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February 24, 2009.

Mild and unilateral hearing loss.

>> Steve: Okay.

On behalf of the Early Hearing Detection and Intervention Program at the Centers for Disease Control and Prevention in Atlanta, welcome to the teleconference on mild and unilateral hearing loss, considering the options for families. Our presenters today are Dr. Sarah McKay, clinical specialist in audiology from the center of childhood communication in Philadelphia. And Dr. Tharpe professor for otolaryngology in Nashville, Tennessee.

Before we begin the formal program, there are a few logistical details. Today's session is using new technology that has initially muted all phones except those of the presenters. This will reduce interference on the lines. There will be a time for questions and answers at the end of the session. All phones will then be changed to talk mode, allowing you to converse with the speakers. If you have technical problems or you don't have the link to the visual portion on the web, e-mail me at S Richardson 4 at CDC.GOV. The session will be recorded both visual and audio and be available later on the web. And now to allow maximum time for discussion, here are two very abbreviated introductions to our leaders for today's session.

Dr. Anne Marie Tharpe is a professor of audiology at Vanderbilt and associate director at the Vanderbilt center in Nashville. Her clinical and research interests are in the area of pediatric audiology. She has conducted research for the last 25 years and has published extensively.

Dr. Sarah McKay has been an audiologist at the children's hospital in Philadelphia for 19 years. She's presented on the topic of unilateral hearing loss at AAA, ASHA, EAA and Sentac. In 2005 she participated in the national workshop on mild and unilateral hearing loss sponsored by the CDC and the Marion Downs Center. She completed a study on children with unilateral hearing loss under the direction of Dr. Judith Gravel funded by the Association of University Centers on Disability. Dr. McKay is currently studying nonconventional amplification options.

>> Anne Marie: Thank you. We would like to thank the CDC and Steve for helping us prepare for this presentation. We always enjoy the opportunity to talk with others about this topic. Thank you very much. I'd like to start with providing definitions of what we mean by mild and unilateral

hearing loss. These definitions have been accepted by numerous organizations in discussing unilateral and minimal degrees of hearing loss in children. And the reason it's important for us to have some definition is when we go to look at different pieces of research and we want to compare our research and combine research efforts, it's important that we know what the population is that we're talking about. So whenever possible, it's nice for us to be able to have a clear definition of these degrees of hearing loss. But, of course, when you look across studies, you'll see many different definitions and categorization of hearing loss. We do know that we expect about one in a thousand newborns to have unilateral or minimal degrees of hearing loss. And yet by school age, this number increases to about three per 100. Coming up to about two and a half million school age children in 4 the United States with unilateral or slight or mild bilateral hearing loss. Of course, we're assuming that this increase in the prevalence over time has to do with late onset hearing losses, perhaps progressive hearing losses that were not picked up in the newborn period through our screening programs. Now, other data, the data that we're looking at here, and let me offer a little bit of explanation for all those initials at the top of the hearing loss category, we're looking at bilateral sensorineural hearing loss and these are minimal degrees of losses, high frequency hearing loss, conductive hearing loss and other. These are numbers that came from assessment of school age children in the third, sixth and ninth grades in the middle Tennessee area. When Fred Bess went out in a mobile van and screened children with -- in a soundproof mobile van, and screened their hearing and identified these numbers at that time. What is important to see here is I think we're looking at almost 9% of these children who had minimal degrees of hearing losses. What is also I think quite interesting about this particular study is that most of these children did not even realize that they had minimal hearing losses until they went out to screen them. Noting, of course, here that again we're talking about third, 5 sixth, and ninth graders. So these children are in classroom settings without any knowledge of having hearing loss. And so, of course, they would not be getting any intervention. So in total, when you add these numbers up, with those other children who had more significant degrees of hearing loss out of this population, we're talking about 11% of school age children in general education environment with some degree of hearing loss. Which is a higher number than what we've seen in the past. An interesting -- another interesting figure that has kind of been -- provided the basis for a lot of our studies and a lot of our interest in this population is an early study by Bess in the 1980s looking at the educational outcomes of children with unilateral hearing loss. The time when this study was conducted in the 1980s, audiologists were not paying much attention to children with unilateral hearing loss other than to identify the presence of the loss and recommend preferential classroom seating, and what Bess was hearing at that time from parents who were coming into our center here was that they had been told that their children would not be having any difficulty, however they were noting that their children's academic performance was not what they thought it should be. They felt it was because of difficulty hearing. 6 That's what kind of got the ball rolling in terms of Bess looking closely at these children. In fact, as you can see on the slide in the left hand pair of bars, you can see that these children with unilateral hearing loss who failed at least one grade in school amounted to about 35% of the population. That was compared to the percentage of children with normal hearing in the district. And by way of comparison, you can see that the children with unilateral hearing loss were 10 times more likely to fail at least one grade in school than their normal hearing counterpart. Likewise, if you look on the right-hand side of that graph, you'll see that Oyler and Matkin out in Arizona in fact replicated our study with their school children and found the same thing in terms of the proportion of children. They have lower numbers of failures overall, but their children with unilateral hearing loss were 10 times more likely to fail a grade in school than those children with normal hearing in their population. And as you can see here, over -- around that period of time when Bess first came out with those results of children with unilateral hearing loss, a number of other studies came out, and if you take a look on the far right-hand side of this slide, you'll see that a large number of children had a combined either

grade failure or need for additional resource help in the 7 schools. That was quite high. Ranging from somewhere around 35% to almost 50% when you combine all of the children with academic difficulties. So this clearly was a problem that needed to be addressed, and had been overlooked. Likewise, a little later, around 1998, Bess took a look at these children in the third, sixth and ninth grades. You can see these children with minimal degrees of hearing loss, so in this population, it's not just unilateral. It's unilateral and minimal degrees of hearing loss as defined by that first slide that I showed you. You can see that these children are at considerable risk for academic difficulty as compared to their normal hearing counterparts. So at this point, I'm going to transition this discussion over to Sarah so she can talk with you about hearing technology that has been recommended for this population. >> Sarah: Thank you, Anne Marie. The American academy of audiology addresses minimal hearing loss in its pediatric amplification protocol suggesting that children with minimal hearing loss should be considered for amplification or an FM system. So when we take a look at this child's audiogram and ask the question, does this child need amplification, it's obviously not cut and dry. 8 Many things need to be taken into consideration. I guess first and foremost, we need to remember that a child is not his audiogram, and there's going to be significant variability. You could have two children with the identical audiogram who are experiencing different difficulties. Need to see how they're doing at home, school, any behavioral issues. Audiogram. Remember there's a difference. It's difficult to predict which child is going to encounter the most difficulties. If we recall, about a third of these children with minimal hearing loss and unilateral hearing loss are going to experience difficulties, but that means that maybe about two-thirds will not. Also we need to take a look and say to ourselves, do we feel confident -- remember I'm talking about infants. Do we feel confident with our test results? With minimal hearing loss, we might be looking at ABR thresholds of 30-decibels with perhaps present AOsEs. Perhaps mild hearing loss at 4,000-hertz only. Have we ruled out a conductive component? Do we feel confident when we're testing this infant that our bone conduction results are accurate? 9 At CHOP, children's hospital of Philadelphia, they only see an otolaryngologist prior to sedated ABR. We need to make sure we're ruling out that conductive component before we consider amplification. Do we feel comfortable perhaps waiting until the child is six to eight months to obtain behavioral thresholds before we decide to fit them with hearing aids? Specific to the fitting of hearing aids for minimal hearing loss, when we're using a prescriptive method, what is the prescribed gain for each frequency when we're talking about a very minimal hearing loss, it might only be a couple of decibels. We have to decide is it worth occluding that infant's ear canal for only a few db's of gain. We need to continue to monitor that baby closely as the ear canal is changing and the targets for DSL are going to change. Also we need to decide is over amplification a concern. And we also need to keep in mind the caregiver's/parent's proximity during the first six months of life. Hold on one second. A practice which can help an audiologist determine if a child is a candidate is the function of auditory measures. They may serve to provide feedback pre- and postintervention. We do this a lot. And they may serve as a counseling tool. Open up communication between parent and child, teacher and 10 parent, or child and teacher. Sometimes when you're giving an outcome measure to a child and a parent, sometimes it's opening up communication in that the parent didn't know that the child was experiencing that problem. A really great resource on functional auditory measures is entitled incorporating functional auditory measures. It provides the recommendations for the tools to be used by the parents and teachers and sometimes the children. And it also bases it on the degree of hearing loss and on the age. It's really a nice tool. And also in the end of this booklet, it provides a detailed description of each measure. Another approach, which we find helpful is having a loaner hearing aid program. At CHOP, we have a number of digital hearing aids and a few Bahamas. Some were donated, but most were purchased as refurbished hearing aids. We usually give about a two to three month hearing aid to determine if the child benefits. This is really, really great, particularly if you're on the fence. Or if the child is on the fence or the parent is on

the fence, which is often the case with unilateral hearing loss and some 11 degrees of minimal hearing loss. I'm going to switch over for a moment to unilateral hearing loss. Unlike minimal hearing loss, with unilateral hearing loss, AAA says that the decision to fit would be made on an individual basis, taking into consideration child's family preferences, audiologic development and educational factors. When we go to this audiogram and ask, does this child need amplification, it's a little bit of a trick question, as you know, because the same rule applies. There really is no rule. Each child is different and will experience different levels of difficulty. So at CHOP, we have different considerations for amplification. And first of all, I'm talking about a conventional hearing aid, air conduction hearing aid. With age, we would consider a child who is 12 months or older for unilateral hearing loss a candidate, we look at degree of hearing loss. They must have a mild to moderately severe hearing loss in the affected ear. And the type of hearing loss, basically something that is permanent or at least semi permanent. And if we can get a word recognition testing done, we would like them to have some usable word recognition abilities in that ear. You might ask, why not younger than 12 months. 12 Again, we're talking about our CHOP guidelines here. The primary reason is we're not sure. There's no evidence to support the early fitting of hearing aids to babies with unilateral hearing loss. We want to make sure that we're getting some behavioral results. We are not fitting an infant with unilateral hearing loss based on ABR and OAE results alone, and we cannot assess a baby's word recognition abilities. I'd like to take a quick moment. We sent out surveys to 68 pediatric practices and got 46 surveys back. I wanted to touch on a couple questions. This was a question, do you fit a child with hearing aids based on ABR results alone without behavioral audiologic test results. As you can see, with minimal bilateral hearing loss. And with unilateral, 70%. There a lot of variability of the age of fitting when you take a look at unilateral and minimal. All the way up from infancy up to 50 months as you can see with unilateral. As is the case with minimal bilateral hearing loss, one thing to remember is that proximity. They're going to have an optimal signal ratio in their parent's arms. After 12 months, that's a different story. They're off. They're mobile. 13 Not going to have a great signal to noise there. When we think why not wait until they're older, a couple of studies that have been done, when we look at the preschool age, this study found that the preschool children had no negative attitudes towards the other preschool children who wore hearing aids. Unlike in a different study with fifth and sixth grade children, there were negative perceptions of peers. Some parents may opt to wait and see if their child experiences difficulty. If they do, the child might be dealing with failure at that point if they're having difficulties and be in a situation where perhaps they're in middle school and dealing with peer problems with wearing hearing aids. So why only mild to moderately severe? We're really not fitting children with hearing loss in the severe to profound range. We need to look at outer versus inner hair cell damage. Making it louder is not going to make clearer. There's also a less of a chance of providing some sense of binaural hearing when the hearing loss is over 70 db. What's usable word recognition? We can't put a number on it. It's likely that a child with very poor word recognition abilities will not benefit from amplification. 14 Again, we're talking about unilateral here. We must make sure that the amplification to the affected ear does not negatively impact binaural hearing. If possible, we'd like to complete speech testing. I'd like to turn over to a few studies on acceptance of hearing aids. With mild hearing loss, they found that 44% reported wearing their hearing aids all of the time. 25% never wearing it. With unilateral, it was less. 26 percent reported wearing it all the time, and 50% never wore it. Davis and colleagues also looked at ease of listening with hearing aids. They asked the parents to rate the ease of listening. Parents rated both children with mild hearing loss and unilateral hearing loss as having greater ease of listening in both conditions with a hearing loss. 80% accepted hearing aids as long as they had moderately severe or better unilateral hearing loss, but found very poor use of hearing aid or no use of hearing aid when the loss was profound. In a second study, Looking at bilateral hearing loss, they wore the aids less often, but only after a period of time of 30 months. Children had a greater awareness of

situations in which they 15 could get by. I will say I think we have found that as well. I like to call it a honeymoon effect where they love their hearing aids at first, but over time they start wearing them only in school or only when they need to. We did a questionnaire here at CHOP in 2002 where we looked at 20 children fit with unilateral hearing loss which were the only children we had at the time and we had them fill out a questionnaire modified from the child. Asked how they were doing now as opposed to prior to hearing aid fitting. In that questionnaire, with questions relating to ease of listening, 72% reported improvement with a hearing aid. When they were asked how they like their hearing aid, at least 70% said they liked it. The rest were sort of ambivalent. When parents were asked to rate their decision to have their child fit, 100% were happy with their decision. We recently did a study where we looked at children with unilateral hearing loss and we had 53 questionnaires returned to us out of all the children we had with unilateral hearing loss at the time. We had them filled out. But it was interesting, because when we did the child, the children who had hearing aids, which was about 46% of the 16 children, did poorer on the child. So it's kind of interesting to think about were these the children that are that third of children we know have difficulty? Is that the reason they chose to be fit with hearing aids in the first place? So what if the hearing loss exceeds 70 db? And this is the big question we get all of the time. I'd like to take a moment, since we are talking about severe to profound hearing loss. At CHOP, when a child has sensorineural hearing loss and oftentimes permanent conductive, the otolaryngologist does an MRI or a CT scan.

And when a absent nerve is identified, this is actually sometimes a relief to parents. It basically rules out other inner ear anomalies associated or hearing loss associated with a syndrome. For parents who are hanging on that, oh, can't we fit that ear, it justifies not amplifying. So one of the options for profound unilateral hearing loss is a CROS system, the microphone on the impaired side routes the signal. CROS amplification study found that children benefit from the CROS when the speech signal originates on the impaired side, but can be detrimental if the noise is entering on the impaired side and is sent to the normal hearing ear. 17 The author's conclusions were that this should be used for children who can appropriately determine which listening environment may benefit from a CROS. It might not be appropriate for young children who may not be able to determine when it's best used. Transcranial amplification is another option for individuals with profound hearing loss. It sends the signal via bone conduction. There are two forms. The Baha, and the transcranial CROS. You'll notice that the Baha that has had various names, it was the bone anchored hearing aids or apparatus, but right now this is what it's called, in case you're wondering. So the Baha marketed for individuals with conductive or mixed hearing loss has recently been marketed to individuals with profound hearing loss or single sided deafness. Due to anatomical maturations, the child has to be five years old before they can be fit. So this study looked at children with conductive hearing loss. And this was done by colleagues. It was a prospective study. They did speech and noise testing and two different questionnaires. They found that children with unilateral conductive hearing loss did show -- the children did note satisfaction from the Baha 18 based on the responses to the questionnaires. A study was done recently using the Baha for teenagers with profound hearing loss, unilateral hearing loss, and I believe this is the only known published study on the use of the Baha with children with single sided deafness. This was a retrospective review of three teenagers with profound unilateral hearing loss. They used the hint and child. They reported improvement in understanding in speech and noise, and they also reported subjective benefit based on the answers to the child. This is another option for individuals with severe to profound hearing loss. This is a device which is interesting. It's a bone conduction vibrator that is encased in the ear canal. A mike is in the BTE component. There are no studies to date in children, but I know of one pediatric center that offers the trans ear as an option. The children report subjective benefits. But again, unfortunately, we do not have any studies to date using the trans ear in children. But it will be interesting to see how they do. With this, the transcranial CROS is deep

set in the canal. The signal is sent over the bone conduction to the normal hearing ear. There are no studies to date on transcranial CROS in children. Now I'm going turn this back over to Anne Marie to talk about FM considerations. >> Anne Marie: Thank you, Sarah. I think there can be little argument but that if we could have our way with children, we would always recommend FM for these unilaterals and minimal degrees of hearing loss, but, of course, as we all know, FM is not always the most practical hearing technology for children, which is why Sarah addressed the issues regarding traditional amplification for use in the classroom and outside of the classroom. But within the classroom, we typically think about the use of FM system technology, but even in the classroom, there are concerns about the practicality of FM use with these minimal degrees of bilateral and unilateral hearing loss. And the problems tend to center around the need for the child to be able to hear the teacher talking in the classroom, of course, but also the student needs to be able to hear their classmates for a number of reasons. They need to be able to participate in classroom discussions. It's important for socialization and other reasons in the classroom to be able to hear. So we want to be careful about not fitting a device on a child that would prohibit that kind of listening of one's peers in the classroom setting. So we had put together a study here at Vanderbilt to look at monaural versus binaural with children with minimal degrees of 20 hearing loss the. And we also wanted to look at the desirability and the effect on speech perception of two different ear mold types. The open and the skeleton ear mold. With the assumption that the open ear mold of course would perhaps help protect against over amplification, but it also allows for more perception of background noise which can be problematic. So we wanted to look at those ear mold factors as well. We utilized the hint C. We also looked at teacher ratings and the student's self-report. But I'm going focus on the results of the hint more specifically. So we looked at again a skeleton mold and an open mold and two different configurations of monaural or binaural fittings. We allowed a two-week audiogram acclimatization with each device and followed by testing. So the entire protocol took a total of six weeks. This is what our testing arrangement looked like for purposes of the hint. So the child seated in the center of the room assuming that the red speaker represents the teacher's voice in this case, where the hint words would be delivered, and this would -- we tested in these different conditions. In the monaural and bilateral mode. And here are the results. 21 And what I'd like to do is draw your attention over here to the right side of the graph. And with the hint, the signal to noise ratio or threshold rather is on the Y axis, and for purposes of this particular test, the lower the bars indicate the greater the FM advantage. So as you can see, the unaided bar, the blue bar there represents a very poor signal to noise threshold, where it is quite improved by the use of FM, regardless of the configuration. You see the monaural open configuration provided significant benefit over the unaided condition. But we do see improvement, significant improvement using the skeleton mold relative to the open mold. Again, that has to do with the skeleton mold being more occluding. Therefore there's less noise going into the ear canal and additional binaural advantage here. We did not have a binaural skeleton configuration. We felt that no one would occlude a child's ear, both of a child's ears under a binaural skeleton configuration. So we didn't even test that. So the hint results, as demonstrated, indicated significant improvement in FM versus no FM condition. We didn't see an effect of teacher location that was significant. We did have an advantage with the skeleton versus the open ear mold and we had a slight binaural advantage. 22 Our interpretation of those results indicated that we can have considerable flexibility in terms of fitting FM on children in a classroom setting. In other words, if a child refused to have binaural FM fitting, we know that even a monaural fitting is quite beneficial in the classroom setting.

Of course, that leaves one ear open for purposes of communicating with their peers. We also -- I didn't put the slides in about the self-perception measures from this study, but the children in this study reported to us that they were willing to use this device, which is -- was very encouraging from school age children, that they were willing to use the device.

But all of them said that they would use it on one ear and they did not want to wear it on two ears, which may have to do with the cosmetic issues. And then what I'd like to do at this point is summarize some of our recommendations for management of these children in general. So, of course, counseling is always important with all of our families with children who have hearing loss. The control of an acoustic environment both in the home and classroom setting is important, and that's the case whether a child receives an FM system or not within the classroom setting. We know that even FM performance can be improved by reduced reverberation. 23 The effects of minimal hearing loss can be subtle. So in my experience, counseling families and educators with regard to the importance of minimal degrees of hearing loss has been quite challenging, because these children exhibit behaviors that are as obvious as children with more significant degrees of hearing loss. And so under these circumstances, I think that the use of auditory simulations can be quite effective in helping parents and educators understand the impact of minimal degrees of hearing loss. I think it's also very important that the medical community as well as parents understand that many of these losses will not be detected through the newborn screening programs and this of course is important when children have undergone newborn hearing screening and then later parents are concerned about perhaps speech production or behavior in their children. And they go back and say, well, Suzie had a newborn hearing screening, so I don't think it's hearing, it must be something else. So we clearly need to counsel and educators and families and medical community more thoroughly about those identification issues. Another important issue is that children with unilateral or minimal degrees of hearing loss should receive etiologic evaluations that are just as aggressive, if you will, as those 24 with more severe degrees of hearing loss. Sometimes because the losses are not as significant, there is not the urgency of medical etiologic evaluations is not seen. However, we know that there are many genetic causes for minimal and unilateral hearing losses that can include enlarged vestibular aqueduct or malformations that may progress to losses. CMV has been implicated in minimal and unilateral hearing loss, and there are concerns there, because with cytomegalovirus, we may see more diffuse neurologic problems with these children that should be identified. Some very interesting results have been reported by Marilyn Noelt from Boston children's hospital. This has to do with the number of cases of children who were initially picked up on newborn hearing screenings with a unilateral potential for a unilateral loss, and were later found to have bilateral hearing loss, which was quite interesting. And the assumption is that there are basically two groups who move from a unilateral to a bilateral hearing loss category. Those of those children who had bilateral hearing loss at the time of the screening. But only one ear referred. That can have to do, of course, with the level of the screening signals that are used and those who had unilateral hearing loss at the time of the screening but progressed and later developed bilateral hearing loss. 25 Furthermore, there are cases, for example, with EVA, where if that etiology were known, we may be able to prevent further progression through caution and protecting children from, for example, contact sport that could exacerbate the loss in the case of enlarged vestibular aqueduct. So knowing the etiology of these losses is just as important as it is with children who have more severe degrees of hearing loss. Some other interesting results from children's hospital had to do with the CT scan findings in children with unilateral hearing loss. In this particular report, of the 18 children with unilateral hearing loss who received CT scans, eight of them had abnormal findings. Including EVA, et cetera. But what was particularly note worthy, I thought, was that in five of the eight children, the CT scan were abnormal bilaterally, which was quite interesting and of course is important in terms of counseling families as to what potentially to expect. Additional recommendations have to do with the environment. If the day-care or school where these children attend, there may be classroom modifications that would be important to conduct in the -- in these settings as well as implementation of different hearing enhancement technologies, perhaps soundfield amplification and other technologies. 26 Speech and language monitoring is an important aspect of our overall recommendations. We want to be sure that families have a

language rich home environment so that we can stimulate the development of normal language. Therapy is sometimes indicated, even with our children with minimal or unilateral losses. We've talked about the audiologic monitoring and how important that is. And of course Sarah covered the importance of functional auditory assessments that should be conducted in the educational environment as well as at home. There have been numerous examples over the years that I have been practices where families have been the first to notice some very subtle changes in their child's hearing because they've been using and monitoring their child's hearing at home through the use of functional auditory assessments. So I have found them to be very valuable. And in final wrap up here, I would like to recommend, if you haven't done so already that you go this website that's listed where you can receive the workshop proceedings from the workshop of 2005 that was sponsored by the CDC and the Marion downs hearing center. There are some wonderful articles and presentations that you can find here.

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So thank you very much for your attention. And I'm going to hand this back over to Steve to open things up for questions. >> Steve: Thanks very much. The phones will now go to talk mode which will allowed everyone

to be heard. You may want to mute your own phone to maintain the privacy of your own office. You can press a mute button or press star six. If you'd like to ask a question, press star six again and that will unmute your phone. This part of the teleconference will also be recorded. >> the conference is now in talk mode. >> Steve: Please go ahead with questions. >> Could you tell us the name of the website on the CDC? >> Steve: Which website are you referring to? >> the one that she just referred to from 2005. Was it Vanderbilt? >> Anne Marie: The address is at the bottom of the slide. >> Can you show the first slide again about the definitions of the minimal unilateral loss? >> Anne Marie: Steve, can you take us up there quickly or do I need to go all the way through them? >> Steve: What we'll do is, if you'll bear with me for a moment, -- sorry.

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>> Anne Marie: I'll just scan it. >> Anne Marie: There you go. >> Thank you. >> Will this PowerPoint be available for us to down load at a later point? >> Steve: If it's all right with the speakers, I'll be glad to forward the particular PowerPoint.

There will be a recording of the entire session, both the video and audio available over the web as well. So please just, if you would like a copy of the PowerPoint, send me a request at [SRichardson4@CDC.GOV](mailto:SRichardson4@CDC.GOV). >> Could you repeat again where we send the e-mail, please? >> Steve: It's [SRichardson4@CDC.GOV](mailto:SRichardson4@CDC.GOV). [Srichardson4@CDC.GOV](mailto:Srichardson4@CDC.GOV). >> I have a question about the studies that were done as far as children's acceptance of a child with a hearing aid. When you did the questionnaire and talking with the fifth graders versus the preschoolers, were those kids in the fifth grade recently fit or had the kids in their class known them for a while with the hearing aid? >> Sarah: Those were not my studies. And I believe that what they did -- I know at the preschool, they showed them pictures of children with hearing aids. So they were looking at pictures. And I believe that -- honestly I'm very sorry.

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I can't recall with the fifth and sixth graders whether they were already fit or newly fit. But I know with the earlier -- the younger group it was pictures. Those were not my studies. I apologize. >> Okay. It would be interesting to do a study, you know, along that line, because it might be more -- it might help parents be more inclined to fit their kids earlier.

>> Sarah: It might. You're right. You know, my experience with younger children, because sometimes I often ask them, you know, how is it going at school and kind of open ended questions. I tend to find that the younger children don't have as many problems. Most of the kids, most of the younger kids are picking hot colors for their hearing aids, red, blue, it is a fashion statement. So I think that says a lot about their self-esteem. >> I find the same thing. The longer the children have had them and had positive experiences and their parents are positive, the better they do. >> Sarah: Right. Right. >> I have a question.

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You talked about determining CMV as an etiology of the hearing loss. Can you really determine that after the first few weeks of infancy or were you -- just be aware that it's out there and monitoring carefully? >> Anne Marie: Well, I think both of those things. One is that you are right. You cannot identify CMV after -- I mean, it varies a little bit, but after the first four to six days after birth. Unless you have access to the dried blood spots from newborn screening that might be stored by your state. And there's a little bit of controversy about that, about how sensitive those dried spots are for collecting CMV after the fact. But I do know that, for example, in the state of Washington, they keep those cards for 21 years. And other states keep them for a much less -- a much shorter period of time. So it depends on where you are and what your access might be to those blood spots, if the testing is not done in the newborn period. >> Thank you. >> Anne Marie: Since there's a gap in the questions, I think it's interesting to think about the impact of the etiology of the hearing loss on educational outcomes.

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What I mean by that is that there has been some individuals who have suggested that it's not the hearing loss per se that results in the difficulties these children are having, but rather the etiology. And that might mean -- Sarah had mentioned that we really can't identify which children with unilateral or minimal hearing losses are going to have difficulty and which ones aren't. Some of these children do beauty fee. Why is that? We're not sure. We haven't been able to identify that.

But certainly it's reasonable to think that perhaps those children who have minimal degrees of hearing loss because of CMV, it may be the CMV that's having some diffuse effect on the children's learning capability as opposed to the actual loss of hearing. And that's one of the areas that I hope we can start looking into more thoroughly. >> I have one more question. You talked about the CT scan uncovering some abnormalities sometimes bilaterally with these children. Is there a lot of variation in the quality of the CT scan? Can you expect to get those

kind of results anywhere? > Anne Marie: That's a good question. I don't know that I can address that adequately.

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I would certainly think that yes, and I know from talking with our otologist here at Vanderbilt that certainly some types of CT scans are better than other types of CT scans there's no question about that. So as far as that's concerned, yes, certainly there could be some variability across facilities, depending on the type of CT that they're using. I wish I had more information about the specifics of the different kinds of CTs, but I really don't. >> Sarah: I know we've experienced that too here where a patient has come from another facility with their CT and I don't know if it was a the type of CT or the particular area that they looked at, but they need to do order another CT to get what they wanted, and sometimes they need to order an MRI. >> Steve: We still have some time remaining in our original slot. If there are one or two questions still remaining out there. >> Steve: If people think of a question they meant to ask, what would be a good way to get those questions to you? Would you be able to respond to those? >> Anne Marie: E-mail would be fine. >> Sarah: Likewise, that would be fine. >> Steve: Would you like to have them sent directly to you or have them come to this office just as a convenience?>> Anne Marie: It's fine if they want to e-mail me directly,

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just save you any effort on the CDC's part. >> Sarah: I agree with that.>> Steve: Would you like to announce an e-mail that would be a good one if someone had a question? >> Anne Marie: Sure. My e-mail is [ANNE.M.tharpe@Vanderbilt.EDU](mailto:ANNE.M.tharpe@Vanderbilt.EDU). >> Sarah: My e-mail is McKay@EMAIL.CHOP.EDU.

>> Steve: Thank you any final questions for our presenters today? A recording of today's session, including the PowerPoint slides will be available in the near future, an e-mail will be sent to the usual listserv groups that received the original announcements of this session. We welcome your ideas on how to improve our session. Let us know what you liked about today's presentation and what we can change to make future teleconferences more useful in your work. Send comments to [GOL8@CDC.GOV](mailto:GOL8@CDC.GOV) . [GOL8@CDC.GOV](mailto:GOL8@CDC.GOV). Thank you for taking part in today's teleconference at CDC EHDI. [End of conference.]

