Back to Basics: Understanding Hearing Loss for Speech Language Pathologists, Part 1
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Amy: Hello and welcome to today’s speachpathology.com webinar with Dr. Jane Madell. She is going to be presenting on Back to Basics: Understanding Hearing Loss for Speech Language Pathologists and this is Part one. Dr. Madell is a licensed audiologist and speech language pathologist, as well as an LSLS auditory verbal therapist. Her clinical and research interests include hearing in infants and children, management of severe or profound hearing loss, including hearing aids, cochlear implants, FMs in auditory processing disorders. She has published five books, numerous book chapters, and articles, she writes the Hearing and Kids section of the hearinghealthmatters.org blog. Dr. Madell presents nationally and internationally on topics related to hearing loss in children. So, welcome, Jane, thank you so much for joining us.

Jane: Thank you so much for inviting me, Amy. I'm delighted to be here. So, we're gonna talk about Understanding Hearing Loss for Speech Language Pathologists. Let me start off by apologizing. I have a cold and I may cough occasionally, but just please put up with that and we'll go on. So, the learning objectives for this course are that as the result of this continuing education activity, participants will be able to identify types of tests required for a complete audiological evaluation. They'll describe the importance of auditory access for auditory brain development. And, they'll be able to describe procedures for determining if technology is providing enough benefit. So, there are basically four types of auditory problems. Hearing loss, which can be mild, moderate, moderately severe, severe, or profound. Auditory processing disorders, which means that you are hearing, but you don’t understand. Auditory attention disorders, which are the kids who just can’t tune in to auditory information. They get distracted and can’t pay attention. And, sound sensitivities, which means that they have trouble hearing and they have trouble paying attention. So, the basic assumptions that we are working with when we talk about hearing in children is that hearing is critical for language development. We know that that’s how children learn language best, so we need to be sure that all children, whether or not they have a hearing loss,
have good access to sound. We know that even a mild hearing loss can interfere with language development. We know that it’s possible to obtain reliable auditory information on infants and children of any age and any developmental status. We know that reliable auditory information is critical to appropriate management. And, we know that early and appropriate technology is the single most important habilitative tool for infants and children with hearing loss. We know that appropriate technology is critical for appropriate habilitation and for educational placement. So, why is early identification so critical? There’s a lot of information which has shown that infants and children who are appropriately fit with technology before six months of age can have speech and language commensurate with their typical hearing peers. Children who are fit at 12 months are already one standard deviation below their peers. At 18 months, two standard deviations below their peers.

And, at 24 months, three standard deviations below their peers. We also know that children who wear hearing aids 10 or more hours a day do better than children who wear hearing aids less than 10 hours a day. So, not only is it appropriate that we fit technology very, very early, but it’s also appropriate that we make sure that children are wearing their hearing aids at least 10 hours a day. So, Why Do We Need Excellent Auditory Access? Most children with hearing loss, in fact, 85% of them, are educated in the mainstream.

We need to make sure that they have spoken language development that will allow them to function in the mainstream. We need to facilitate their psychosocial development, so they’ll be able to play appropriate with their peers. We know that language is best learned through audition. There’s an incredible amount of research that shows that. It provides the most information. It permits incidental learning, which means the ability to overhear a conversation. We know that 90% of what young children learn, they learn by overhearing, not by someone sitting directly in front of them and talking to them directly. We know that if children hear from a, children can
hear from someone sitting a few feet away or in the next room, they pick up things incidentally and that is a significant amount of what young children learn. Language learned through audition provides subtle information that isn't available visually. And, we know that hearing is an open channel. You can close your eyes, but you can't close your ears. You hear all day long. Let's talk a little about language and the auditory brain. The family's decided outcomes.

The family's desired outcomes is what guides us, both ethically and legally. So, I find it very helpful to say to a family, what is your long-term goal for your child? Where do you want your child to be at three, at five, at 14, or 15, at 20? And then, I've never had a parent who's said, I want my child to be delayed. Every parent I've ever spoken to has said, I want my child to be able to play with their peers and go to school with the kids on the block and be a typical kid. So, then we can talk about what does is take for families to get to that goal? 95% of children with hearing loss are born to hearing a speaking families. That means that children really need to hear everything. They need to hear and their parents are going to speak to them.

Their parents don't know another language. We want their parents to speak to them in the language to which they are most comfortable, which is spoken language. We also know that acoustic accessibility is critical if a child’s going to learn to listen and talk and our goal is to make that happen. So, How Does The Auditory Brain Work? Hearing loss results in significant changes in the higher auditory cortex. The auditory cortex is directly involved in speech perception and language processing. So, we need to make sure that the auditory cortex is stimulated because if we stimulate it, children will be able to use the auditory cortex to develop speech perception and language. We know that normal maturation of central auditory pathways is a precondition for the normal development of speech and language skills in children. How much practice is needed in order to influence neural structure in the brain? Malcolm Gladwell reports that it takes 10,000 hours of practice for the brain to learn something. Hart and Risley report
that it takes 46, that a typical four-year-old hears 46 million words by the time they’re four. That’s amazing. So, what does that mean for our children with hearing loss? It means we better figure out a way for them to hear close to 46 million words by the time they’re four. Dehaene reports that it takes 20,000 hours of listening as a basis for reading. And, Pittman reports that children with hearing loss require three times the exposure to learn new words and concepts due to the reduced acoustic bandwidth that is caused by their hearing loss. We are hopeful that hearing aids and cochlear implants and remote microphone systems will increase the bandwidth and help children receive more auditory access.

So, Hart and Risley did a really interesting study in 1995. They live in Kansas City, they’re linguists, and they report that what they did was they contacted all the families who had babies in Kansas City in one calendar year, which I think was 1994, and they asked the families if they could go into the homes and record the babies babbling because they were studying the linguistic development of children. So, interestingly enough, while they were there, they were also recording the way their parents were talking to them. And, they discovered that if a parent spoke about 30,000 words to a child in a 14-hour day, when the child was three, they had an average IQ of 117 and a vocabulary size of over 1,000 words. If parents spoke 17,000 words to a child in a 14-hour day, their IQ was only 107 and vocabulary, 749.

If parents spoke about 8,600 words to a child in a 14-hour day, IQ was 79 and vocabulary was 525. So, before you ask, let me say that these children had no other disabilities. This was all related to language exposure. So, we know that how much a child hears will tell us exactly what a child is capable of. So, for a child with a hearing loss, we want to be sure that they have appropriate... I’m looking for my arrow, there we go. That they have appropriate technology, which is providing good acoustic accessibility. It’s not enough to have the technology. It has to be appropriately set. They have to have enriched auditory exposure. And, they have to have, and that will
result in good auditory brain development. If they have great technology and they do not have good auditory exposure, or if they have good auditory exposure and not good technology, they will not have good brain development. So, what makes acoustic access? Children need sufficient acoustic access. It’s the most important factor in affecting children with hearing loss. They have to hear well. It seems obvious, but we need to just say it. Technology is often not programmed well enough to meet your child’s acoustic needs. Some research that was done out Boys Town showed that 40% of children with hearing aids, the hearing aids were not appropriately fit. Very scary, huh? Auditory environments have to be appropriately managed.

We have to make sure classrooms are quiet and homes are quiet. Turn off the TV, turn off the washing machine. Don’t have something with fish in it in the back where a motor is making noise for the fish to breed. We need to really make sure that the environment is quiet. Only one child can talk at a time. No pencil sharpener use while we’re learning things. So, technology needs to be programmed, so a child has sufficient access. If a child is not progressing the way we expect them and everyone has good expectations, we need to assume the problem is technology. Make sure the technology is working and is fit appropriately. Hearing loss and auditory processing disorders are really about the brain. Hearing aids, FM systems, cochlear implants, are not about the ears.

They are about the brain. Hearing loss is a doorway problem. The technology is a brain access tool. So, children need to say, this is not about my ears, this is about my brain, when they’re talking about their technology. The audiologist is the professional responsible for being sure that brain access is managing hearing loss, managing technology, and managing the acoustic environment. If a child isn’t progressing well, suspect the technology first. Is the child hearing well? Is he hearing high frequencies? More than half of the phonemes in the English, of the consonants in the English language have high-frequency information. If a child doesn’t hear from four to 8,000
hertz, this child is gonna be missing a lot of consonants. Is the child wearing the technology consistently? If a child is wearing hearing aids four hours a day, it will take that child six years to hear what a typical hearing child hears in one year. And, we know from research that a child needs to hear 10 hours a day to do well. This is an audiogram. It goes from... I'm trying to move my arrow and it's not wanting to move. Oh, there we go. Okay. It goes from very soft, to very loud. And, from low pitch, to high pitch, just like on a piano. An audiogram quantifies the hearing loss. We talk about the different features. From an audiogram, we can understand the specific hearing loss and the effects of the perception of speech.

We can learn about the degree of hearing loss, the configuration, or the shape, of the hearing loss, the type of hearing loss that a child has, and whether the two ears are the same or not the same, which is what we call symmetry. So, here is an audiogram. Normal hearing is from zero to 15 decibels. Borderline, 15 to 25. Mild, 25 to 40. Moderate, 40 to 55. Moderately severe, 55 to 70. Severe, 70 to 90, and profound, more than 90. That's critical for the way we think about hearing loss. Here are the symbols that we use when we look at an audiogram.

Symbols for the right ear are red and for the left ear, are blue. Red right round, unmasked air conduction. When we put earphones on a child and we measure their hearing, we look for circle, red circles are the right, blue crosses are the left ear. These are if we use masking, which is a little complicated. I'm not gonna talk about it in detail here. These are bone conduction, and I'm gonna talk about that in a little while. And, these are the responses for hearing loss with the aided in the right ear, cochlear implant right ear, aided left, cochlear implant left, aided binaural, cochlear implant binaural. But you'll see that more in a minute. Here's a list of abbreviations, which you can get from the handout, and we're not gonna talk about them in detail now. So, when we describe a hearing loss, we look for an average of the thresholds at 500, 1,000, and 2,000. And then, we use the numbers I showed you before in that colorful chart to
decide whether it's mild, moderate, severe, etc. And, we also look at air conduction and bone conduction because it may be moderate by air conduction and normal by bone conduction. Or, it may be moderate by both air and bone conduction. Don't be confused, we're gonna get to it. So, again, this is low frequency to high and soft to loud. And, we look at the audiogram, we're gonna record the responses for each frequency for each ear on the audiogram and then we will be able to figure out the degree of the hearing loss. Zero to 15 is normal, as we said, and we go all the way down for each frequency. Here's an audiogram which shows some of the speech sounds and you can see that there are a lot of speech sounds that have energy in the high frequencies. Here's what I call the Speech String Bean. This gray area is the Speech Banana where speech information falls.

And, you can see from this audiogram that there are speech sounds throughout the Banana. We can look throughout the Banana and you can see speech sounds. What we want is for children to be hearing at the top of the Banana so they really have the ability to hear all the sounds. We can listen to hearing through earphones, like this. Or, bone conduction, like this. We also can use insert earphones, like this, so that a child doesn't have to have a big heavy thing sitting on their head.

And, here is another picture of bone conduction, where we have a headband holding the bone vibrator on. When we're testing air conduction, we're testing the entire system. Outer ear, middle ear, inner ear. And, we can do that through loudspeakers or through earphones. When we test bone conduction, we bypass the outer ear and the middle ear and we test the inner ear directly. And, as you can see here, the bone vibrator is on the mastoid. So, if you have a conductive hearing lose, then the problem is in the outer or the middle ear. Sensorineural hearing loss is in the cochlear or beyond the cochlear, in the auditory nerve. And, a mixed hearing loss is both conductive and sensorineural. If it's a conductive hearing loss, as we said, outer or middle ear, it can be an ear infection, it can be a structural deformity, a growth, like a cholesteatoma, or a
foreign body. And, here is the conductive hearing loss. You can see that the bone conduction... Bone conduction is normal and air conduction indicates a moderate hearing loss. A sensorineural hearing loss is caused by damage to the inner ear. The most common cause is hair cell damage in the cochlea. There can also be damage to the VIIIth cranial nerve, such as a tumor, which is very unusual in children. Or, auditory dyssynchrony, which is a problem in the transmission of the signal through the auditory nerve and that is caused by, that's what auditory neuropathy dyssynchrony syndrome is. It can be congenital. It can be genetic, which can either be congenital or can happen later. There can be a fever or a viral infection that is causing the problem. And, hearing loss can be progressive.

A child can start off with a mild hearing loss and it can progress to moderate or severe. This is the picture of a sensorineural hearing loss. Both air conduction and bone conduction are in the same place. And, in this case, the hearing loss in the right ear is severe, those are the circles. And, in the left ear, is severe to profound. No, it's severe in both ears. Sorry, I misread it. So, this is a chart that I think is helpful in understanding how a child is functioning. If you've got a mild or a slight hearing loss, you're gonna have trouble hearing soft sounds. Vowels may not be affected.

Consonants, receptive language, expressive language may be affected. And, processing time may be affected. If you go to a moderately severe hearing loss, you can already see that everything is affected. And, with a severe to profound hearing loss, definitely, everything's affected. So, looking at a chart like this is something that can help you think about children you're seeing and what particular things might be affected for them. Auditory processing disorders are an interesting problem. The children have normal hearing, but they have a reduced ability to hear well when the signal is distorted or when there's competing noise. Unfortunately, classrooms are noisy, which means that children will have trouble hearing in classrooms. So, identification of an auditory processing disorder is made by an audiologist after an
auditory processing evaluation. It’s a test that has to be done in a test booth with specific tests that the audiologist does under earphones. It requires team management. There has to be a speech language pathologist involved to help with therapy. The classroom teacher and possibly a teacher of the deaf to help with some academic work that a child with an auditory processing disorder may demonstrate. The disorder may or may not be associated with language learning disorders. Children with sound sensitivities also demonstrate problems. These are children who, sounds at a typical hearing level bother them, but not necessarily all children. So, a child may have a physical or a psychological problem. Kids with autism often have sound sensitivity problems.

They are identified by measurements in a test booth in which the audiologist determines what’s the softest level that makes a child uncomfortable. But parents and therapists and teachers can contribute a lot of information by noting the specific sounds or the specific situations in which sounds are a problem. Auditory attention disorders are also a problem. We all know children who seem to be able to play with books or specific toys for very long periods of time, but have trouble attending to sound around them. So, it’s important that we know what that is and that we pay attention to it.

A child who can't pay attention to auditory information is going to have a lot of trouble learning in the classroom. So, the factors that can affect auditory learning are hearing loss, obviously, access to auditory information, the amount of auditory deprivation a child has, which can be caused by a hearing loss or it can be caused by ear infections. We know that an ear infection can last as long as six weeks. If a child has a hearing loss associated with an ear infection and they get three ear infections in a school year, which is not uncommon, they can have 18 weeks of hearing loss during that school year, which will certainly interfere with learning. So, we wanna be sure kids have good hearing, management of hearing loss in whatever way is necessary, good and constant
language modeling, and controlling the auditory environment. Cutting out noise. Reducing the distance from the talker, which if that can't be controlled, if we can't have the person sitting within a foot or two of the child, we need to use a remote microphone system both at home and at school. Let's talk about Hearing Screening in Infants. Newborn hearing screening can be conducted either using Otoacoustic Emissions or an Auditory Brainstem Response screen.

So, what does it tell you? If you have an Otoacoustic Emissions screen, if you pass, it means it's no worse than a mild hearing loss. If a child is referred, they could have fluid in their ears, they could have debris from the birth process, or they could have a hearing loss. If a child has a ABR screen, it's conducted with a broad frequency click. If they pass, they have no worse than a mild hearing loss at some frequency, but we can't know for sure that it's at all frequencies because you've used a broad frequency click. If they refer, they might have a hearing loss. The keyword to remember here is screening. This is a screening, it's not a full diagnostic evaluation, and it's measuring hearing only at that moment in time.

Here's the picture of a baby having... Oh, if forgot my arrow. Here's a picture of a baby having an ABR screen. And, here's the picture of a baby having an Otoacoustic Emissions screen. And, this little baby is my granddaughter. She's now 16, doesn't look that way anymore. For diagnostic tests, we use a number of different things to be sure that we know everything about a child's hearing. We start off with ABR and this provides information about the intactness of the auditory pathway. It's not a direct measure of hearing. Otoacoustic Emissions measures the outer hair cell function. Again, it's not a direct measure of hearing. Immittance measures middle ear function. Again, not a direct measure of hearing. All of those things, while they are not a direct measure of hearing, are absolutely critical to understand the entire auditory system. But behavioral responses are also critical and they are the only direct measure of hearing. They measure the response, they require measurements of a response from
the child. Observation audiometry, or behavioral observation audiometry, is tested for children with a cognitive age of birth to six months. We're looking for changes in sucking and we use those to identify whether a child has responded. Visual reinforcement audiometry is six to 36 months of cognitive age and we're looking for a head turn. We present a sound and we pair it with a toy that plays the drums or a video on a screen and the child makes an association, just like Pavlov's dogs did, between the sound and that reinforcer and we use that to measure a child's hearing. By the time a child is about 30 months of age, we can do play audiometry and look at the child from between 30 months and five or six years and we call this the listen and drop test. The child holds a block to their ear, or another toy, and drops it in the can when they hear the sound. Once a child is five or six, they can raise their hand or push a button when they hear the sound. And, here is the picture of behavioral observation audiometry. We're looking for sucking with a bottle or a pacifier or at the breast. Here is visual reinforcement.

A test assistant is playing with the baby and when the sound is heard, he turns and looks at the toy. And, here is the picture, here's what the reinforcement toy looks like. The bear with the drums or whatever. And, here is a cartoon. And, here, the next slide, here is a child listening, putting a puzzle piece on a stand or listening and dropping a toy into a can. So, factors that affect test results are a child's developmental age, their neurological status, their behavioral status, and middle ear status. Do they have an ear infection? We need to know what a child's developmental age is. If a child is developmentally, or cognitively, six to 30 months, the appropriate test is visual reinforcement, no matter how old they are really. So, we need to know what the child's language age is, or their developmental age, so we know exactly where a child is. So, what should we be looking for from testing? You, the speech language pathologist, or a teacher of the deaf should be asking to see the test results, not just to see the report. Was the appropriate test used? If a child is cognitively 18 months of age, did we use VRA? If a child is cognitively three months of age, did we use behavioral testing? Was
speech perception testing done under earphones, in soundfield? Is the child hearing well enough to manage in the classroom? That's the critical question that we need to know. So, this is just a cute little baby with earphones that we would not use to test, but I like to show it periodically. Let's talk about speech perception. The goal of technology is to make sure that a child is hearing well enough to learn. We wanna know how they're hearing under earphones 'cause, under earphones, we're gonna make it loud so we can see what the optimal level is. We also wanna test them with loud speakers, with no technology, to know how they would be hearing if they weren’t wearing hearing aids. How do they hear at normal and soft conversation with nothing? And, how do they hear in noise?

But, most importantly, we want to see how they hear with their technology because that's how they live in an everyday situation. The most important time to test them without technology is when either the child or the parents are not pushing technology and we need to prove to them how important it is. So, if I test the child at normal conversation, right, left, binaural, and with a remote microphone, and at soft conversation and in competing noise, I can demonstrate what the child is hearing and what the child is missing. And, if speech perception is poor, I know what I have to do. So, I wanna test thresholds, speech awareness, speech reception, and speech discrimination, which is how they understand a lot. Speech awareness threshold is just did they hear the sound?

Speech detection, they have to tell me something about what they're hearing. We can use conversational voice. We can use music. We can use the six sound test, the Ling sounds, ah, eee, ooo, sh, s, mmm. We can use the short version, ba-ba-ba, sh-sh-sh, s-s-s, and see how a child is hearing. When we get thresholds, we're looking for the softest sound a child can hear to understand speech. And, there are standard spondee pictures or words that we use. We can also use familiar objects or toys, body parts, or numbers, or some familiar words for a child who can do that. Speech perception is
really the most critical thing. We're looking for a percentage score. How well does the child understand at normal conversation, which is 50 decibels, at soft conversation, which is 35 decibels, and in competing noise? When we measure the outcomes, we're looking to see how well a child does in typical listening situations and how well they're doing with their technology. Hearing aids or cochlear implants. We wanna see if they're improving over time. And, when we measure with speech perception, we wanna see if anything's wrong. If they have a reduction in performance, what's causing that? Is something wrong with the technology? Has hearing changed? We need to look at that carefully. We can use speech perception to demonstrate the habilitation and rehabilitation needs.

Can a child manage in the classroom? What do we have to do to improve functioning? Can we assist in selecting the appropriate educational environment? So, it's important to remember that we need to look at speech perception for a child with a hearing loss the same way we would look at it for a typical hearing child because they're in a typical classroom. Typical hearing children hear between 90 and 100 percent in quiet. We want to know that excellent speech perception is 90 to 100 percent. Good is 80 to 89 percent. Fair is 70 to 79 percent. And, poor is less than 70%. I want children to have good or excellent speech perception.

If they do not, I need to be absolutely certain, first, that the technology is doing what it needs to be doing and if it is, what's happening in therapy. Those are the things we need to look at. So, speech perception should be measured by the audiologist when hearing loss is identified, every time a child is reevaluated, and when we're changing the technology or the technology settings. So, if we do not test, we don't know what the person hears, but, more importantly, we don't know what they don't hear. We don't know if they've had a change in perception or if there's something we can do to improve their auditory functioning. We need to use test materials that are linguistically appropriate. We don't wanna test a nine-year-old with a kindergarten word list because
that’s not gonna tell me how they are hearing in their third grade classroom. We wanna test things that are an appropriate level of complexity and we may have to do multiple tests because one test won’t tell us everything. Single words are good because they have limited cues. The response will be familiar words to the child and we can look at the whole word. Did they get the word right? Or, did they make a phoneme error? For example, if the word is bed, B-E-D, and they say bet, B-E-T, they have made a, one phoneme is the error. If we look at all the phoneme errors, we can figure out what we have to change in the technology settings. Nonsense syllables are even better because then there are no clues and the child just has to tell us what they’re hearing and we can make a good estimate of how they’re doing.

Sentences are really a fill-in-the-blank game. If I say to you, I'm going to the library to get out some, you don't have to hear the last word. You know that the word is books. So, really, when we’re using sentence test, we're using top-down processing and we’re looking to see what the child can fill in, if the child can fill in the missing words. So, that’s not really the best speech perception test. So, these are a list of factors which can affect speech perception. Obviously, the degree of hearing loss, how long the child has had the hearing loss, how much experience they’ve had with technology, and if the technology is appropriate. Are the parents and the school demanding that the child listen or are they assuming the child can’t hear? What’s the child’s language level? What’s causing the hearing loss?

Is the technology appropriately set? And, what’s the experience of the school or the audiology team? All of those things are things that need to be looked at. So, the suggested protocol, as I've said before, is normal conversation, right-left binaural, soft conversation just binaurally, and normal conversation noise binaurally and with the remote microphone. This is the test form I use. It’s got a lot of boxes, I know that's scary, but the more boxes we have filled in, the more information we have for the child. So, let’s talk a little bit about monitoring technology. The reason we have technology is
because we want to reduce sensory deprivation. We wanna know how much sensory deprivation a child is having. We want to maximize the use of residual hearing. We want to provide sufficient input for auditory learning. We wanna lay the foundation for the child to get good academic learning. We want to facilitate socialization. We want to facilitate the information that the child can have for extended learning, incidental learning, and for safety and comfort. Language is a socialization issue. So, the more language a child has, the better socialization they're going to have. And so, that's where we want to go.

We want the child to start there. We want to be sure they're hearing everything they need to hear. Technology needs to be tested if we want to know how a child is performing. We can never assume. So, the real goal of testing is to see if the child is hearing speech at a soft enough level so they can hear the teacher, the parent, and whoever the primary talker is. They need to be able to hear conversation around them. And, they need to be able to have incidental learning so they can overhear. We wanna be sure that speech is clear enough, that there's no distortion or noise or reverberation.

So, I think we've said all this. In order to test technology, we need to do real ear testing, we need to do aided testing to get aided thresholds so we know we're at the Speech String Bean, and we need to do all that necessary speech perception testing. The audiologist's role is to make sure we have accurate identification of the degree and type of hearing loss. We want them to evaluate and select the technology. They need to make sure that the technology is providing the amount of input that a child needs. We need to evaluate their auditory progress. Is a child doing what they need to do? Are they making one year's language progress in one year's time? Are they making one year's improvement in their auditory skills? What's happening in the classroom? What are their classroom skills? The speech language pathologist and the audiologist both need to know how a child is managing in the classroom. We need to identify whether a child has any other disabilities. And, we need to refer to have those abilities evaluated.
Are those disabilities interfering with language? Are they interfering with communication functioning? Are they interfering with how a child is learning to listen? The audiologist needs to work well with other team members to make sure we are listening to the input that we’re getting from speech language pathologists and teachers and parents so that we know that we are using their information to know how we’re setting the technology, how we’re fitting technology, how we’re setting equipment. We need to be sure we’re collecting information from everybody. And, we need to make sure we’re providing support to children and to families. The speech pathologist has a critical role.

The speech pathologist is monitoring language and literacy. They need to know what a child’s language level is. For a child who is not functioning at age level, the speech language pathologist needs to tell the audiologist how the child is functioning and the level at which they’re functioning. If a child’s receptive language level is at six months of age, I need to know that to select the appropriate test. So, the information the speech language pathologist provides me is absolutely critical. What is the child’s literacy level and what is happening to that child? How are we providing treatment? How our we monitoring auditory development? Can the child hear in the classroom?

Can the child hear peers in the classroom? Is the FM system being used appropriately? Is there a remote microphone that’s being used as a pass around mic so the hearing impaired child can hear all the other children? How is the speech language pathologist communicating with the audiologist about the child’s auditory skills and any need they see for a change in technology settings? What exactly are we doing to improve things? We need to work with other professionals, including teachers and other therapists. And, we need to make sure that the speech language pathologist is providing the information that they need. Their information is critical. We need to be sure we’re providing support for children and families. Each of us needs to do that. The Role of the Listening and Spoken Language Specialist. Some of it overlaps with the speech

continued
language pathologist and some of it overlaps with the audiologist. We are all monitoring auditory development. Is the child making progress? How much progress is the child making? The listening and spoken language therapist will develop a therapy program using a normal auditory development sequence to develop skills and the speech language pathologist should also be doing that. How does a typical child learn? And, that’s what we should be using for a child with a hearing loss. We need to work with the audiologist to determine what the perception is and when it indicates for a need in change of technology or technology settings.

The listening and spoken language therapist needs to educate others who are working with the child about how hearing loss affects academics and literacy and what’s happening in the classroom. We need to make sure that we know what a child hears. We need to make sure the technology is worn full-time. If settings need to be changed, we need to do that. We need to make sure the child is hearing high frequencies because a lot of the high-frequency consonants are critical for language and learning. We need to make sure if hearing aids or cochlear implants need to be changed or settings need the be change, we need to know that.

If a child is hearing well at normal hearing levels, they are going to be doing well in the classroom. If they are not hearing well, how are we going to get them academic information? If they're not hearing soft speech well, how are they gonna manage in social situations? We need to be sure we understand what speech perception is in all the difficult situations, and then we need to figure out how that’s going to manage, how we're gonna manage monitoring that to improve function in the classroom. In a classroom setting, we want to really be sure that a child has good access to auditory information. If a child is not hearing the teacher well, then that child is gonna have a very hard time learning to listen. So, the first thing we want to do is we want to be sure that we know how the child is hearing in the classroom so that we know whether or not they are learning well. If a child has speech perception that is at a good to excellent
level, we know they’re hearing well in quiet. But the teacher is not standing next to them all the time, so they need to be able to hear soft speech. Soft speech tells us whether they’re hearing at a distance. If their soft speech is good to excellent, then, in a quiet room, they’re going to hear. However, I have never been in a quiet classroom and I’m gonna guess nobody else has. Classrooms are noisy only because there are children in them, so what are we going to do for a classroom? Well, I wanna be sure that the goals are that the child is hearing classroom conversation at least 90% of the time. Probably, that means it has to be done with a remote microphone. There is no child with a hearing loss that doesn’t need a remote microphone.

The teacher has to be wearing a remote microphone and talking to the child with the remote microphone at least 90% of the time. If there is a pass around mic, then the pass around microphone has to be used at least 90% of the time so that the child is hearing all of the classroom discussion. Classroom discussion is critical. We don’t only learn from the teacher. We learn from the mistakes kids make when they are answering teachers’ questions. So, we need to be sure that the child can hear all the comments from children in the classroom. If there isn’t a pass around mic, the teacher has to be using her microphone to repeat everything that all the children say.

Whether it’s right or wrong, the teacher needs to be able to repeat the question, John said that Columbus discovered American in 1497. Is that the correct answer? No, the answer is 1492. So, the teacher needs to be repeating what the children say so the hearing impaired child gets everything. If the children are doing work in small groups, somebody in that small group needs to be using the FM mic or it needs to be placed on the table so that the child can hear all of the things that are being discussed in the small group at least 90% of the time. So, it’s critical that we get all of that information in. When a child goes to specials, like music and art and whatever other specials there are in a particular classroom, there needs to be use of the FM microphone in those situations. Children will make a determinations about whether they want to use an FM

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microphone, a remote microphone, in places like the lunch room and free play in the yard or in the gym, wherever they have free play. Some children choose not to, but they're missing a lot of language when they do that, so we really need to be sure that we know that a child is hearing what they need to hear. If they are not hearing well in those situations, then we absolutely need to make sure children understand that they're missing a lot. Children get through about second grade with the things that they are missing because a lot of language, a lot of games, are visual. But by the middle of second grade, third grade, a lot of the social things really require language. And so, if we could get children to agree to let their peers wear a remote microphone, they would be getting a lot more language and hearing better in a lot of social situations. We've had a lot of, I've had kids whose parents report that when they don't have a remote microphone on, they lose track of what's happening and they don't hear and they start having trouble having social conversations.

So, anything we can do to assist a child hearing with a remote microphone will make an enormous difference in helping a child hear and helping a child develop language skills. And, it's those language skills that make all the difference in the world in how a child develops literacy because language and literacy both come from the same part of the brain. If we do not develop appropriate language skills, we will not develop appropriate literacy skills. It's absolutely critical that children have the kind of literacy skills that they need if they're going to develop good language. They have the good language skills, if they're going to develop good literacy. So, part of the IAP goals have to be, first, that we assure that the child has access to audition in the classroom. We need to be looking at their language and literacy skills. We need to be expecting them to make one year of language progress in one year's time. If a child is not making one year's language progress, then they can't keep up with their peers. If a child is two years delayed in language in the classroom, my goal for that child would be that they have two hours a day of individual language therapy in order to enable them to catch up. That's a very big goal and I understand that, but if we don't do that, the child can't
catch up. And, we can’t continue to have children going from grade to grade if their language skills are getting worse and worse. We have to be absolutely positive that these children are developing the language skills that they need to, so we need to provide them intensive language therapy. And, if we do provide them with intensive language therapy, we’re going to be able to get them to have the kind of language skills that will enable them to hear in the classroom. So, we need to be monitoring language skills and using that information to improve their therapy plans to make them hear well. If a child hears well at normal conversation, they’ll hear the teacher. If they don’t hear well at normal conversation, we need to do something to make them hear well. If they do not hear, if they hear well for soft conversation, they’ll hear at six feet. If they don’t hear well for soft conversation, they’re going to miss an enormous amount of what is happening in the classroom.

If they hear well in noise, they will hear a lot of what’s happening in the classroom, but they will still go home completely exhausted at the end of the day. Every child with a hearing loss needs a remote microphone system in almost every listening situation. They need to wear it full time in all academic settings. They need to wear it in as many social settings as we can get them to wear it. They need to be wearing it at home, at the dinner table, in the car, at gym, at ballet, at religious studies.

In any situation in which we can get them to wear it, we need to get them to hear because that is the way they are going to be able to be the stars that every child will a hearing loss is capable of being. The more they hear, the more they learn and it's our job to make sure that that is happening at every minute of every day for every child with a hearing loss. When a hearing aid is not enough, if it's not providing enough gain, if it's not providing enough access, then we need to think about changing, either changing the hearing aid or moving to a cochlear implant to make sure a child has sufficient auditory access. So, unfortunately, hearing aids don’t provide everything. Hearing aids provide many things, but there are many things that a child does not get if
they do not have appropriate auditory access. We need to know for sure that children are hearing what they need to hear. We need to know that they have the auditory access that they need. If they do not have sufficient auditory access, they won’t develop language at age level, they won’t have literacy at age level, and they won’t have social skills at age level. That means they will have significant problems learning in the classroom, they will have problems learning language at home, and it’s our jobs, all of us who work with children, to make sure they are hearing everything they need to hear all of the time.

- [Amy] Yes, thank you so much. That’s a lot of really important information and a really great explanation kinda driving it home of how important that really is. And, I’m sure you have seen huge gains for those who are diligent and do wear them and use them kind of 24-7 in almost every social situation, correct?

- [Jane] Yes, that is correct. And, that’s what the goal is. I hope this has been helpful. I will see you all in session number two, which is next week. Thank you very much.