

ROUGH DRAFT FORMAT
NCHAM – UTAH STATE UNIVERSITY
INTRODUCTION TO EVIDENCE-BASED HEARING SCREENING AND EVALUATION
PRACTICES FOR CHILDREN AGES 0-5
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>> WILL EISERMAN: Good day, everyone. I would like to welcome you to today's webinar entitled "Introduction to Evidence-Based Hearing Screening and Evaluation Practices for Children Ages Birth to five.." My name is William Eiserman and I'm the director of the early childhood hearing outreach initiative, also known as the ECHO Initiative at Utah State University. Some of you probably have heard about us over the years. The ECHO Initiative is housed within the National Center for Hearing Assessment and Management at Utah State, which currently serves as the will audio cutting out]... and we are funded through a cooperative agreement from the Maternal and Child Health Bureau. Starting in about 2021 and for about 20 years, the ECHO Initiative has served as a National Resource Center on early hearing and detection with a focus on supporting early Head Start and Head Start program staff in implementing evidence-based hearing screening and follow-up practices. Now, today we are delighted to continue to make our resources and other learning opportunities available not only to staff from Head Start programs but to all of you from various early care and education settings. Now, before we get into today's content, I just want to cover a few logistics. If you're needing closed captioning, there is a CC button at the top of your screen. Click on it and it will activate closed captioning. Please don't select full screen mode, because you won't be able to see all of our media that we have prepared for you today. Also, if you need to step away, don't bother clicking "I need to step away." It just kind of disrupts the flow because it overtakes our screen for a moment when you do that. So refrain from doing that, if you would.

Today's webinar, as I said, is recorded. So if anything disrupts your full participation today, know that you can go to kidshearing.org and view this at any time, as well as share it with others who may not have attended live with us today.

I want to give a shout-out to our captioner there. That's a real person who is captioning for us today, and often the unsung hero when it comes to making things accessible. So, we appreciate your time and talents and being able to caption this webinar for us today. At the end of our presentation, we hopefully will have time for some questions. So jot some notes as you go along, and if we don't answer your questions as a part of our presentation, we'll do our best to answer them at the end. So, anything else, Terry, you can think of we should start off with?

>> TERRY FOUST: No, I think you have covered it, William.

>> WILL EISERMAN: All right, well, that was Dr. Terry Foust, who is a pediatric audiologist and a speech language pathologist who has served as a consultant and trainer with the ECHO Initiative since its very beginnings. And we're really happy to have you with us here, Terry.

>> TERRY FOUST: Thank you, William. I appreciate that. And good afternoon to everyone. As William said, William and I, along with other ECHO team staff, as well as many local collaborators, have provided training almost nearly every state with thousand us of staff from early Head Start, PED Start, American Indian, Alaska Native and Migrant Head Start as well as other early care and education programs over the years. And we always really encourage, just as we are today, by the huge amount of interest that there is in establishing a hearing screening program, and establishing these programs so that children with hearing-related needs get identified and then served. So, the work of the ECHO Initiative is based on the recognition that each day young children who are deaf or hard of hearing are being served in early childhood education and healthcare settings, often without their hearing-related needs being known. Hearing loss is an invisible condition. So the question is: How can we reliably identify which children have normal hearing and which may not?

>> TERRY FOUST: William, the short answer to that question is that early care and education purposes, they can really be trained to conduct evidence-based hearing screening, and what you're seeing in these photos here. The ultimate outcome of a hearing screening program is that we can identify children who are deaf or hard of hearing, who have not been identified previously. So the procedure you see on the left, that is called otoacoustic emissions, or OAE hearing screening, which is the recommended method for children birth to three years of age and really increasingly being recommended for children three to five years of age as well. Now, on the right you're going to see the pure tone audiometry screening, which historically has been the most commonly used screening method for children three years of age and older. And what you'll still see in many early care and education providers using. We'll be talking about both of these methods here today.

>> WILL EISERMAN: And, Terry, I want to pause for a moment and point out to our participants that the use of these methods represents a first step in what sometimes progresses into a more comprehensive diagnostic process for determining the hearing status of a child. Depending on the system in which you work, the use of these methods may be called "screening," or they may be described as the first step in an evaluation process. In either case, if the child passes and there are no other concerns about hearing or language development, the process is typically completed. If the child doesn't pass, however, it's important to follow a protocol that leads to a more in-depth evaluation. So today we're going to be using the term "screening" as we talk about this initial step in the evaluation process. So let me give you a quick overview of what we want to cover today. While this presentation is not a training, per se, our goal is to provide an overview of the big picture of what is involved in implementing evidence-based hearing screening for children across the age spectrum birth to five years of age. We'll start by giving you an overview of the auditory system, or the hearing system, which will help lay a foundation of understanding, how the hearing screening methods will be talking about today actually work?

Next we'll discuss the principles of screening, making sure we're all clear about what screening is and what it is not. And we want -- then we're going to talk about why we screen for hearing loss. What even makes it possible for us to be seriously engaged in systematic screening for hearing. We will then talk about the two methods, OAE or otoacoustic emissions and pure tone audiometry, starting with an overview of the OAE screening process followed by an overview of the pure tone screening process. Next we'll address the important question: What do we do next when a child doesn't pass a screening? We'll summarize the follow-up steps that are undertaken when a child doesn't pass a hearing screening on one or both ears. So you have a big-picture understanding of that. We'll wrap up by showing you how to access some resources to support the process of developing and maintaining your hearing screening program, all of which reside on kidshearing.org, and then we'll answer whatever questions you might have. So that is where we are headed. And you can follow through the progression of these topics by referring to the left side of your screen as we proceed. So, let's give you a quick overview of the auditory or hearing system. This is an image of the ear or auditory system. Now, there are three main parts to the auditory system. The outer ear, the middle ear, and the inner ear. When sound travels from the outer part of the ear, which is right here, through the middle ear to the inner ear, when it gets to the eardrum right here, it causes the eardrum to vibrate, which then moves these three small bones in the middle ear. This movement then stimulates tiny little hair cells in the snail shape portion of the inner ear which is called -- do you recall from your high school days? It's called the cochlea. From the inner ear, the sound signal is carried along special nerves to the hearing centers of the brain, and then we experience the sensation that we typically call sound.

>> TERRY FOUST: And while this is how the auditory system typically functions, there can be some exceptions. So there can be temporary issues like a wax blockage or fluid in that middle ear space caused by ear infections that we may discover and also be able to get addressed during hearing screening process. But the primary target condition of a hearing screening is the functioning of the inner ear or cochlea.

In some instances that sound will travel through the outer here and middle ear but reaches the cochlea, that signal is not transmitted to the brain. And that results in what we will call a sensorineural loss. And this condition is usually permanent. It's the primary condition for which we're screening in mass screening efforts. This may come as a surprise to you, but it's really an important fact to know. Sensorineural hearing loss is a birth defect in the United States.

>> WILL EISERMAN: And Terry, I think you might have broken up a little bit there, so I'm going to say it again. This may be a surprise to some of you, but sensorineural hearing loss is the most common birth defect in the United States. The World Health Organization outlines a set of guiding principles for health screenings, helping us know when it's important to invest time and resources necessary to engage in specific health screenings, and early childhood hearing, hearing screening, meets the criteria of the World Health Organization. In spring of 2021, just this past year, Dr. Ullari, a pediatric audiologist, presented a webinar for the national center on health, behavioral health and safety on the topic of earlier childhood hearing screening, and highlighted four of the World Health Organization's principles that are particularly relevant to early childhood hearing screening. When it comes to hearing screening, science, technology and

systems have developed to the point where these key criteria have been met warranting a commitment to hearing screening. Hearing screening is recognized as an important health -- or hearing loss is recognized as an important health problem, particularly in young children. Fortunately, we have feasible and evidence-based and cost effective screening tools that lay individuals like many of you can use. We're going to talk about those today. For those children who don't pass screenings, we have a clearly outlined follow-up process, an age-appropriate diagnostic services available, from pediatric audiologists and healthcare providers. So we can act upon those screening results. And we'll give you a quick overview of that follow-up process today. And then for those children who are ultimately diagnosed with a hearing loss, we have treatment and management options to help children access language that may include technology, like hearing aids or cochlear implants, or the use of sign language. All of which contribute to language acquisition. Meeting these four criteria suggest that we are at a time where it makes sense to be seriously committed to periodic early childhood hearing screening, not just to mark off the screenings as a task we have done, but to understand it as a central part of our commitment to the child's early language development that can have life there is long lasting consequences when those screening activities are appropriately followed up when children don't pass.

>> TERRY FOUST: So, let's ask ourselves... screening can be thought of as sort of a sorting process. It helps separate the children who are at risk of having [audio cutting out]... those who are far less likely to have that condition. So those... [audio distortion]... by pediatric audiologists with their care providers to continue to refine that sorting process until we can definitively identify that small group of children with a hearing loss. And to be blunt, we screen because we simply cannot provide a comprehensive audiological evaluation on each and every.

>> WILL EISERMAN: Let's talk about why periodic screening using specific evidence-based methods throughout early childhood is important. Starting at birth, you probably recognize this scene. You may have been on one side of the window or other, maybe both in your life. When a child is born, we can't keep our eyes off that new baby, right? We count every finger and toe as we inspect these little babies.

>> TERRY FOUST: We just can't see it. It's not visible, and also because it's the most common birth defect, that's why we screen for hearing using specific methods. In fact, most newborns in the United States are now screened for hearing loss using evidence-based methods. And those that don't pass are then followed up with a thorough evaluation process which then sometimes will result in the identification of a permanent hearing loss. But being able to screen and ultimately diagnose hearing loss at birth really dramatically changed what it means to be born with a hearing loss. You know, let's imagine knowing from the very beginning that a child is deaf or hard of hearing and then being able to provide a way from the very start, for that child's access to language, without there ever being a period where there was an issue of hearing eventually proven wrong.

>> WILL EISERMAN: Most babies receive a hearing screening at birth. Not every single baby gets this screening.

>> TERRY FOUST: Yeah, and babies who don't pass the screening, they require further evaluation. And many get this further evaluation, but unfortunately there are some that are loss to follow-up, and these babies don't receive that further evaluation.

So screening again during early childhood, that o gives that second opportunity to identify those children. But we also need to continue to screen because hearing loss can develop at any time during childhood. So it can develop any time as a result of illness, physical trauma or environmental or genetic factors. And this kind of loss is often referred to as late onset hearing loss, which means that it's acquired after the newborn period.

>> WILL EISERMAN: Yeah, in fact the research suggests that the incidence of permanent hearing loss doubles between birth and school age from about three children in 1,000 at birth to about 6 in 1,000 until the time children enter school. So that's why screening during this vulnerable period in a child's life is so important. You know, it's commonly understood that language development is at the heart of cognitive and social-emotional development, and school readiness. This drives many of the practices we see in early childhood settings. Think about how much emphasis is always placed on early language development, counting the words children can produce, etc. Well, it's important to note that hearing health is at the heart of typical language development and that if we're going to be conscientious about promoting language development as a part of our commitment to school readiness, we need to be equally conscientious about monitoring the status of hearing throughout this early childhood period. If hearing is compromised, then typical language will ultimately be compromised and delayed as well. And we don't want to wait for a language delay to discover that the child has a hearing loss.

>> TERRY FOUST: And that's why we see so much emphasis placed on monitoring the status of hearing children. Programs like Head Start have served as models of comprehensive health and educational programs for young children and their families. They have required hearing screening for all their children, even before we had the excellent methods that we now have to do this. So the screening, when it's followed by appropriate early intervention, it can really dramatically improve options and you comes for children who are deaf and hard of hearing. So when hearing loss is identified early, we can make sure a child has access to language. And then as a result children who are deaf or hard of hearing, they're really thriving in ways that you see rare. And by providing hearing screening, each of you can be part of creating these really amazing life-changing outcomes. So let's take a look at several examples of children with severe to profound hearing loss who have the benefit of early identification and they're communicating.

>> WILL EISERMAN: These two little girls both have bilateral hearing loss, meaning both ears, and they have hearing aids. And they have a significant hearing loss. Listen to their language as they play together. Keeping in mind their ages as they play with their dolls.

>> CHILD: We're having a party over here! You're going to miss it!

>> CHILD: Okay... are you guys talking?

I'm skating! Weeeee...

>> CHILD: No, this is the water she's skating on the water.

>> WILL EISERMAN: Now, we have another example here. This is an example of children whose parents selected the use of sign language as their communication mode. Listen -- well, not listen, but watch them communicate and enjoy how they are accessing language both expressively and receptively.

>> WILL EISERMAN: We really want to make this real for you to know that hearing screening actually leads to these life-changing outcomes. This last example is of two boys who also have profound hearing losses. They are considered deaf, and they have cochlear implants. You might not even guess that they were deaf if you were just to hear them speak.

>> CHILD: Hey,!

>> CHILD: Hi, my name is Gipson. People are special in different ways. One of the things that makes me feel special is I'm deaf.

>> CHILD: I'm deaf too. And deaf means that your ears can't hear. AJ and I have special things to show you called cochlear implants. They help us hear.

>> CHILD: Cochlear implant is a big word, so I call them CIs.

>> WILL EISERMAN: So we hope that gives you a good grounding and a little extra motivation that what you're involved with doing hearing screening is all about potentially being able to change the lives of children who may not readily have access to language.

>> TERRY FOUST: Thank you, William. So the availability of OAE hearing screening and pure tone audiometric screening means that it's no longer appropriate for us to rely solely on subjective methods that have been used in the past, methods such as ringing a bell behind a child's head, or depending solely on caregiver's perceptions of a child's hearing. Don't get me wrong. Observations of a child's response to sound, especially the lack of a response, can be helpful, and we should pay attention to how children do or do not respond to their environment. But these sorts of observations do not come through the hearing screening because they're far too crude and unreliable and frankly we can do so much more than that because of our current technology.

>> WILL EISERMAN: People often ask, isn't hearing screening already a standard practice during well child visits with healthcare providers? Well, although some healthcare providers have incorporated evidence-based hearing screening into well child visits, this really isn't yet standard practice, especially for children less than four years of age.

>> TERRY FOUST: And some parents may report with a lot of certainty that their provider did perform a hearing screening, but I think it's really important to understand -- and I can't emphasize this enough as an audiologist that routine examinations of ears by healthcare providers cannot ever be mistaken as hearing screening. And I know that can come as somewhat of a disappointment to you as it does to you and other professionals and parents who are really hoping that that is being taken care of during well-child visits with healthcare providers. But it's precisely because it isn't yet happening in that context that programs like All of Yours that are adopting hearing screening practices, because obviously there's an increased recognition of importance of monitoring hearing, and it's feasible to do this.

>> WILL EISERMAN: So, the take-home message here is this. Unless a child's health records include documentation of ear specific hearing screening results and the screening method used, we should never assume a hearing screening was completed.

>> TERRY FOUST: And William, another important point to remember is this: While OAE and pure tone screening are highly reliable methods, they're not perfect. So no screening method is perfect. And that means that there may be some rare conditions that are not identified through the screenings. So whenever a parent expresses a concern about a child's hearing or language development, even if the child received and passed a hearing screening using one of these methods, that child should be referred for an evaluation from an audiologist.

>> WILL EISERMAN: So before we go on, let me say one more thing about newborn hearing screening results. When children enter your program or your healthcare system, especially during the first year of life, always be sure to collect the newborn hearing screening result. If the result is anything other than a pass on both ears, you want to make sure that the follow-up evaluation has occurred. If you don't see evidence of that, you will want to help the family circle back to the healthcare provider to accomplish that. And one way you can do that is by completing your own screening and providing that information to the healthcare provider. If you're in a program that requires an annual hearing screening, you can use the newborn hearing screening result for the first year of the child's life, if you want. But don't rely on that beyond that period.

Terry, I just had a problem with my screen that I need to deal with.

>> TERRY FOUST: Okay. No problem. Let's -- we'll just go ahead and move on here for just a moment. But we want to take the chance now to talk about these two hearing screening methods that are used during early childhood. So if you're responsible for children -- and I'm sorry, William, we just advanced there. There we go. So, if you are responsible for children who are under three years of age, the recommended method is OAE screening, which you see on the left. Now, if you're responsible for screening children three years of age or older, historically pure tone screening has been considered the recommended method for that age group. This is the -- this is the headset screening that you're probably familiar with where a child raises their hand and they perform another task when they hear a sound that is presented into their earphones. You see this method being used on the right. Now, I just want to mention, there is growing recognition that for a variety of reasons, as common as the pure tone method has been, it may not always be the most feasible method to use with some of these younger children. Research has shown that 20 to 25% of children in the three to five-year-old age group can't be screened with this methodology because they aren't just developmentally able to follow the directions reliably. And that has been really our experience as well. And so in those instances, OAE screening is the preferred method for these. So at a minimum, if you're establishing evidence-based practices for three to five-year-olds and if you're considering using pure tone screening, you also need to be equipped and prepared to do OAEs on that 20 to 25% that I mentioned who can't be screened with pure tone, or alternatively you will need to have a means for systematically referring all of those children to audiologists and perform the screening, which can be quite challenging to accomplish.

Now, to simplify, more and more audiologists are recommending the use of OAEs uniformly with all children ages three years of age and older. And the reason is that it's quicker than pure tone screening, both to learn to do and to actually implement. It's far

more likely to be a method that will work across the board with all the children in the 3-5 age group that you'll be seeing, and it's equally as effective.

Now, if you or your program are still undecided about which method to use primarily for children 3 years of age and older, we encourage you to carefully review a document that we have that compares OAE screening and pure tone screening for this population and we also have it posted here for you to download. So be sure to take a look at that resource.

>> WILL EISERMAN: Terry?

>> TERRY FOUST: Yes, William?

>> WILL EISERMAN: If you can continue to advance the slides, that would be great.

And while I catch up with you... sorry, I'm having a technical problem.

>> TERRY FOUST: No problem. No problem at all. So now that we have addressed which methods are recommended for which age groups, let's go ahead and talk about how implementing evidence-based hearing screening practices is more than just simply using a designated piece of equipment or a specific method.

>> WILL EISERMAN: That's right, because to implement evidence-based practices, that equipment or method must be used according to a prescribed set of steps under carefully controlled conditions. Each step documented in detail. And this is true whether you're using OAE screening or pure tone audiometry screening. While this webinar isn't a training on either of these methods, we'll give you an overview of each method and in so doing help to identify key elements of the process that require training and divided practice. We'll -- and guided practice. We'll also point out some of the useful implementation tools you can use on a daily basis once you're up and going with the hearing screening practices. So our goal is to get you pointed in the right direction to help you get either a training or refresh your training to review these resources and to be able to proceed in that way.

Are you there, Terry?

>> TERRY FOUST: Thank you. I just had to come off mute. Okay, thank you, William, for that. So I think this is a great place, let's start with otoacoustic emissions or OAE screening, which as we said is the recommended hearing screening method for birth to three-year-old children. Again, you will see this depicted in these photos right here. So if you are serving children birth to three, OAE is really the one and only evidence-based method recommended. It's recommended by the American Academy of Audiology and the American Speech Language and Hearing Association, which is also known as ASHA.

>> WILL EISERMAN: OAE screening is the most appropriate method to identify young children at risk for hearing loss. Terry, if you can advance the slides, that would be great. It's most appropriate because it's accurate and feasible. It doesn't require behavioral response from a child. And that means we can screen children who are very young. It's quick and easy. Most children can be screened in just a minute or two. Sometimes in as little as 30 seconds per ear. It's a flexible tool that can be used in a

variety of environments. Including classroom, home or healthcare settings. And most important of all, it's effective in identifying children who may have a mild hearing loss or a loss in just one ear, as well as those who have severe bilateral loss.

>> TERRY FOUST: In addition, it can also be helpful in drawing attention to a broader range of hearing health conditions that might need further medical attention.

OAE screening can also help to identify children who have a temporary hearing loss as a result of a middle ear infection, even though this isn't the primary goal of OAE screening, it's definitely an additional benefit of screening with this method. OAE screening clearly meets the World Health Organization's core principles that William talked about just a few moments ago.

>> WILL EISERMAN: So take a good look at these pictures here. This children here are all being screened using the OAE method. What do you notice about where they're being screened? They aren't being pulled out into a foreign environment that might be strange to the children. They're being screened in everyday educational and home environments where the children are already happily spending their time. And those people who are doing the screening are typically people they already know. They're teachers, home visitors, health specialists.

>> TERRY FOUST: In fact, the screening works best when they're comfortable doing the screening and they can play with a toy or be held or even sleep while the screening is being conducted. Let's talk about conducting an OAE screening. To conduct an OAE screening, we first take a thorough look at that outer part of the ear to make sure that there's no visible sign of infection or blockage or something to be concerned with. And then we take a small probe on which we have placed a disposable cover. And that is then inserted into the ear canal. Then that probe delivers a low volume or quiet sound stimulus into the ear. And the cochlea or the inner ear, that snail-shaped part of the ear, normally will respond to sound by sending the signal to the brain while also producing an otoacoustic emission, and this emission or response is analyzed by the screening unit, and then about approximately 30 seconds or so a result will appear. It's either a pass or a refer. And every normal healthy inner ear will produce an emission that can be recorded in this way. So let's look at a realtime -- an actual realtime screening so you can see how it will go under ideal conditions.

>> WILL EISERMAN: Let me try to slide this over, Terry.

>> TERRY FOUST: Thank you.

>> WILL EISERMAN: We'll see if that works. I don't think it did. You do it.

>> TERRY FOUST: Okay, are I you seeing it there?

>> WILL EISERMAN: No, no, not that. Put that over to the right and now slide the PowerPoint slide over to the right.

>> TERRY FOUST: Gotcha. It's not working for me.

>> WILL EISERMAN: I did it. So let's watch this realtime screening.

>> Let's try that one! Ready?

>> Ready?

>> WILL EISERMAN: It's helpful to have two people screening a child, as you saw here. This person is --

>> She already did it!

>> WILL EISERMAN: And there they're done again. Terry, see if you can pull the other... oh, let's see. Maybe I can do it.

>> TERRY FOUST: Okay. Did it work?

>> TERRY FOUST: It did. Great. Thank you. Okay, so, yeah, thank you for that. And that should be typically that quick with an ear that is functioning normally and, again, a cooperative child as you saw there.

>> WILL EISERMAN: You know, I'm not sure it's back, though, the PowerPoint slide is back. Is it? Let's see...

>> TERRY FOUST: I am seeing it on mine.

>> WILL EISERMAN: Huh. Well, okay. So Danielle and Gunner, can you confirm you're seeing the PowerPoint slide again? I'm not sure that I am.

>> I can see it.

>> Sorry, folks.

>> TERRY FOUST: Yeah, so I have gotten feedback from Lenore that she sees the checklist and I am seeing the checklist as well, William.

>> WILL EISERMAN: So, like a lot of skillful tasks, confident screeners can make it look easy. And it often is easy once you have been trained and had a little practice. Now, to assist screeners in keeping all of the different steps of the screening process in mind, we have a skills checklist for OAE screening on kidshearing.org, and that guys you through that process. So we have got tech checklists like that available. And in the interest of time, Terry, could you go to the next slide? And I'll just talk through this really quickly here.

>> TERRY FOUST: So on the OAE training process?

>> WILL EISERMAN: Yeah. So as you do -- as you engage in training, you're going to want to make sure that you have training on all of those different steps on the screening skills checklist, that you have an taunt to learn first to screen yourself and then other adults, and you learn how the device works under different conditions, whether the person being screened is moving or there's noise in the environment. And you learn about all of that before you even think about learning about how you're going to actually do the procedure on children. And then learn how to manage their behavior through that process. And then importantly learn how to development those results. So all of that constitutes what needs to be included in a thorough training process.

Now, you probably are wondering what OAE screeners cost. They're about \$3,800. And those disposable probe covers are about \$1 to \$1.50 apiece. So you want to factor those into the planning processes as well. So, Terry, let's go on to pure tone screening. That was an overview of OAE screening. So now we're going to talk about pure tone screening, and keep in mind that this is for children who are older. Three to five and older. And it's never recommended for children under that age. So you probably recognize this screening method, if you can go to next slide, Terry. You either have had this done on yourself or you already have used this screening procedure in which musical note-like tones are presented through earphones, and then you provide a behavior response, like raising your hand or dropping a toy into a bucket to let the screener know that you have heard the sound. Now, pure tone screening gives us a good idea of the entire auditory system's functioning, all the way to the brain, what the child is showing us, with the physical action, that they have perceived sound. This

device costs about 800 to \$1,000. It's a durable and portable device. And a wide range of individuals like yourselves can learn to do this procedure. Now, Terry, walk us through how it actually works.

>> TERRY FOUST: Yeah. So to conduct pure tone screening, we're going to do the same thing we did with OAE. We're going to first take a look at the ear to make sure that there is a visible sign of infection or blockage, and just like we did prior to doing OAE screening. Now, if that ear appears normal, then the screener instructs the child how to listen for a tone and respond to that tone by raising a hand or placing a toy in a bucket, some game like that. This step can take some time so that we're really sure the child is able to reliably complete this task. Now, once the screener has observed that the child provides a reliable response to the sounds presented just as the screener instructed, that is when the actual screening is started. Now, during the screening process, this listen and respond game is repeated at least twice at three different pitches on each ear. And then we note the child's response or their lack of response after each of the tones presented. If the child response appropriately and consistently to that range of tones that represent each ear, then the child passes the screening. And then there are two notable ways that pure tone screening differs from OAE, and that's in that the process requires children not only to be cooperative but to be fully participants in the process, following directions and responding reliably. William, did we want to take a moment to show our pure tone examples?

>> WILL EISERMAN: No, no, that's okay. You know, as we mentioned, the screening itself is not like OAE is. Instead in pure tone screening, you as the screener have to manually step through the presentation of each tone multiple times for each ear, and then writing down the results. Then following a very specific protocol, you as the screener determine whether the ear passed or not. With pure tone screening, there's considerable more potential for screener error to produce inaccurate results. And so as a result, there is a need for even more thorough training and oversight to make sure that all screeners are adhering to these prescribed screening protocols. We can't emphasize enough the importance of getting that training and oversight of any screeners, because even experienced screeners can make errors that inadvertently invalidate the screenings in ways that they might be unaware of.

>> TERRY FOUST: Exactly. Let's show you here, this is an example of the actual screening step that need to be documented for each ear that you screen. So through the training process, you learn all of these steps, all of the steps of the training and the screening process, and then all of the environmental conditions that must be monitored and met as you complete a child's screening.

>> WILL EISERMAN: As is true for OAE resources, kidshearing.org -if you can advance the slide, that would be great. Just like we have for OAE resources, kidshearing.org provides a set of implementation resources for pure tone screening, so this is the checklist that we have available on our website that would really be the foundation for a training process, as well as monitoring those doing screening for quality. So take a good look at those and make sure that whatever you do to get your training, that it covers all of these different components. It's really critical. So the next question that comes up is...

We have given you the overview of the two methods. Regardless of which method you use, you're going to eventually have children who don't pass. So what then? In order to

be evidence-based, your screening process has to include a follow-up protocol for when children don't pass. And we have to emphasize, our screening efforts are only as good as our ability to systematically follow up on children who don't pass on one or both ears. So, Terry, if you wouldn't mind advancing as I walk through this, that would be great. So, another key resource we have on kidshearing.org is this follow-up protocol and forms that reflect this protocol, so that you don't even have to commit this to memory. If you use the forms, it will walk you through all of the subsequent steps. So we would expect -- we're going to screen all of the children. So 100% of the children get screened.

And we expect that about 75% of the children will pass on both ears and we won't need to do any further follow-up for them. However, about 25% of the children won't pass. And they're going to need a second screening in two weeks. About 8% of the total number of children screened will not pass that second screening and will need to be referred to a healthcare provider for a middle ear evaluation. Now, once any middle ear problems have been resolved, like a wax blockage or ear infection, you will then screen this small number of children a third time. And we expect about 1% of the total number of children being screened to still not pass. And those children will then need to be referred to a pediatric audiologist for a complete audiological evaluation.

So that small subset of children will indeed need follow-up referral and screening, and we have found from working with literally hundreds of programs that this is a protocol that works, that it reduces unnecessary referrals but get those children that need to go for referrals to the referrals that they need.

>> TERRY FOUST: Let me interject, William, the pass and percentages are significantly different than what we show here. If they're significantly different, then what we anticipate at any point in this protocol, I think that's really a flag or a trigger to want to seek or ask for technical assistance.

>> WILL EISERMAN: So this is another illustration of the protocol that you will find described on our website in the details about protocol. One important exception to this protocol to point out is that whenever a parent or caregiver expresses a concern about a child's hearing or language development, even if the child passed the screening, they should be referred to an audiologist. And this is true regardless of which screening method, if they pass. Because screening methods aren't perfect. So to be on the safe side, whenever there's an explicit concern about hearing, we make a referral.

All right. So our last thing is we want to show you our resources. And this is our website. [Kidshearing.org](http://kidshearing.org). You will find a wide variety of resources. We invite you to feel free to use all of the implementation tools, and certainly before you sit down to make any of your own, whether that's writing an informative letter to parents or referral letters, whether you're needing forms to document your screening results, go and see what we already have here. Because we have tried to create everything that you would need to run a complete program, and this has received lots of input from programs all over the country. So be sure to get acquainted with these resources. Let me just show you our website and where you will find that. Terry, let me see if I can navigate here. So this is our website, kidshearing.org. And if we go -- if we go down on here, you will see starting with planning resources, all the way down to archives, a variety of different kinds of resources. So let me just tell you really quickly about this. I know our time is getting short, but this is really important. We want you to see that under planning

resources, this is where you would find things like information about how to find an audiologist to help you, or information about screening equipment. Under the next category, you will see access training. If you look there and you're needing training for your program, click there and you will be taken to some training options that are available, whether it's for OAE training or pure tone audiometry training. Once you are trained and ready to implement, you will find different resources under the screening resources tab there. Whether it's getting ready to screen, you could send out. Under protocol you will find the guides for the protocol and forms. Under "share results," you will find letters for parents. And then lastly under "follow-up resources" you will find a tracking tool you're invited to use that keeps you on track with a group of children who are progressing through the follow-up process.

All right, so that covers everything that we had for today. And if I sound flustered, I apologize. I am a little flustered, because I haven't really had full access to my screen through most of this presentation. So my apologies for that. But we're going to hang on here for a few more minutes, and if you look over to the left side of your screen, you will see a Q&A box, which you can type your questions. I also want to note to you that you will see that download, the handout download. That is the document you might want to download if you're screening children three to five years of age and older and are still undecided about what methods to use.

Terry, are you seeing any questions as they come in here?

>> TERRY FOUST: Yes. One of the first ones is -- can you see them as well?

>> WILL EISERMAN: Yeah, go ahead, Terry.

>> TERRY FOUST: The first question is regarding pure tone. It says do pure tone devices show technical fails? And the short answer to that is no. Most of the pure tone devices will rely upon the person who does the screening on their observation of that paired response of hearing the tone and observing the response that is required. There is a question about -- looking for the --

>> WILL EISERMAN: The checklist, yeah. And this checklist is found under monitoring quality. So go down to the follow-up button and look for "monitoring quality" and you will find the checklist for both OAE and pure tone. What about the next question, Terry? Is there any place for tympanometry with children birth to three years of age?

>> TERRY FOUST: In fact, I'm going to combine that with another one that also talks about tympanometry and OAE, because that person has equipment that is a combination unit. So let me respond to that. First of all, the combination units that were available aren't right now. So there's some question about the future availability of those combined units. But the question is, is there a place for tympanometry in kids zero to three?

So our OAE screening protocol, as we talked in the presentation, one of the kind of side benefits of that is that it will help us identify children who may have a fluid-filled ear and that then causes a refer on the screening. And our protocol then would -- if we had that twice, we'd then send them for medical intervention or assessment of middle ear function. And so that protocol does essentially capture those to middle ear dysfunction or problems that are causing an issue or, actually, identified through this screening process. The tympanogram always has a place in doing a full evaluation because that would be where we would really want to get a full assessment of focusing just on middle

ear function. So it has a great place in assessing middle ear function, and most often that would be in the further evaluation process.

>> WILL EISERMAN: We're going to hang on and answer more questions, but if some of you have to leave, before you leave click on your screen here to give us some feedback on today's webinar, and you also will be able to get a certificate of attendance today through that same link. So if you will do that before you depart, that would be great. But we're going to hang on here for a few more minutes and try to cover at least some of your questions. All great questions flowing in here. I want to make sure that those of you who are from Head Start programs, reach out to the Head Start Center on health, behavioral health and wellness. If you have specific questions, you need technical assistance on, of course you're invited to always go to kidshearing.org and access whatever resources we have here, but for those of you from Head Start, you have that additional resource from the National Center that you can tap into as well. There's a question here... are there any online trainings for using OAEs? Again, if you go to our website, kidshearing.org, writ says "access training," you will find information about that. And that is true of pure tone screening as well.

>> TERRY FOUST: Thank you, William. There are several questions about either the PowerPoint being shared or recording of the webinar. I wondered if you could speak to that.

>> WILL EISERMAN: Sure, thanks, yeah. So this webinar is being recorded and posted on kidshearing.org. It's already been pre-recorded and is there, so you can view it as a pre-recording, but today's live presentation will be posted also there within the next day or so. Also, for those of you who might know of others who want to join live, we're repeating this webinar next week on August 24th, given we had so many registrants that we offered it a second date, and it's the same URL you used to get in today. So if you want to have others join, they can do that. If they haven't registered, we would encourage them to register as well, just so that we have information about all of you who are participating with us.

>> TERRY FOUST: I see one quick question here regarding screening. Child has hearing tubes, is it safe for children to get an OAE screening? And the answer is yes. And we would expect a pass result if we have those tubes open and functioning and we have a normal functioning inner ear. So you can test them, and if we get a pass, that is great. If we get a refer, then we would do appropriate follow-up. But yet it's safe to screen children with OAEs who have PE tubes.

>> WILL EISERMAN: I'm noticing a lot of the great questions you're typing in are really questions that go beyond the overview that we intended to provide today, and there really are questions about what you would be addressing as a part of a training process. So to be clear, today was not a training. It was an introduction. And there's a lot more to a training process, including having hands-on experiences, which we have always included as a part of our training processes. So check out those resources about training. Also, if you look at those checklists that are on our website, they include those activities that we would encourage as part of a training process. So if you have some other means for accessing training, please by all means still tap into our resources to help guide that process.

I think with that, given that we're at the top of the hour, and past, we're going to close it up for today. Our website is ECHO.NCHAM@USU.Edu , and you can contact us through our website. If you need to email us. So feel free to do that, if you have questions that you're not able to address by looking at the various resources we have online or, again, if you're in Head Start, after you approach the Head Start Center on Health, Behavioral Health and Wellness. Thank you, everybody, for your time today. Terry, of course, thank you to you, and to our captioner, and all of the other people at NCHAM who are behind the scenes supporting these learning opportunities. Go to kidshearing.org in the next day or so to access the recording of this webinar and/or to share it with others.

Thanks, everybody, and remember to click before you leave, so you can give us feedback and get your certificate of attendance here.

Thank you.