -- actually I think I just answered the question, Joan.

>> Joan: I just wanted to say -- just wanted to add one

thing to it and that is -- sorry. I'm echoing. A person who got her second implant and wanted to share with you what she said to us when they were balanced. I really noticed when I don't have new one on that my brain just irritated, and that is what we should say for the brain added together and if they don't want to wear the second one with the first one and it is not a social issue, then they are not balanced. And they are not benefiting the child.

>> Jane: There's another question here, someone asking is overstimulation a common programming error and how often does it happen? I don't know how often it happens but it is not an unusual programming error. It is especially common for children who have been wearing -- or adults who have been wearing power hearing aids because what they want, they just keep asking for it to be louder and louder, and if we are not looking at speech perception, it is the tendency of the audiologist to give it to them louder and louder and if you give it to them too loud, we can guarantee you speech perception will be distorted and will not hear well. Overstimulation is not unknown issue and what% of time it happens, wouldn't want to hazard a guess. Joan or Sylvia if you want to add something there, pop in.

>> Joan: We see overstimulation quite a bit.

>> Jane: What do we do about speech production for

children for specific -- what about young children who do not have speech production for specific older sounds. Sylvia, take that one.

>> Silvia: What you're asking about is when you have a child that is learned and sound of incorrect sequence. What I do with that is monitor that very carefully and play around with the child's variety of sounds and very quickly go to the audiologist to let them know that we have got red flags in terms of speech development and what I find with children with therapy when we have done therapy and gotten to a level with the new cochlear implant of open-set speech discrimination when we return to working with both cochlear implants together after a period of time we note if the old implant is louder than the new implant, the new implant skills, though they were at open-set will very typically diminish and then what we see is that the -- result of the stronger you're carrying all the weight and burden of the auditory discrimination and listening process.

>> Jane: Somebody is asking if we have had good luck fitting hearing aids that provide good high frequency amplification. School audiologist and stuck with dispensing audiologist who prescribe one thing and parent is stuck between the two of them, and that's exactly the problem we were trying to talk about. Yet with some of the transpositional hearing aids we can get high frequencies but not necessarily a clear signal so

you really need to know what's going on with the speech perception and yes you have our sympathy, need to try to figure out how to work with the education -- with the dispensing audiologist to help figure out how the child is hearing, and if you can test and show what the child's speech perception is, what they are not getting, you may be able to say look we know the child can hear it if capability of hearing it and not able to use the information, what can we do to fix it. Joan, do you want to add something?

>> Joan: I think you're exactly right and we have a lot of new hearing aids that go to 8,000, 10,000-hertz so if a child can benefit from the hearing aids, then we have technology to do it. If they can't -- if they don't have the high frequency hearing, we should be looking at transposition or cochlear implantation if it is appropriate.

>> Jane: Somebody asked what is the most common reasons stated was responsible for poor performance and that's in the next talk and we will hold that one over because we are dealing with that one in the next talk. I think we will take 1 minute question because it is already 12 minutes after the hour and then the audiologist online people will e-mail us the questions and try to get back to you. Somebody asked child's lack of responses to sound when mapped appropriately -- mapped at an appropriate level not behaviorally, autistic behaviors are noticed. How to

tweak out what is affecting the response. The first question is if this -- I'm assuming you mean this child has autistic behaviors all the time, not just autistic behaviors during mapping. If it is only during mapping, something is wrong with something that's going on. If it is all the time, then it requires -- then you need an audiologist to do the mapping who's behavioral audiologist who works with autistic children so that that person can separate out autistic behaviors and using skills how to put this all together. So I think we really need to end because it is already 12:13. Sylvia or Joan, do you have anything you want to add and then we will turn it back over to Cochlear? Assuming Sylvia and Joan don't want to add anything so turning it over to Cathy.

>> Cathy: Taking me 1 minute, Jane. Thank you. Do you mind muting your microphone? Excellent. Thank you. I want to thank Jane -- I apologize. I have had internet issues, thank you Joan, Jane and Sylvia for fantastic issue and we did run over so I will not leave the course open any longer and download the certificate of participation from the file share pod and if you have any questions, contact us at [hope@cochlear.com](mailto:hope@cochlear.com) and we will see you hopefully in about 45 minutes for part two of today's series on Red Flags: Barriers to Optimal Auditory Development Part I. Thank you

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