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**NATIONAL CENTER FOR HEARING ASSESSMENT AND  
MANAGEMENT  
BEHAVIORAL AUDIOLOGICAL ASSESSMENT OF INFANTS AND  
TODDLERS**

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>> INSTRUCTOR: Looks like most of the students are back now. You can see the beautiful face of Diane Sabo on the web Cam. Can everybody see her? Daniel, can you make Diane a presenter, please? I made Cindy Hinds our captioner. Hi, everybody. Can you see me? Diane, go ahead. We're going to get started now with the live portion. She's going to do an update on the behavioral assessments of infants.

>> Diane: Good afternoon, everybody. You have some questions for me. And I'm going to -- (there's an echo) I'm sorry if I'm stopping. I hear -- I'm going to -- (echo) talk a little bit about some things that I found that are in nice in terms of literature showing

support for some of the things I talked about in the video. So -- and I don't know if I have control. Of this. So give me one minute to see if I can advance the slides? And I'm not sure that I can.

>> I'll do it for you, Diane.

>> Diane SABO: Because I can only go to full screen or not full screen, Karen.

>> Okay.

>> Diane Sabo: We didn't talk a lot about bone conduction testing which is -- (no audio).

>> Oh, gosh.

>> Hi, this is Daniel. Wait on one second. I was trying to fix the echoes and I accidentally muted Diane. Sorry about that. Karen, you need to mute your microphone. Because I think that might be where the echoes are coming from. Diane, want to try again? I'm sorry, we lost the last 20 seconds of you. Up, let's see. Still not hearing you. Is your microphone clicked on? There's a mic icon you need to click on.

>> Diane: Can you hear me now?

>> I can hear you, can everyone else hear you? Okay. Looks like you're good. Go ahead, sorry about that. We should be okay now.

>> Diane Sabo: Okay, I'll start at the bottom. A lot of technical things today, I guess. What I said before, and if I'm repeating myself, I'm sorry. But I found some recent articles I thought I'd share with you because it lends support to some of the things that you may be doing, may have heard of, and/or things that we know but we don't have a good literature base for. One of the first articles I found was behavioral using visual reinforcement audiometry and bone conduction. This was published in 2011. They had

36 infants, they broke the infants to two age ranges. They broke them to 7 to 15 months and 18 to 30 months. They used tones, the frequencies we usually use, 500, 1,000, 2,000, and 4,000 hertz. They put the bone vibrator on one of two ways, the standard head band, the steel head band, or they used the elastic head band. And the elastic head band is like the huggy head band. They had some babies where they could not get the bone conduction vibrator to stay in place. So they used the head band. They preferred the steel head band. They used an assistant in the room and a 190-degree response. You can see what the threshold is for. There's little difference between the two groups in terms of the 8 to 15-month-old and then the older children. The thresholds are relatively the same. We can see that this is in the DBHL. They're around 10 DB for the lower frequencies and a little higher for the higher frequencies, more about 15 DB for the higher frequencies. Next slide. So their findings were for infants up to 30 years of age had normal bone conduction if -- and it gave the upper limits. So they gave the responses at 15 DB at 500, 12 DB at 1,000. 19 DB and 24 DB respectively. Those are considered to be the normal range of hearing levels, bone conduction, four infants using the VRA procedures. So you can see that in that 0 to 20 DB range in general. You can get good bone conduction findings. Now, when you compare this to some of the air conduction findings and one of the reasons we asked about why what are the actual levels looking at the data where in bone conduction, you see a little bit of a difference between bone conduction results using for the ABR, between adults and infants. They wanted to see what are -- is there a bone difference in the bone conduction thresholds? In general, the bone conduction thresholds are higher. They feel there's some sensory and non-sensory issues that go into this. I think if you look back through the literature,

you know that not all babies respond at the threshold level, there are non-sensory things that causes their thresholds to be a little higher than what we see when you're testing an adult. So by bone conduction and by air conduction in general, the low frequencies are sometimes more a little more elevated by air conduction than the higher frequencies. But by bone conduction, the thresholds are a little better. In the low frequencies and worse in the high frequencies. So just a little bit different. It's a good article. And we will have these articles posted on the website for you. So if you're interested in getting more detail, we will put the actual articles up there for you. Next slide. The effect of stimulus type on visual reinforcement audiometry, and this is the initial stimulus. We talked about voice is a wonderful way to get the good response. It's something that the children pay attention to. Babies will turn to speech. Then what happens many times, you turn the tone on. And what happens is the infant actually just kind of stops or doesn't walk and doesn't know what to do. What about the initial tonal response? Does that really make a difference? So what they did was -- look at next slide. They used different stimuli and they used 1,000 hertz narrow band noise or 1,000 hertz F.M. signal. They wanted to know if there was a difference with the Warpal (phonetic) tone or head band noise and could they get more of an initial response using the stimuli. They used the 7 DB stimulus, the reason they did that is they had another study that came out in the same group and they had used 70 DB with that study. So they decided to go ahead and use the same stimulus level for their initial presentation. So they had 200 infants. Some of them they were between 6 and 30 months of age. They did 100 with using narrow band noise and 100 that had F.M. frequency modulated tone. The response, again, was the head turn towards the speaker looking for the initial unconditioned response. We're not talking about, you know, a

conditioning thing. We're really looking at can we get the baby to turn their head to this signal then use that head turn and condition it long term. So next slide. So we're looking for that unconditioned response. And they found a significant difference with narrow band noise being different than the FM or the warble tone. So they were able to get 69% responded to a 70 signal to the narrow band noise versus 45% to the warble pure tone. They had infants to 11 months. They showed that 45% responded to the narrow band to 16% to the frequency modulated or the warble pure tone. They took a second subgroup that was older to see if age makes a difference. This was the 20-month-old group. They found 24% responded to the narrow band noise and 9% to the warble band tone. So narrow band has a nice effect in getting a good head response and using that to condition for the reinforcement audiometry. If you have thoughts on what stimulus to use, try using not the warble pure tone but using the band noise see if you can maximize getting a normal head response using a narrow band noise. And we have another article that I found interesting because they talked about one in the video -- I talked about one commercially available system for -- that is out there for doing video reinforcement audiometry and using the video screens. It's fairly expensive. They investigated to see if they could come up with a way to make a cheaper system. For those of you who are tech savvy, I'll put this article up there for you. Not everybody is going to go out and build their own system. What they did was using Adobe flash-based approach. Next slide. Some of them have reasons why they went this direction is that you can get clips, you can use commercially available clips from products that are sold. But the problem is that you also should have copyright to do these things. And to try to get copyright for someone like Disney or other large major companies that do a lot of the animated films and if you

wanted to use any of the characters from the animated films, then it's usually a lengthy process that you can get it but it takes a considerable length of time in order to do this. So this group of individuals wanted to see well, is there an easier way to make some nice animated type of video without having to go to a lot of expense. Again, it was Adobe flash. Next slide. So what they did was they used this as their black screen. So they don't have a completely black screen. But they used some stars on it. They are thinking the next version they'll go to completely black screen. It's something you can think about -- do you need to have a blackened screen or something on there just not moving or very brightly colored. You can see in the next slide --

Some of the animations that they have. Now, what's hard to tell from the -- from reading whether or not these -- you know, the -- obviously it's not a video in the paper and these are the pictures actually right from the paper. But it did not say for sure if these were like the tongue goes in and out and moves up and down and the flies move on the the tongue. It was hard to know whether or not they had to still shots to come up. Or if there's animation to it. So I would be interested to talk to this group a little bit more to see. I'm putting it out there for those of you thinking I don't have the money to go into the video, to really purchase a video reinforcement system. This may be an option. Next slide, the next paper -- and I found this one really interesting. Because we all know it's been quite a while since we heard about the cross-check principle. It's something you want to think about and use often. It's a more current paper that looked at the cross-check principle and say, what can we say about the cross-check principle 30 years after we started talking about it? And so this paper came out and they looked at VRA, OAE, and temples. They used insert earphones. This was a large study that was done. It

was a multi-study that they had a lot of data. So they went back to look at the data to say what can we say about this and how good is the cross-check principle. So they did -- it's a retrospective study. They investigated the odds of obtaining results using cross-check. VRA, insert earphone, warble ear tones, 15 DB with the lowest level. They used a pulse. They did not try to get thresholds. They tried to say yes-no, we have normal hearing. If they did, they did a search for that. They took 13 DB at the lower level. They did OAE through DPOAE. It didn't matter. They classified them three ways. Small signal, less than 3 DB. A signal 3-6 DB or greater than 6 DB for signal and noise ratios. And they used tympanometry, it was a screening from the sites. Yes/no, I have a normal middle ear system or no I do not have a normal middle ear system. Next? There were 1483 cases that they could annualize and to really get some information about. And they compare the number of normal threshold levels to the total number of cases. 92 to 93 had normal hearing levels of their cases. And of those 92 to 93 with normal hearing levels, 86% to 87% had present OAEs. So it's confirmation if you have normal hearing levels, your acoustic emissions are present and they are at a level with a higher level. When there were discrepancies between the minimal response level and the OAEs, that is, you had normal minimal response levels that was less than 15 DB and absent otomistic emission, half had normal audiometry. This is more apparent at 2000 hertz than 1,000 or 4,000 hertz. Slide. So discrepancies where you have elevated minimal response levels in present OAEs. Those are harder to explain. It usually is. Why is the child not responding, yet I still have normal oto-acoustic emissionings. They felt that some of it had to do with how well the child responded in the session in the rating of reliability. They also thought maybe there was some bias based on reliability, VRA could have some building to it.

They really did have a good reason why they had this discrepancy. Next slide? And I quoted this because I thought it was important enough and I think again it really points out that we know these things, we've been doing these things for a long time, but here we have current literature that really can give us some information about what's going on. They found there was good agreement between minimal response levels in OAEs as they expected. When the two measures didn't agree, tympanometry was helpful at least half of the time to see why there was this disagreement. Minimal response levels were reliable -- questionable reliability, OAE may be important to ultimately test interpretation. Value of the cross-check principle has been once again substantiated. Again, the idea of having these articles is to try to help us understand more about what they're doing and verify what they're doing with having this support from the literature. It's evidence-based practice. So I think it's an important thing that we continue to get these studies out there and to look at the literature and find support for what we're doing and how we're making our interpretations. And just going to leave a little bit on the last note. We do all of this wonderful testing and we really want to make sure that we have the family involved. Because the one thing that we do know, and this is the show is this has been done for many, many decades that family involvement plays a role in language outcomes. Any child with a hearing loss or doesn't have a hearing loss, but it's important for the children that we do find to have a hearing loss, family involvement is critical. We don't want to downplay our good testing and forget about the fact that we really need to have -- to form this relationship with the families and make sure that we have a good connection and a good report so that when we do need them to do the next steps, that we have them onboard so that their child can be -- can have the maximum outcome that's possible. So



that's all I have in terms of updates. I would be happy to entertain -- I'm sorry I flew through those a little fast. I was trying to keep everybody somewhat timely since things are off kilter in terms of time with technical difficulties. But I would love to hear some questions. So if anyone has some questions, please, I I this the way do this is that you will be typing the questions in? Is that correct?

>> Yeah, if you guys have any questions -- one of the questions is about the CEUs. Yes, you'll need to take the quiz. Yes, you can use the certificate we'll send you for your ASHA hours. Any questions for Diane, though? Do you see the questions down there, Diane? Can you speak more to social reenforcement, please? Do we celebrate anymore?

>> I see it.

>> Yeah.

>> Diane Sabo: That's a good question. When ever I was listening to myself on the video, social -- you don't want somebody in the room who is so stoic that they are bland to the child. So the simple not, though, the pleasantness of an assistant is also important. You don't want to do the social reenforcement to the point where you become the reenforcer is the main message. That's hard when you are happy that the child is doing what they want. You have to downplay that. And it's not -- the celebration itself is when you're done and you got really good results. That's really when we should be doing the most celebration and quiet redirection is probably the best thing in the room, that way the child is really sure about what their direction is. What are they supposed to do. They're supposed to turn their head. They're supposed to have this animated toy or video be the thing they're looking for as opposed to you, the person. That -- does that

help?

>> We have another question coming in from Jenna. While we wait for Jenna's question, you can see in the middle of the screen, web links 2 to the learning outcomes, the overall evaluation, and also there will be the quiz as well. And all of that needs to be completed. Looks like they're still typing, Diane. Do you see it?

>> I don't have a age criteria. (Echo) whatever I can do with the child is what I can do with the child. Sometimes I have -- I had two around the same age, one was 11 months, one ten months. The 11-month-old let me do internal earphones and four frequencies in both ears and was able to rep respond and it was like heaven. The next 10-month-old, I came many, I got the earphones in, he didn't understand what to do. I took them out and try sound filled, really he did not understand the task. I never got him conditioned the way I would like to see him conditioned. I had a 20-month-old today, insert and sound filled. Mom wasn't sure he would wear the earphones, got the nice responses and I was able to clarify, get two frequencies in each year using insert earphones. So I try whatever age, I don't have an age cry tierian for using insert earphones or not. Yes. Children who are afraid of the reenforcements. You never know, some children will sit there and view the task and for some reason, you turn it on the next time they startle. After that, you can't ever use it again. And that's a lot of time I'll go to the video reenforcer. So in our booths, we put up reenforcers in all of our booths as well as the animated toys. You can turn on the toys. They hold interest but sometimes once they see the toy and the movement, and then try to just turn the toy on, it doesn't have the same effect and I'll go to the visual -- the videos at that point. If you don't have the videos, I would say, yes, use the light. Just light up the toy without animating it. The

children who are visually impaired are probably one of the tougher populations. A lot of times, though, children who are visually impaired have enough sight to see light and dark. So what you can do is darken the room and then have some -- have a bright light so that that can act as a visual reinforcement. So a lot of times -- again, a lot of children who are visually impaired can see but they may need to be very close to the animated toy to see it. So you may have to do some modifications in terms of moving the person to -- to the -- move the child closer to the animated toy if they are able to see it if they are close. Or as I said, darken the room and then that contrast with the lightup of the box oftentimes is enough for them to see. So, yes, that is difficult population. Especially when they're too young to do play audiometry, see if either of the things help. You're welcome, Jessica.

>> Thank you, Diane. Really appreciate you -- your patience with having to be a little bit late on this because of some of the technical issues. We're going get this whole thing up and running and recorded. And we should be able to have everything available for you. I think within the day by tomorrow sometime if all goes well. But we will send out an e-mail announcement that it's available. If you would, review those web links. I do have to have that quiz accomplished within the next three weeks because I'll use many CEs in the next three weeks. Any questions or concerns, you know you can reach me, KDIDDY or find me on the website and e-mail me that way. Thank you for your patience, your kindness, the lack of verbal abuse because of the issues that we had. And we really do appreciate you coming today. Thank you so much, everybody.

>> And I want to just say thank you and sorry if I rushed a little bit at the end. I have to go teach class and I'm a pediatric audiology. I'm going to go and run right now.

Thank you, if you have questions, please feel free to e-mail me directly.

>> Guys, there is a -- good night, Diane. There's a user name for the quiz. The user name is participant. The password is webinar. So the log-in for the quiz is participant. The pass word is webinar. Any other questions? Well, thank you all for coming. Again, sorry about the technical issues and we shall see you the next time, I hope. I will stay on to answer any additional questions you may have.

>> Daniel, do you see the questions? Somebody is having trouble doing the webinar quiz.

>> Let's see. The one for the webinar quiz does not work. Let me try it here. It's pulling up for me. Let me -- let me try posting alternative links. See if that works any better for you. One second. Wait, wait -- I think I do see the problem. Oh, that was because access was denied. Okay, I just posted a second link there on the window. The one that starts with the tiny url.com. If you still get an error, you may need to close your web browser and reopen it again. If you try to log in once with the wrong user name and pass word, then it won't let you log in correctly again until you close and reopen it.

>> I understand, Sheryl. It seems like today we're all being jinxed with our computers when you have a moment, restart your computer and try it again. If you still have trouble, you can go ahead and contact me. Let me put my phone number in here. Okay, so I just put my phone number in there. After you're done, restart your computer, start the link again. If you can't get to the quiz, give me a call and I'll give you some help.

>> Karen, are you still there?

>> I am.

>> Bernadette had a question about when the surveys were due.

>> You know, as soon as you're able to get them done. Again, within that three-week window, I have to submit everything to AAA for the CEUs. Please be nice on the overall. You're welcome.

>> The chats will be visible on the recording. In fact, the recording is still going on right now, even. So the chats right now are still being recorded as well. . .

>> This is Daniel on the mic. I think unless Karen says otherwise, I think we're probably ready to shut down the room so I can start processing the recording. Does that sound good to you, Karen?

>> Yeah, that will be fine.

>> Thanks again, everyone, for coming and your patience as we worked through the technical glitches. Get the video processed and out to you as soon as we possibly can. Have a good day.

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