DR. STEPHEN HOOPER: First question I have is related to, what is the comorbidity of the diagnosis of autism and brain injury. I think that--first of all, I don't know if anybody that's actually pooled those two things together. Secondly, I'm not sure it would be appropriate to pool them together because autism is a neurodevelopmental disorder. And it does relate to brain function and it's brain development differences that we see as opposed to an injury. So--and you have individual's autism to get a brain injury, yes, you can. And you have individuals with brain injury that have autism, perhaps. Is that overlap any different than what you might see in the general population? I wouldn't think so, although the rates of autism as you all know are pretty high now, one in sixty-eight. But it is true to say that if you've had a brain injury and if you reflect back on this morning in terms of that limbic system in getting sort of injuries to the amygdale, and remember the head ganglion of the emotional system and you get injuries to that white matter that you may indeed have a lot of brain injury or brain differences that may be reflected in autism-like symptoms. So you can have the joint attention problems that are one of the precursors to social functioning in a hot area for individuals with autism. You can have social agnosia in terms of folks, you know, not reading social cues or recognizing faces. You can have significant pragmatic issues going all the way from theory of mind problems to sort of the difference between literal and figurative language understanding. Still, a lot of kids who get traumatic brain injury may have these features but we wouldn't want to call it autism. We'd want to call it brain injury. And again, I don't know if any studies have actually looked at what is that comorbidity of autism and brain injury especially in preschoolers where it gets real tough to figure out the autism. Second question I have is if a unit one injury, and again that's Luria's unit one talking about the brain stem related to arousal, what is the length of time of expected recovery for perhaps a youngster who sustained it at twenty-four months of age or two years of age. Remember that unit one with the brain stem is largely up and running at birth. So if you damage that, the recovery curve--the typical recovery curve for school-aged kids and adults is anywhere from, you know, 12 to 24 months or 12 to 30 months and for some folks, for other studies, it can be even longer. So it's hard to say and my guess is nobody's ever looked at this in terms of the recovery time for a brain stem injury for a kid. My guess is--remember, because it's up and running for the most part, if you damage it, there's not a lot of development left there. So you're probably going to have a long term persistent problem with sort of brain stem related functions like arousal. So somebody's going to have all the way from--they could have tension problems to narcolepsy to just general sort of arousal to various types of stimuli in their environment. It's a great question though. And then I have a third question. It says how does the information that we've been talking about this morning apply to babies who have been exposed to substances in utero and perhaps babies that have seizure disorders. Well, a lot of it does apply in terms of not necessarily the--in terms of the babies that are exposed in utero, it's fascinating because, again, all the things we're talking about today actually are developing prenatally. And it goes all the way back to the formation of the neural tube and that first two to four weeks in gestational life. Now, for those of you who've had children, many of you maybe didn't even know you were pregnant in that first two to four weeks. You find out, you know, about that time unless you were doing it by modern chemistry and you
knew sort of exactly the time point but the fact of the matter is is most women don't know they're pregnant in that first two weeks or four weeks. What happens with the neural tube however is that is when the brain system in the central nervous system is being formed in that first two to four weeks. And all the precursors are down by four weeks of age. So if you don't know you're pregnant and you go out and you whoop it up and have a lot of drinks and maybe some recreational drugs and you do that regularly for a couple of weeks and guess what, you may have a baby that has fetal alcohol syndrome. Okay? I've had cases where actually preschool teachers--you know, the mother came in with her child and said, "My child has fetal alcohol syndrome." And the teacher was, "Oh, I didn't know you're an alcoholic." And the mother said, "I'm not an alcoholic. I just happened to be drinking at the wrong time in my pregnancy." And she was a young mom and, you know, young people go out, so I'm told. I wouldn't know. But the fact of the matter is is that it's a--it's serious business and most people don't know that the teratogens that they put in their system are actually going to hurt their unborn. So all of these things apply whether it's substances, mothers get sick, you know, rubella can be something that is devastating to a developing fetus but may feel like a cold to the mom. So if you don't get prenatal care, you won't get that treated and it can be actually--you know, just sort of do some terrible things to the brain and the central nervous system of a developing baby. Again, what's important to know is this concept of development [inaudible] so what's happening at certain points in time prenatally apply as well. So we talked about myelin. Remember, I said it starts at the end of the second, beginning of the third trimester. Well, if you're doing something to your body that you shouldn't be doing or you're not taking care of yourself perhaps because you're poor and you can't get the nutrients you need or in the food that you need and the diet that you need or perhaps you get ill, so it doesn't have to be bad things that mothers happen to do to their bodies. It can be just stuff that happens. Well, you may disrupt that myelin development because it starts at that point in time. And so indeed, then that developmental trajectory continues post birth. So this applies to the babies that are exposed in utero to all kinds of substances. Alcohol is the bad one though. That's the one that's almost worse than some of the other drugs because alcohol is a bad drug and as you all know, it's legal. So, anyway, other questions? I can take a couple other questions.

WOMAN: [inaudible] more...

DR. STEPHEN HOOPER: Good.

WOMAN: My mother's side, it's...

DR. STEPHEN HOOPER: What do you find in with outcomes for anoxia in preschoolers? Well, anoxia is a very interesting problem because--what is anoxia?

[indistinct chatter]

DR. STEPHEN HOOPER: Yeah. Anoxia is you're not getting any oxygen to the brain. And when can you get anoxia?
DR. STEPHEN HOOPER: When you choke, when you are near drowning, perhaps coming down the birth canal, all right. So, these other--these various things that can happen where, for whatever reason, oxygen doesn't get to the brain. What we know about the brain is that you have about three to five minutes before the brain begins to sustain damage. That's why you never worry about when a kid says, "Well, I'm going to hold my breath until I pass out." Well, go ahead because they're going to pass out and start breathing if they even get that far. So the fact is is that we're talking about something the prevents you from getting the oxygen to the brain. You get about three to five minutes before you start to sustain neuronal--remember the neurons? Before we start hurting the neurons in those--in the cell bodies and the axons and the dendrites and the connections, about three, five minutes. So the longer the anoxic event, the greater the chance that you will have--sustain brain injury. Now, the problem is with an anoxic event is oxygen goes all through your brain, so it's not like you're going to get an anoxic event here. It's going to be a generalized diffused kind of injury where everything in the brain gets--is vulnerable to disruption which then means all the neurological underpinnings for all of your development is going to be at risk. So we're finding that the longer and more severe the anoxic event, the greater the probability that you will have problems. A lot of times, you'll see this with individuals who've had seizure disorder. And in fact, when I worked at Penn State, I had a case. I worked in the rehabilitation hospital and I had a case where a child had seizures and the father put the child in the car, a baby who was 12-month old, had a seizure and they drove an hour and a half to get to Hershey, country roads, you know, sort of finding their way and they brought him into the hospital and the baby had been seizing for an hour and a half. What happens when you have that kind of seizure event is that you're not getting oxygen to the brain. That's the problem with long-term seizures and that's why they say if you have a seizure that's lasting three minutes, you get the help in immediately because most don't. Most last, you know, seconds or maybe a minute but if the--if it starts to go three to five minutes, it's not because of anything other than the oxygen to the brain is not--is not getting there. So anoxic events are bad when they happen and the idea is to try to shorten them as quickly as you can. This other question, I'm going to hold on to here in a minute because I think we're going to get to this later this afternoon. Other questions? Can we do one or two questions more? Anybody have one? Okay. Very good. So let's move in to this afternoon. What I want to do is I want to talk a little bit about sort of assessments. And I want to talk about it from the standpoint of a perspective and from a preschool kid perspective. But I also want to talk about sort of from an early childhood perspective, what is the implications of the day and things to think about. So let's talk about this. Neuropsychological assessment, those of you that are involved in BrainSTEPS probably are familiar with what this is and the need for it. Those of you in early childhood may or may not have familiarity with what this is. It is fair to say though that there is increased focus on the assessment and the intervention needs of the little guys, and it goes across a lot of developmental needs. I mean, you know, this is no accident. We know early intervention works. There's good data for it, what you do is vital to children with
all kinds of difficulties and quite frankly, traumatic brain injury is right, front, and center with that. The other thing that's happening is a lot of times, our kids, you know, these aren't kids--aren't being segregated anymore. They're being brought into regular childhood programs and kids with brain injuries are sitting in regular fourth grade classes and so on and so forth, so sort of the inclusive aspects of what's happening, whether it's right or wrong is happening. These kids are sitting in your classrooms now. And it's important, again, I think this early intervention component is really very critical for preschool TBI and what's really important here is that we really don't have any standardized screening mechanisms to find these kids. When you go through your preschool screening, I'll bet you dollars to doughnuts that you don't say, has your child had a brain injury and what do you do and what the--you're following through with those questions. And you and every other state in the country, you're no different. And if you add that, you will be one of the few that asks. People asked me in North Carolina because we've been training school psychologists in North Carolina for 20 years now, over 20 years, and people said, "Well, gee, you've been doing it for so long, what's your--what do you think the biggest accomplishment is?" And when I think about it, the biggest accomplishment is I have school psychologists now saying as trivial as it is, on every assessment they do, they're asking has your child ever had a brain injury, have--they ask the question three of four different ways to sort of figure it out. You know, and everything else that we put our time into, the assessments and the interventions and, you know, it's hit or miss because people do what they want to do or what their systems require them to do when they get back to work. But they all ask that question now and I think it's a small drop in the bucket but it's now consistently being asked. We don't do that for fetal alcohol syndrome. We should. And we sure don't do it for traumatic--we don't do it for preschool, we don't screen for brain injury. It's in part, you know, why is this happening, well, why are we getting this diversity? Well, you know, medical care is getting better. Kids that would have died before don't die. And the fact of the matter is is while we're lessening mortality among these types of situations, we're also increasing morbidity. So fewer children are dying which is a good thing but that comes with some additional responsibilities for addressing their developmental needs. There is a statistic that I don't think I have in my slides but if you are premature, if you were born prematurely, okay, which by definition is what?

[indistinct chatter]

DR. STEPHEN HOOPER: Generally 36 weeks or less, that's sort of a working definition of prematurity and we could sort of debate that given a week or two but it's roughly 36 weeks or less. If you were born prematurely, you have a 75% chance of having an IEP somewhere along the line. Now, that IEP can be just for an articulation problem, relatively mild on the spectrum of concern, or it could be for a severe intellectual impairment, okay? My guess is if we started screening for TBI, you know, that would even go up further, okay, and where you start asking the questions. And half the challenges that we have in the North Carolina schools and my guess is maybe to a lesser extent here because you guys are very active with BrainSTEPS. Then again, I don't think you may or may not appreciate how important and special that is because it's not been something that's been done in probably 48 other states. Like, Oregon is the
only other one sort of driving this in a--in a systematic way which I think is really the trick because you're changing systems. Other states like North Carolina do it on a hit and miss basis and we're trying to correct that but it's slow. But the fact is that trying to build in screening mechanisms is just going to be real critical to tracking even these kids and we just don't ask. We know that because we're seeing more kids with concerns including those with brain injuries, you know, the treatment needs don't go away, you know, knowing these types of things really begin to lay the foundation for earlier intervention, better assessment treatment linkages, and thinking about the things that we do to prepare for the developmental and learning needs that kids are going to have so that we can capitalize on a strong assessment to detail what kids do well, what kids are struggling with, and what they need help with, and what we--maybe we need to sort of say, "We're not going to worry about that now but here, we're going to prioritize these three things because this is where this youngster and their family is." And so it provides--the neuropsychological assessment can provide a very detailed assessment at some of those needs. Now, for me, I'm not--I'm not a big test guy. I do a lot of testing and I know the test and we can make a list of tests and that's great but you guys could do the same thing. And I like to think of assessment a little differently. I like to think of it as sort of putting the pieces of a puzzle together. For me, assessment is really a problem solving process, you know, so somebody says to me this youngster's had an injury, you know, and I need to know where they're functioning. Okay. I get this--I get this sort of referral from the docs a lot in the hospital. I need an IQ test. And so my comment to them generally is, "Okay, I can give an IQ test. That's easy. I'm happy to do it. But tell me what you want to know about this kid, what--you know, what are the challenges? What are the parents worried about? What are they complaining to you about? You know, what do the teachers know about this kid? Are they concerned about reading? Are they concerned about where this child is with toilet training or walking? Tell me, you know, what are you trying to accomplish?" And then I get my answers. Then they start to say, "Yeah, we've been talking to the mom and they're really worried about X, Y, and Z." And I say, "Why, you know, I can do this and that and I can figure out this." And so I can do the IQ test but that's not really what they wanted. And so it gets back to, you know, figuring out what I need to do to solve the problem and so this is really, for me, a goal-directed problem solving process that uses different kinds of measures to get there. And for me, in those cases and the cases with brain injury, the developmental framework, the framework for me, the theoretical framework is development. What do I know about brain development and how do things go forward from a neurological perspective? This is variable, so it goes from case to case. It's going to be very different. What are the questions that we're asking, tell me about the kiddo a little bit, what else do we know, you know, is the kid okay and then all of sudden, they weren't because of the injury or was the kid sort of struggling a little bit and then they had an injury? That's a different scenario and knowing that premorbid function is really important. You know, what's the problem, what's the resources? Is this a family that has a lot of resources and if they need to get to X, Y, and Z they can do it or is this a kid we're going to have to dig a little bit in the social services to really get them the things that they need? So this is not a one-size-fits-all, it's not one, two, three. For me, it's every case is tell me
what the problem is and how can we work through this together. I don't have a white horse that I ride in on. I know sometimes when I can consult with schools, one [inaudible] to being around a long time is mostly the school systems know me but, you know, I get a lot of resistance, you know, you guys--the university think you know, X, Y, and Z well. That's not the--that's--you know, that's not what I'm selling, you know, I want to be able to sort of help you problem solve around what are the challenges. And sometimes my answer is I don't know. And that's okay. It's okay not to know but then you just keep hanging in there and this is why developmental surveillance especially in preschool is very, very critical because things can change very quickly as you all know simply because of development. Clinical neuropsychologies and applied science, it looks at behavioral looks of expression of brain function and dysfunction. And what's important here for me is this part right here, dysfunction, dysfunction. As a field, this is what most people hear about, brain damage. You know, I--still to this date, people will call and say, "You know, I have this case. I want to know if he has brain damage." And my response is always, "Well, if you want to know if they have brain damage then I need to refer you over to neurology because they can actually look at--look at the brain and tell you that." So I want to make sure they're asking the right question of the right person. Now, I can infer brain damage but I can actually tell you if it's there or not. So if the question really is I want to know if there's brain damage, well, then you need to go get a picture of the brain and that means a neurology scan and somebody has to interpret that. There's nothing wrong with that. It's just asking the right question to the right person. I can't tell you the number of times where this is a question that's popped up in the schools and they made a referral and they had to pay for it and they get back a half-page report that says brain damage. And they're going, "Yeah, but we wanted to know why this kid can't read." It's, like, well, you've asked the wrong question of the wrong professional, okay? So it's a matching. The neurologist didn't do anything wrong. They did what they did and schools just didn't ask the right question. So there's a real trick to this but I think we always get lost in the neuropsychology of what kids can't do. I'm equally interested in what they can do. So I want to know what the kids are interested in, what makes them laugh, what are their affinities, you know, can I tickle them, do they like that or do they--don't want to be touched especially by me, you know--you know, I'm a stranger so how do they respond, where are their strengths, you know, even in the most severe kid, severely involved kid, there's something you can find that's going to tell you a little bit about what they like or what they can do or what gives them a smile or what have you. So for me, I'm equally looking for what we can do and what this kiddo can do as well as what the residuals might be from an injury or an insult to the brain. You refer for neuropsychological assessment for a variety of reasons, the spared versus impaired abilities especially in the concept of an event like a traumatic brain injury, understanding the impact on development, we've talked a lot about this this morning and this really comes to life with preschoolers when you lay out the developmental trajectories in terms of milestones as much as we started the day with and you start to say when did it happen and what might we expect to be problems down the road. If you just lay out the developmental timelines across motor, fine motor, gross motor, speech, language, et cetera, and you all have these books especially the early childhood people sitting on
your shelf somewhere, and a lot of you probably have that information ingrained in your brain, the fact of
the matter is is that you can say the injury happened here, here are things that are going to be at risk. It
sounds simple but if you don't combine the two, you'll never get there. Okay? It's a--it's a--it's just a
simple matching of your knowledge base with understanding the nature of the injury or the event. You do
the same thing with cancer, you do the same thing with diabetes, you could do this say--you know, you
could lay these things out and see what developmentally is going to be of issue. Probably one of the
areas that's become less of a focus in neuropsychological assessment is the localization of function and
dysfunction. Where in the brain do you think it's disrupted? We still do this. I work on the epilepsy
surgery team, the pediatric epilepsy surgery team at UNC, and the fact of the matter is is I'm asked to
localize the brain where the word seizure focuses. And it's hard with preschool kids, really hard, because
remember, if plasticity is going to occur, generally happens earlier, so the brain's already reworked itself
by the time you even get to the kid. So the whole interpretation of what we expect to see in the brain is
going to be really different. So you got to be real careful with that but this is what I'm asked to do and why
am I asked to do that? I'm asked to do that because I'm comparing my data with the brain scans, the
EEG, and some instances, depending on the age of the person, the PET scans and we lay it all out and
we say where in the brain is that focused. And sometimes it aligns, the stars align and we hit it and other
times, we're all over the place. And we do all of that before the surgeons go in and start to map it out.
And they are very careful, so if they're going to cut something out of the brain, they want to know what
they're cutting. The other thing that these data do is that sometimes the neuropsychological data actually
provide guidance as to the surgeon to say we're not going to make--do the surgery because the other
parts of the brain are not able to sustain function so if we cut this out, they're going to be left with nothing,
so let's keep working on drug sort of management if we can. So, it's a very interesting process but this is
not generally what we see cases for. It's really these first two tend to be of greater importance. The data
sometimes can help us to decide whether we can push forward to remediate or whether we have to look
for alternate pathways and compensate. And again, the--we get these suggestions for remediation and
compensation from the data, and I believe that the neuropsychological process does really drive sort of
the monitoring tracking of progress once you get to the school set. And even in the preschool years
because it allows us to sort of say, "Here's where this kid is now. Now, let's see where they are in six to
twelve months or eighteen months," or whatever that tracking plan is for that kid. And that doesn't mean
you have to go in and do everything again, but you can selectively go in and say, "You know, the kid's
memory and the kid's visual processing actually were pretty good. But the attention wasn't so good. So,
let's make sure we reassess that at regular intervals. And we'll just check in on the memory and the other
components just to make sure everything's okay." But we won't do that as frequently. So--but, you know,
it's not a one-size-fits-all, but I think it gives you strategies for the monitoring and the tracking. For those
of you that work with preschoolers, I always tell my students check your egos at the door. You are no
longer in charge. If it's an infant or toddler, they want to go to sleep, you're done. What are you going to
do? You know, if they put their head down and they're done, it's over with, you know, you've got to--sort
of being nimble and quick and you can't sort of force the issue. I love it when my young female trainees come in in skirts and heels. It's, like, you're going to be crawling all over the floor today so you go home and change and put on something where you're able to crawl over the floor with these kids. I don't care if kids are under the table, I don't care if they're rolling around as long as they're performing. And kids will perform, you know, as long as some kids have to move. So, we are pretty liberal with how we work with our kids in the clinic. And then I tell that to trainees, you know, the reason for that is just because things are complex. You know, you can't make a three-year-old do what you want to do because if they decide they don't want to do it, they would just shut their mouth and you're done. I'm sure you've seen that. And I'm not opposed to bringing the parents in the room. I like to have the parents in the room because sometimes they can say, "Well, you know, he does that at home." Well, let's see. Let's see if you can get him to do it. And sometimes that works and sometimes it doesn't but you really got to be sort of on your toes. We don't have a lot of tools, the interpretation gets cloudy. If you look at just typically developing preschoolers, the reliability is significantly lower than it is for school age kids in terms of the consistency of their performance because they don't want to do it, they don't have to, and there's no big consequence for it. So, how do you interpret data? Well, that becomes a challenge. Assessment treatment linkages are tough in part because we don't have great assessment treatment linkage mechanisms and, you know, we have all kinds of other things that get into compliance issues and understanding directions. I used to love the--there's an intelligence test out there that most of you have heard, the WPPSI, Wechsler Preschool Scale of Intelligence. I think it's now on its fourth edition but the earlier version of the WPPSI, they actually--now, the test is designed for three-and-a-half to seven-and-half-year-old kids. Somebody went in a research study and they literally did a readability of the instructions. It's all they did. They said, "Well, here are the instructions. They seem a little convoluted. Let's see--you know, what's the comprehension level? What do you think it was?" The second grade. And these instructions were given to three to seven-year-olds, you know, so you're getting it right, kind of like a tail end of the--of the--what the test was normed on but God knows what the three-and-a-half to six-year-olds were getting in terms of their processing of it, okay? So, the fact is is that there's a lot of pieces and they've changed all that, you know, they know that now. They've gone back, they've tried to adjust those things to make it, you know, consistent with instruction. But gosh, you know, not all test do that and so we have to be cognizant of--you know, sometimes the kids do what they do because they don't get it, right? And now you throw a child in that has a brain injury who may not get it because they've had the injury and how do we manage, sort of standardize the administration? It's tough. Glen Aylward actually has done a fair amount of work in this area and he described this whole area in terms of--25 years ago as a no man's land with respect to a level of development and it hasn't progressed enormously since then, a little bit. But when you get to birth two, there's just not a lot there. So, we've seen progress but it's been slow because I really think it's a unique skill set. You got to like working with babies and toddlers and preschoolers and you can't get locked into I've got to get these three things done because you may not get any of them done if the kid decides to shut down. Consistent with sort of a--the approach we use with school-age kids, you know,
this type of approach for preschoolers, so, on the flip side, can give you a lot of information. It gives you that profile we talked about of strengths and weaknesses, it gives you a profile of spared and impaired abilities following an accident, it can identify various treatment factors that may be getting in the way like attention or memory or the idea that they may not have good receptive language, it also is going to help us theoretically in understanding what we know about this brain behavior relationship in this--in this young group especially those with special needs. And in particular, with folks with TBI, again, only 12 studies. There may be yet another one or two since we did our review. But it's not an area that people have focused on. Baron Gallagher proposed to professionals be flexible in what they think that constitutes a special needs population and they said that it shouldn't be just how wide the variation is but also what kind. And this really starts to bring in the TBI group especially the mild TBI group with the preschoolers. And again, we can begin to utilize that to get at this comprehensive description of what kids can and can't do cognitively. A neuropsychological assessment also can help us out with sort of the ecological aspects of what a kid has to do. With preschoolers, we're not dealing with reading and writing and math. We're dealing with developmental needs and the precursors for those types of things. So, what's being affected in that child's life and what do we have to prepare for down the road? And so again, the ecologic validity of what we're trying to do has merit here. The other thing is for preschoolers--you know, this has a lot of merit for sort of the big areas that you have to deal with in terms of cognition and motor and social emotional and those key areas identified by federal law and the ones that actually fall into family-centered practice. The other part of this is when we move into just looking at description, you know--here we go. There are a number of assessment approaches out there and again, a lot of times, you're not going to have multiple hours with the preschool kids. You're going to have to do it in small doses. We generally have good luck getting kids assessed in a day but we do that with a lot of breaks and a lot of distractions and sometimes naps and definitely snacks and things like that. But there are some intellectual batteries out there and they come in different theoretical packages. The lighter, you know, is a non-verbal approach to this. The WPPSI IV is now out, and the Binet, and the Woodcock-Johnson take on a Catell-Horn-Carroll model and we're looking at different neurocognitive constructs and so those give you a robust peek at what kids can and can't do. The Kaufman and the Cognitive Assessment System actually have theoretical models that are--that are based on Luria and they're based on the Das-Kirby-Jarman model, looking at simultaneous and sequential and planning types of processing. Some of you earlier said you do the Bailey. The new Bailey is actually a lot more multidimensional than the old Bailey was. I like it that we can get these multiple domains and they even break down further in terms of receptive and expressive language and fine and gross motor. The Mullen is one that we use a lot because it already breaks it down for you. So, for me, this is one that we find that we use a lot with kids that have brain injury and other sort of neurodevelopmental disorders because it gives us a nice sort of framework for thinking about the brain functions involved with kids. There's also some neuropsychological batteries that are out there. The Reitan-Indiana goes way back to probably the '70s in terms of its application. And there is the CANTAB which is a neuropsychological computerized neuropsychological battery which is
one that you probably would never use because it's $13,000. We have one for one of our research projects and I'm not sure I would spend $13,000 on it again, but the fact is is that there is--are some very useful tasks on there that dip into the preschool years. The NEPSY is one that you probably will see and have seen. Anybody see the NEPSY in their work? Yeah. There's a lot of tasks in here. In fact, I want to just mention the NEPSY because this is one that has some nice features. It starts at age three and has a nice developmental trajectory. So, if you have a child that's injured before even three or somewhere around three, you can use this going forward and you would have a nice measurement trail with the same test over time. There are six domains, thirty-two sub tests, and these are the domains, again, from a Lurian perspective, you have attention and executive functions, language, sort of the non-verbal abilities, motor, memory and learning, and one of the--for the revision of the NEPSY, they've added social perceptions. So, somebody was asking earlier. The question was what is the relationship of autism and brain injury. Well, if you have a child with a brain injury, you certainly would be able to tear apart some of the social perception in terms of looking at Theory of Mind and those types of things from this scale. These tests are attractive and I think you know we got animal sorting and clocks and inhibitory control with the picture puzzles, and so these are the things that kids will be drawn to in terms of tasks. Do you sit down and you give all 32 sub tests to a kid? Absolutely not. You sit down and you pick and choose, especially with a preschool group, which one of these is going to yield the best results. And again, when I say yield the best results, I'm thinking of dysfunction, I'm also thinking of what are some things kids can do because that's what I want to build on in terms of going forward for a habilitation plan. Again, based on Lurian Theory, Marit Korkman is the developer of this from Finland. They are big and Helsinki is right cross the bay from Russia, so, big Lurian influence here with this test coming out of Finland. It's multidimensional, you can administer it piece by piece or by domain. It does a very nice job pooling for scores and percentile ranks and whatnot, then also for making observations of what kids can and can't do. There's a big difference between kids who can put those puzzles together and they nail it versus a kid that puts the puzzle together and goes, "What is it?" versus a kid that can't put it together and says, "Well, I know it's a giraffe and I just can't put it together." Those are three different kids in how they think and process information. So, qualitatively, despite what the score may be, I also want to see what these processes are in terms of the qualitative nature of how kids attack things. I always like--you know, you've all seen variants of this. I mean, I think Art Linkletter way, way, way back, many of you probably don't know Art Linkletter, but he used to do this thing, the Kids Say the Darndest Things, and he used to bring kids on an interview about current events and they would say all these funny things but they were always little kids. And then I think Bill Cosby had a similar one that he did with kids. But it capitalized on just sort of where that thought process was and what they thought was important and the qualitative aspect of that was just so fabulous to see and watch. You get a variety of scores, you get your--you know, what we know in love and our standard scores, we get the error types and the error rates in terms of those qualitative features, we also get behavioral observations. Interestingly, we don't get domain scores. You will not get a social perception score or a language score or an overall score in the
NEPSY. They did that on purpose. They did not want you to reduce kids to a single score and that's why you don't get scores. Like it or not, it's an interesting perspective, so, it gets us away from saying, "Well, here's where you are in your language abilities." And it allows you to kind of say, "Well, language is multidimensional, so here are the five things that we found out about your language abilities." So, it forces that sort of discussion as opposed to combining them. Now, you probably can't combine them and get an average score yourself, but that's not what the test advocates. So, despite these advances in batteries for preschool kids, basically, the--probably the lion's share of things that get done are really through these informal or flexible battery approaches. And Celiane Rey-Casserly, you know, a number of years ago actually said that for preschoolers, you really need to be looking at these things, you know, what is the clinical history, get a really good detail there, what are the clinical observations that you see of the kid. So, in our study, I'm always telling people we're going out to introduce ourselves and from the moment you say your name, you're watching this kid, you're watching how they interact, you're watching how they walk, we have to walk back to our assessment room, you're watching what they do with the parents, you're watching what they say. If they were drawing or playing with something, they can bring that with them, but I want to see it. I want to see what they're doing with it. So, before we even get into the testing room, I said, "I want a page of notes on that kid." You know, I want to know what you know from simply saying good morning, how are you, shaking hands, walking down the hall, you know, for me, that's assessment. And I--when I even write a report, you know, the classic reports you see, you know, reason for referral, background information, behavioral observation, test results, this is sort of a classic way test reports are organized and you all have seen them. The behavioral observations for me are test date, so, I say everything you observed here really should be in the test results report. So, I say, "Well, you know, I noticed that this kid, you know, could do these three things on testing. But qualitatively, we observed X, Y, and Z." And sometimes those things align and sometimes they don't. And when they don't, that's when things get interesting. That's the problem solving approach, why is that, when does it manifest, why does it manifest, and has it--does it have anything to do with the injury or the nature of the condition we are dealing with or something else. So, Celiane actually talks about these things and again, here's this qualitative and quantitative aspect that she advocated. Muriel Lezak is sort of is a, you know, grandmama of neuropsychology in America. And she's still alive and doing a lot of very nice work in Oregon. She says that, you know, construction of a flexible battery, she would give you a wide range of input and output functions for preschoolers. So, how did they get it in? How did they get it out? Think about Luria's one, two--units one, two, and three. Unit two is information input, unit three is information output. So, she's saying in many ways, these are real critical when you look at preschool kids. Are they developmentally appropriate? Do you have normative data? She thinks you need to have it. I would add to that a caveat and say, "It's sufficient but not necessary." If a kid is non-verbal, if the kid is blind, you're not going to have a lot of tools to work with and so your qualitative observations are going to be really as important at that point in time. Can you do it? And what is the capacity to address the how of how a kid performs? You know, again, that qualitative aspect. There are several models that have emerged over
the past years and, again, I like to think of this as sort of a construct approach to the assessment. And when we think about preschoolers, believe it or not, there are a couple of models that have already been proposed, interestingly, in the last 20 years or so. Lezak actually suggest these are things that from a neuropsychological perspective are really important, so, the motor, the sensory-perceptual, the verbal, the memory, and the abstract concept formation. Larry Hartlage and Kathy Telsrow say, "Well, you know, here's another way to think about kids. We need to think about these broad domains." Barbara Wilson actually thought that these were the domains with the sub components noted here. So, when you think about a neurocognitive approach, this is one that you might look at. Glen Aylward, here's what he laid out in his modeling. Way before that, preschool investigators Shansky and Silver and Hagin, just classic studies and the work that they did, they actually suggested that these are the models that were--these are the constructs that were most important and the ones that were predictive of outcome. Now, remember, these are not all--these are not traumatic brain injury cases. These are just what do we know about at-risk preschoolers and what's predictive. Surprisingly, if you look at these dates, '70s and '80s, we haven't had a really good model since then. So, it's been--it's been over 30, on some instances 40 years. When we look at those models, so, I still think a Lurian perspective helps drive thinking. It helps drive my thinking. It allows me to use this model with preschoolers as well as with school-age kids, and I don't do adults but it certainly would extend into the adult years as well. And what are those? Well, here they are, motor functions, sensory-perceptual, attention, language, visual processing, memory, and executive functions. In Luria's original model, he called that intellectual functions. But he didn't mean IQ, he meant abstract thinking, planning, organizing, strategizing, and that's the--sort of the nouveau term is executive functions. I think when you work with kids, you also have to be looking at these factors as well, you know, level of function, where are we with the achievement or the pre-achievement areas, adaptive functioning, social, emotional functioning because there are some clear linkages to neurologic underpinning and what do we know about the different environments kids sort of move around in, what about their family situational, what kind of school environment are they. So, this is how we work, and what I do is is in the assessment, when I start thinking about kids, these are the constructs that'll pop into my head. So, this child's had a brain injury. The brain occurred seven months ago. Here's what I know about the brain injury. Now, what do I know about this child's motor function? And it may absolutely be fine, but remember, I'm looking for the strengths and the spared abilities as well as the ones that are not. So, when I think of motor functions, I'm saying, "Well, where is that child's gross motor strength and their basic fine motor speed?" And one of the things that we know about these things is they can be lateralized. If you're a right-handed person, you tend to be a little stronger, a little faster, a little more coordinated with your right hand. That is why we call it the dominant hand. Okay? We know that by the way, dominance does not develop. Babies already have a dominant side. They just may not reflect it as they would. If you watch what thumb they may suck, it's probably their dominant hand, okay? The one they reach with is probably their dominant hand. All right. So, even babies have this. So, we know prenatally, there are certain parts of the brain like the left planum temporale that are already larger
prenatally. And so we are not developing our laterality, it is there from the get-go and it evolves such that you're stronger, move faster, and a little more coordinated, that dominative hand for most people. So, with a brain injury, I want to see if that pattern holds true. We also have the complex fine motor speed, motor coordination [inaudible] how is that child operating in space, or a motor function, you know, we [inaudible] this much through articulation, their balance, we talked about the cerebellum this morning, if there's a brain injury, I want to be--I want to know what that is. There's a test out there that's been out there, it hasn't--it's not going to be revised. But it's called the McCarthy Scales of Children's Abilities. Anybody remember the McCarthy? McCarthy did a really nice job of bringing these things in and they actually had normative data for how long a child could stand on their right foot versus their left foot, and they normed it. And so, we know these things but they are going to revised it because they think the NEPSY has taken over. But I always liked the McCarthy because it gave us the sense of motor capability and spatial based movement that we really haven't seen in many other tasks. If we had a--if you're working with the PT or OT, they may tear this apart a little differently in terms of things that they're looking at but there are a lot of overlap. And I think that, again, the interdisciplinary aspects of this, this doesn't mean you have to rush out and do this assessment, but partnering with those professionals becomes very critical to track these needs and these strengths if they're there. There's a--an example of a tool would be the Peabody Motor Development scales which would give you a number of these types of functions and appropriate for preschoolers. Sensory-perceptual abilities, most of the time, we're looking at tactile, visual, and auditory modalities. These are the ones generally that we talk about for learning. And again, when we talk about multi-modal or multi-sensory approaches to learning especially in the preschool years, these are the things that we're generally pulling for. We don't do as much with olfaction and taste, but for traumatic brain injury, remember, one-half to two-thirds of cases are going to have frontal lobe signs. Those--olfactory bulb sit right here. If you have an injury in the frontal lobes, you're going to potentially have your sense of smell disrupted, okay? And it can be one side or the other in terms of your nostrils because you have two olfactory bulbs. Okay? So, the fact is is that this could be something that gets disrupted and we have to at least think about that. A lot of times, the neurologists will take a look at this if they're involved with the cases but you can also ask the pediatricians to check as well. This is the big one. Please do not confuse attention abilities with ADHD. If you have ADHD, you have attention problems. If you have attention problems, you do not necessarily have ADHD. Many of you right now are having attention problems hanging with me, okay? I'm boring you, you're thinking about getting out of here in an hour, it's been a long day, maybe you don't feel well, maybe you got 50 things on your plate at the end of the school year, there's a lot of things happening, so, your attention doesn't--is waning but it doesn't mean you have ADHD. Some of you might have ADHD but the fact of the matter is that when I talked about attention abilities, I'm talking about attention per se and not ADHD. And with preschoolers, you know, tearing this apart becomes very important, so is it the fact that the kids having trouble with focused attention or is it the fact that they have problems with stick-to-it-ness or that vigilance? Can they hang in there for a long time or how long can they do it? Do they get information in
in terms of the encoding? And this is where you start to have the crossover of some of these functions with other functions like memory. If it doesn't get in, you can't get it out, right? So when we expect kids to remember things, we got to make sure they get it in there in the first place, that's the encoding process, that's the attention. You know, generally, what we do, and you've all seen this, we say, "Okay, kids, pay attention." What do they do? They sit up, puts their hands maybe on the table, they do this, they could still be thinking about monkeys, right? So just because they know what the behavior is for attention doesn't mean they're paying attention. So it's a real tricky thing that we play. Like a lot of times, maybe you do this in your class, "Okay, children, pay attention." There's a behavior that goes with that but there's also an expectation but we can't guarantee the expectation, and especially with the little kids. They understand the behavior but, you know, getting that language, like, "Okay. I need you to listen to what I'm saying," is a little different than, "Okay, kids, let's pay attention." Okay. I can't tell you the number of times I did that with my kids growing up. I need you to pay attention to this and I think, "Well, they know the behavior but they're not getting it." So how do we get it in? The encoding is important. The set-shifting issues and the divided attention, a little more challenging for preschoolers because remember, a lot of times, they're one-trick ponies, you know, they can't do too many things at one time. The--and so developmentally, these are things that come onboard. One way to get attention is with some continuous performance tests and there's some computerized versions out there, the Kiddie Conners Continuous Performance Test. Anybody ever see it or use it? KCPT? You can give it to kids four years age and up. That gives you a lot of information. Lasts about seven minutes but you can get a lot of information related to selective attention and sustained attention and there's an auditory and a visual component to it. So, attention's a big one. If you really want to know about ADHD, get rating scales, look at the criteria. I generally will do both because if there's attention problems, I want to make sure we don't have ADHD there or whether it's something else. Language abilities, if we have any speech and language folks in the room, you know, they may divide things up a little differently.

WOMAN: [inaudible]

DR. STEPHEN HOOPER: You know, you may divide things up a little differently then in your world in terms of how you think about it but again, it's an opportunity to sort of bring that multi--that interdisciplinary influence in but inexpressively, people will talk about communicative intent which is really critical in the young kids because they're not talking to you, how they communicate. The word motor fluency, the naming, the word and phrase repetition, we had a little thing that we would do with kids with brain injury that would come in is we'd have snacks with peanut butter crackers. And so, we would take a break and, of course, as long as it was okay with the parents if the child could have peanut butter, and when we would take our break, we would sit and we'll have little Ritz Crackers and a knife and I would have them make their peanut butter and I would make mine and we would sit and we would eat it. But I wasn't so--I was interested in could they follow the directions and again, everything for me is data. I'm playing and I'm relaxing with the kid but I'm watching, watching, watching. But the thing I used to like to do is watch them make the peanut butter. So what does peanut butter do? Sticks to the roof of your
mouth and so then you start to watch the kids. Do they do this? Okay. Or are they doing this? Or do you find then doing, you know, the right side of their mouth and then it's all still over here and then they got to stick their finger in there. So they can still feel it but they can't get their tongue over there to get it. That is important because it gets to, you know, how does their whole oral motor stuff work? And then I would refer them to speech and language and say this is what I observed and then they would do a formal oral motor. But there's a lot of these little things that you can do to just sort of fit into the assessment day very nicely but actually give you some informal observations. And of course, going the hierarchy, can they name--can you have word and phrase repetition? What about the organization of their output? This is really important because when I say organization, it's subject-verb syntax in one part, the other part of it relates to the difference between spontaneous output and confrontational output. So, spontaneous output, if people just talking, what are they talking about? Now, we all know kids like this. They communicate and they just jabber, jabber, jabber, jabber, jabber, jabber, jabber, and then you say tell me this. And they go, "I don't know," where they shrug or they answer with one word questions. Big difference in that kid between spontaneous output where they're talking to their agenda, as loose as it may be, and then your agenda where you've now imposed some structure where they have to retrieve the information and get it out. When you get those big differentials, well, confrontational speech becomes of concern because that's what they're going to have to do as they move in to the upper levels of school. Vocal tone and prosody, how do they--what's the cadence of their speech, does the vocal tone match the affect, etcetera. And of course, this thing gets into the pragmatics. An example here might be used to the preschool language scales that are out there. Similarly, there's a receptive language component where we go from phonemes and word and phrase comprehension to sort of more complex speech, again, understanding vocal tone and prosody. If kids are having trouble with this much as you might get with a right hemisphere injury, what you may find is that they're missing the fact that their parents are really angry with them. The parents just get angrier or that the fact that the cadence in the speech is communicating one thing and they're just totally missing it. How fast do they process? I had a little preschooler who was referred to me because they didn't think she was learning anything and so we brought her in. We're doing an assessment. I had my postdoc with me and she would do something and what we noticed was this--that she would get two items down the road and the kid would answer the one that was two items back. So, pretty severely injured kid, she'd been riding a horse at age four and actually was a pretty good little rider and she--the horse bucked and she--instead of falling off, her foot got caught in the stirrup and the horse dragged her for about 200 yards and she got knocked off the stirrup because her head hit a fence post while the horse was galloping. So, pretty awful situation. But they were saying, "Well, we're just concerned she's not learning." And when we got her in, we're going, "Yeah, she's having a lot of trouble here." But then we noticed in our assessment she would answer the question that was asked two back. It's, like, what's that all about? So, I said to the postdoc, "just put a--put a clock on her. Let's ask a question and just time her and let's just see what happens." It took her four minutes and thirty seconds to give us an answer, but doggone it if she wasn't right most of
the time. So she had it in there. It's that file cabinet scenario I was telling you earlier. She can't find it. It took her that long to get it out and this kid was pretty severely involved. We tracked this kid for a number of years, you know, and eventually, her speed of processing those types of things got down to about 40 seconds, but even that does not fit into a regular cadence of a classroom. So she had some pretty severe speed of processing issues but it was interpreted as her not knowing or learning and in fact, she wasn't able to get it out in any efficient way. And again, the pragmatics are always big in what you're understanding and again, just in terms of receptive vocabulary, the PPVT has a long history here of sort of tackling vocabulary and is a good marker in the big five of reading. Visual processing, again, there's a hierarchy going from recognition to discrimination all the way down the higher order visual spatial functions and visual organization. Simply for preschoolers, the VMI is very nice and what's nice about the newer versions of the VMI is you get visual reception and you get visual construction in terms of the actual drawing, the visual motor component, so you can tear that apart which is really important with the little guys because you may have a delay in the visual motor. In the memory area, memory is tricky because you got modality, you got time, and you got retrieval, and the retrieval part is interesting because, you know, one of the strategies for retrieval, and this is where I would do a lot of work, is how can I get kids to get things out of that file cabinet. If it's on--if it's not alphabetized, what are the keys for that kid to be as efficient as he or she can? So, we'll do a lot of informal work here but, you know, the Woodcock-Johnson actually has a number of memory tasks that will dip in down into that two and three-year timeframe. Memory components, modality wise, these are the big two, the visual and the verbal, but remember, we have four other memory modalities, somatosensory and tactile. Okay. Big one. My wife's got a beautiful taste [inaudible] she could taste something and go, "Well, it's got this, it's got this, it's got this. I can do that to it." And for me, I'm tasting it, I'm going, "Yeah." I got two gears, it's good or it's not good. And she's torn it apart and in a way that I can't even imagine but she's already thinking about, "Well, this is what it is and this is what I could make it." Smell, very similar, we talked a little bit about that and of course, we have this multisensory memory. The time issue is important. Most preschoolers are going to be in the immediate to short term. This is information that you need once or for a few seconds. Their long-term memory, this is where they're beginning to organize those file cabinets, but giving them ways to do that is important. And the remote recall, and again, that's something that's a special condition of long-term recall that you see a lot more discussion in the geriatric literature. If you have older parents or aunts and uncles, this is where people say they can't remember what they had for breakfast but they can tell you with exquisite detail what they remembered from 1968, you know, and who they were with and what they were doing. Well, that's remote recall. It's a whole different set of mechanisms that we generally don't worry about with preschoolers. The things I play with when I look at the memory retrieval are here, you know, recognition is our lowest form of memory. That's why most of us like multiple choice tests, okay? It's because it's recognition but we also have automatic recall. Automatic recall relates to how you write your name. Every one of you doesn't think about it anymore. You just write it. It gets back to when I--the example I gave this morning of driving the car with a clutch, once you get it down, it's
automatic. Luria used to call that a kinetic melody. You just did it. You don’t even think about it anymore and that’s a whole different brain system that when you’re learning it, which is why when you come back to do the clutch, it’s a little bit of a relearning formula. I want to know how they do with facts versus procedures or how they do with contextualized versus non-contextualized information. How do they do with repetition? Does their learning go off? How about if I give them some cues? These are the keys, so, if I give them phonemic cues or if I give them semantic cues, how do they recall information? Maybe I have to associate it with something and again, recognition is a strategy for retrieval. So these are things that I will work with if I have a child that has a specific kind of memory problem to see which one of these actually works best for that youngster. And remember, sometimes these things are context-driven. If a kid really likes sports or reptiles or insects, they’re probably going to have a different set of strategies than they will for the tasks that you’re asking them to do in preschool. So, it can be context-specific and you’ve got to keep that in mind as well. We have a couple more minutes here before we take our break but I do want to talk about executive functions and we’ve been sort of dealing with those often all day. But these [inaudible] the definition of executive function that Luria promoted back in 1966. It’s an ability to maintain an appropriate problem solving set so that you get something you’re going for. Okay? It can involve an intention to inhibit a response or deferred until a later more appropriate time such as you guys wanting to go home. You’re not running to the doors just yet. You might be thinking about it but you’re inhibiting that and deferring it to a more appropriate time. A strategic plan of action or sequences, okay? So how are you going to get to the door? Where are you going to go afterwards? And sort of a mental representation of how you’re going to do it, maybe you’re going straight home and maybe you have to stop at the grocery store and get some other things before you go home. So you’ve got a map—you have a plan and a representation of that. So it’s a very high order. Most preschoolers aren’t thinking at this level but it doesn’t mean they don’t have some executive capability. Welsh and Pennington said, "Well, all true set maintenance future goal but it really involves planning, organization, inhibition of [inaudible] responses, self-monitoring, flexibility of strategy, so, if something doesn’t work, what do you do? You go from door number one to door number two. How do you manage that and do it efficiently—efficiently? What if somebody tells you it’s not right? That’s not right, okay? So do you change gears or do you get frustrated and you try to do the same thing again and again? This concept of working memory also enters into this and it’s a real interesting concept for preschoolers because working memory for preschoolers, people have debated about whether, you know, preschoolers really have working memory and some of the tasks drop down into--like, on the Woodcock-Johnson, they start to really come onboard about three and half to four but if you think about stranger anxiety in an infant, that’s working memory. That’s working memory. Working memory is something that you keep in your mind for—it probably doesn’t have a shelf life of more than 15 minutes or 15 seconds and you do something with that information much as you do with reading comprehension or doing mental arithmetic or for me, I have a hotel room in my--key in my wallet. I don’t remember my hotel room. Why? Because it’s not important. And I’m going to remember it long enough to use my key and then it’s going to be out of my mind. Right now, I don’t
remember my room number, so--but the fact of the matter is the working memory is not long-lived. It doesn't last long but it's an executive function because it's regulatory. Denckla added the concept of delay, so, if you have a delay in there, that becomes another type of executive function. It is the reason why if I gave you a long number right now, you probably would have to write it down very quickly, you know, or you'd say it over to your--say it again and again and again to yourself so you don't forget it, all right? If you put a delay in, it was a problem. It can create a problem. Executive functions, again, in that frontal lobe, it's a dorsolateral prefrontal cortex. It actually seems to be of great interest for somebody's functions. Again, it drives sort of the cognitive components of what we're looking at and if you damage that dorsolateral prefrontal cortex, you're going to see all of these types of concerns going from impaired working memory, increased distractibility, and problems with sustained attention, perseveration, you may have trouble interpreting people's, sort of, perspectives, trouble initiating a task or shifting your gears, all of these things can happen if it's damaged. And again, these are also things that can lie silent if the injury occurs in the preschool years. So, you may not see all of these things off--right after an injury because teachers and parents and other caregivers are addressing many of these issues. It may not be until the child has the demands placed these systems that you see that. There's a number of things out there in terms of measurement of this. Woodcock-Johnson gives us a number of executive function tasks. There's some things out there that are relatively new like the SHAPE School that look at inhibitory controlling kids. We have a behavior rating inventory as well for preschoolers that looks at executive functions. Similarly, the ventral medial prefrontal cortex is going to be really important for affective processing and understanding reward contingencies. So if you damage that part of the brain, you start to have these kinds of problems. And think about damage in the preschool years, preschoolers already by default are a little impulsive. And now, you've added a brain injury to the mix and the fact of the matter is you may have now exasperated what is a normal developmental problem to the point that it creates a longer term problem. Areas of the brain that we're talking about, you know, again, frontal lobe, this is the dorsolateral prefrontal cortex right in here. And remember, you have a left side and a right side and this is the ventral medial and again, as you look at these regions broadly, remember how vulnerable they are to a brain injury, so, damaging the brain especially with a frontal injury is going to make both of these areas very vulnerable to disruption. Bottom line, preschoolers, check your ego at the door and be flexible.

WOMAN: Dr. Hooper has written, you know, over 15 books and this is a book that he just came out--it just got published within the past year. It's called Assessment Practices and Procedures in Children and Adolescents with Traumatic Brain Injury. All of your BrainSTEPS teams have a copy of this, for those of you that are on a BrainSTEPS team. Your team leaders have this, so--and they will share that with you. Anybody else that wants to order it, if you go to--if you Google Lash & Associates, L-A-S-H, & Associates Publishing, that's who publishes this. It's a great book though. All of his books are great, so, this is a fantastic book that I had to plug. All right. Thank you.
DR. STEPHEN HOOPER: Okay. Home stretch. Home stretch. So what's this all mean for you as early interventionists and early childhood professionals? Well, early identification is big. As I mentioned earlier, early intervention works. It works for kids with all kinds of disabilities, autism, early learning problems, and certainly with traumatic brain injury. It's really important that we think about the special education needs of these children and what if they're being served in another child care arena, how do we get them services? What do we do? There is a potential immediate need for services following the brain injury, so, you have these acute needs that can occur, this--including transition from the hospital, if it's a severe injury, back home or into the community. But you also should remember this concept of injury is lying silent. There may be downstream problems that are not only persistent but appear to surface at a later point in time. And what I tell folks in North Carolina, because we have a classification called PDD, Pervasive Developmental Delay, and on one hand, it was done and so that kids could get services without getting into a labeling phenomenon but in some ways, it disconnects events that occur in kids' lives like a brain injury. So, if that brain injury has just put in there passively and they don't ever look at it again, you may think you're dealing with a new problem when that kid hits 12 and 13. And now, all of a sudden, they're dysregulated and they're disorganized and they're getting into trouble and they can't keep their mouth shut because they're talking all the time and the fact of the matter is it may go back to an early brain injury. So, being able to at least--whatever you call them, and I tell folks--I try not to get into the AB--alphabet soup game, you know, in terms of what we call kids from a--from a classification--special education classification perspective, but knowing that this is in the history and it's kept in the history as an active ingredient will always allow you back to that. Now, not all problems are brain injury driven but it gives you the option to at least consider that, and if you don't ever consider it, you never get a problem. It's sort of like people used to think fire setting was rare until they started saying, "Have you ever played with matches?" And what they realized is it was about 70 or 80% kids play with matches in some way, shape, or form. Okay. And some like to set fires. But up until they started asking, it was a very rare phenomenon and it was rare because nobody asked. Brain injury is sort of the same thing. If you don't ask or if you don't track, you won't be able to stay on top of it. TBI, unlike a developmental disorder, I think is challenging for special educators and that this is a dynamic condition. Not all people who have a traumatic brain injury are going to require special education services especially when we look at the mild TBI. You may not need to have special education for a particular situation but do know that things can change rapidly over time and with recovery, again, the concept of developmental surveillance is very critical. We also don't know a whole lot about mild TBI in very young children. You know, what do those kids look like? And I think that it also begs the question there, one of the tables in the back of the room that says they haven't been sleeping but it's sitting back there and they have a psychologist and a PT and an OT, it's like a working interdisciplinary table back there. I do think that's a critical component to this in terms of working with your other providers around this issue and I think with traumatic brain injury, you've got to link up with your local primary care providers, the pediatricians, the family medicine practitioners. If you don't know who they are, you should know because they're going to seeing these
kids. And they may not be talking to you about it. So, trying to figure out a way with the family to link these things together becomes very, very important and this is where the BrainSTEPS can be--the whole BrainSTEPS model is critical. I'm preaching to the choir here but this should be automatic for you but you got to take a developmental perspective here. You've got to know your--with preschool kids, you better know development. You better know your developmental milestones and not just when kids walk and sit up and speak their first words. It needs to be more detailed than that. And again, most of you probably have that working knowledge in your armamentarium of skills. If you understand the core tenets of development then you're going to understand what should be happening next, what's expected, what the timing of that injury has disrupted and what the timing of that injury may have the potential to disrupt down the road. And again, sometimes, you know, we think about should recovery really be from a developmental perspective and not bring in the concept of where are we with, you know, chronologic expectations. This is really sort of how the child is progressing and what is appropriate for them on their own developmental timeframe. And that may probably would be a more fair measuring stick of change and not the Holy Grail of are they going to get back to being normal again which with many preschool kids may not have a good handle on anyway. Of course, we want to use whatever's available from developmental--developmentally appropriate practice that's evidence-based. This is that collaboration of professionals, really important here. I think when you get this, you get more synergy in your program. These communications really need to be frequent and part of that developmental surveillance, just really, really critical in these transition issues from preschool to school also become very critical. How do you do the handoff when they leave you and they go into kindergarten? How do you do that? And with kids with a brain injury, remember, if injuries are lying silent, you may be the only one that's able to say here are three or four things that we are--want you to keep an eye on as these kids move into the formal learning environment. I am a proponent of getting good assessment data. I will say that this is essential to pinpointing, again, those spared versus impaired abilities. Again, I put equal weight on both. I want to know what's left and what we have to work with because this is really where the hope is. This is what we know and this is how we grow, change overtime. A neuropsychological perspective allows you that comprehensive look at a kid. But, you know, you can come about this perspective with a multidisciplinary, interdisciplinary, or perhaps in your situation, a transdisciplinary approach which with preschoolers actually has the benefit of capturing time and data in a much more efficient fashion. Any data you generate really should be, you know, useful for a treatment plan, you know, the IFSP, very, very important in terms of utilizing these data to get there. And again, you've heard me say a number of times, developmental surveillance is very, very important. I just think we have to keep tracking these kids because we have a long road of development that now has recovery sort of overlapping with it and how do we track that change over time. Kids will change, even your most severely involved kiddos will change. They will look different. And if we don't track that, we're going to miss some potential changes. When you do your developmental surveillance plan, in fact, you should also look at some other factors like the severity of the injury, the age of injury. How long has it been? You know, one of the things that
we've run into in North Carolina, it's less now, but initially, when we started doing the traumatic brain injury work, the challenges weren't coming from the kids that were injured acutely. The challenges were coming from the psychologist saying, "Had your child ever had a brain injury?" And they go, "Oh, yeah, back when they were two, this is what happened." And the kid's now nine. So, going back and trying to get that information and figure out what it was, so, it became an important part of sort of how do we track kids. So, getting this information is also going to tell you a little bit about if this is an old injury that happened seven years ago, you probably don't have to see this kid every six months. Okay? And similarly, if this is a baby that was hurt very early on and we had the question about the brain stem, how long do we recover? Well, we know the brain stem is relatively functional at birth. And so, if you got an injury to the brain stem, well, that child's probably not going to change drastically because of recovery at age four. They're going to change and it's probably related to development and perhaps someone going to recovery. But if you're three years post injury, well, you probably don't have to see that kid every two months or every three months. You can have a regular plan that's maybe--has longer intervals between visits or checking in. Again, I talked to some of you informally about this. You know, getting testing data is important. I think the formal route is good. Not all kids are going to cooperate with us. They're not on the same agenda we are. But I--and so, I also think informal strategies are very, very important. Watching the kids and seeing what they do, sometimes playing with them. You can get an enormous amount of information just from sitting with kids and playing with them, if you're strategically watching for the motor, the attention, the memory, the language, those types of things. I had--one of the best experiences I had many years ago when I was a--when I was a fellow at Brown, I did a rotation with a pediatric neurologist who had a little pouch that she carried on her belt. It was about this big. And when she went in to do an exam with a preschooler, she would sit down on the floor with the kid and she would get this pouch out, she would open it up and it was filled with little animals, green, yellow, red, every animal under the sun. I don't know where she got these things, but she had them and she put them on the floor and she'd say, "Look what I have." And then the kid would help get them out so she'd watch them--she'd watch the kid unzip the thing, could he do it, could he get them out, how did he get them out. And then she would start talking to the kid about, how many do you have? How far could you count? What colors do you see? Can you put all the red ones here and all the yellow ones there? What if I did this--you know, what if I hit this one, where would you--I mean, she had all these little things that she just played with the kid but it was all very strategic. Could the kid remember? Could the kid count? Could the kid distinguish one type of animal from the other? Could they categorize? That was very well-done. And she would come out of a 30-minute session with the kid with an enormous amount of information and the kid never knew what hit him because it was fun. And I often thought that that informal approach was just gold in terms of how she dealt with it. And I think your observations could be the same way. And it's important if you strategically think about your constructs and you don't have to buy the Lurian constructs. There are four or five other models that I shared with you today. If you like one of those better, use one of those. But think about everything you see in a kid in those ways because there may be tests that you
can give, and sometimes you may want to have tests, but you can still make observation and commentary on what a kid can and can't do. That in turn goes into your treatment planning for a kiddo. I always worry in this area that families continue to receive fragmented care in the community. I think a lot of that has to do with just what is a TBI, and what do we have to do about it, and how do we communicate across these different agencies that really don't have good communication systems in place because of HIPAA and FERPA and other things that we have to be very sensitive to as well. The other thing that I think is important is that--know that traumatic brain injury is not normally distributed. It does not follow that normal curve of--that we all know and love that we've seen somewhere on our travels. Traumatic brain injury tends to happen in situations where something else is not right, and that doesn't mean that that's always the case, but it means that the child may have already had a development delay and now something's happened, or that there may be something going on in the family and this happened, or there's a--there's a number of things that can happen where things aren't quite right and then you have a traumatic brain injury. I have a family in North Carolina that I just finished seeing the last child as he's moved into adulthood. Five kids, all five had brain injuries.

AUDIENCE MEMBER: Oh my God.

DR. STEPHEN HOOPER: You know, it--and you meet with the parents and they are lovely people. They are low SES, they work four jobs to make ends meet, and the supervision in the house was not what it was supposed to be because they have older kids watching younger kids and eventually the older kids were the ones that had the brain injuries and yet they were still responsible, so the younger kids would ride their tricycles out in front of cars and it was just--and there was probably--when you met the parents, there was probably ADHD in there and learning disabilities and so the parents had their own struggles with things and--I mean, you know, five kids. I mean, just an awful story. I've often thought about doing a case study on them in terms of here's a good family with the right needs and the right intentions and yet this stuff happens and how does that sort of evolve. So TBI is not normally distributed. When you see it, it's worth asking. It's not a red flag, but it should be a yellow flag that pops up and says, "I wonder what else there might be here." And sometimes it's nothing because it does happen to anyone. It could happen to anyone. Partnerships, again preaching to the choir. You know, if you got to bring parents and family members into this in terms of not only their cooperation but understanding the process. You know, because if you get their buy-in, they're going to facilitate the treatment plan. It extends to community-based providers. A lot of times kids after a brain injury are going to have people in the community that they're working with and you've got to know who they are and what they're doing especially with pre-schooler because you don't want to be doing two different things to sort of drive home a point. And if you have this relationship with the family, quite frankly you're going to figure out what else may be going on in that family. Is there depression? Is there fiscal problems and money issues? Is there a marital issue? Are there siblings in this family that are being forgotten because all the time and attention has been given to the child with the injury? And rightfully so, but how do you now deal with the needs of this other kiddo. So there are a lot of dynamics here that if you have this relationship, these things are going to come out
with some gentle and subtle questioning. Transitions are big. We don't still have a great understanding of what is best or how we do it. Again, your BrainSTEPS is really important here in terms of reintegration. And because TBI is a dynamic sort of issue especially in a recent injury, you know, how this contributes to problems may be misunderstood if it's not sort of explained upfront. So after the injury, people see everything, you know, seemingly getting better and now they're saying, "Why is this kid doing this?" This is another kind of problem when in fact it may be part and parcel. Everybody knows the real estate mantra, location, location, location. I think in TBI it's education, education, education. We really need to do our job here. Educating not just ourselves and our colleagues, but also the families and other people we work with. Because if we have this understanding, it at least gives us another alternative to think about when we're faced with challenges that kids throw at us. Is it because they are just being a squirrely little four-year-old or is it because the squirrely little four-year-old, who should be a squirrely little four-year-old, has had a brain injury and it's now been exacerbated? That's a different sort of question to ask. So an increase knowledge of TBI is really, really important. It's going to guide pre-academic instruction. It may help with your behavior management. And hopefully, if we get these things right, it's going to facilitate recovery in the overall developmental attainment of that youngster. There's also some other things to be thinking about. Prevention is really the key here. As early childhood specialists, you probably aren't going to jump on this bandwagon in terms of activities, but knowing about is very important. Do kids wear their bicycle helmets when they ride their bikes? You know, what do we know about sort of the driving habits of the parents? What are the kids doing recreationally? And gain, this whole issue of the shaken baby syndrome becomes very important and this is going to come before the kids in likelihood get to you. But has anybody heard of the Period of PURPLE? This is in every hospital in North Carolina. This is an evidence-based program that deals with when babies cry. Okay. It's that simple. Purple stands for something. I can never remember the acronym, but P is for the peak of crying, two to sixteen weeks, unexpected, resist soothing, pain-like face, long-lasting for many hours, and in the evening. And if anybody's ever had a baby like this, our oldest daughter had cholic and this went on for days and we'd come home from work and my wife would go, "Here. I'm going out." And she would hand her to me. And it would be like, "Okay. She's had it," you know. And so this can be very, very, very frustrating. What's very interesting though is when you look at developmental literature, and this again is where that--those developmental milestones become very, very important. This is a crying of babies, right here. Okay? Now you get this peak right in here, right? But most of the crying is occurring in this timeframe, right? Guess what, guess when babies get shaken. Guess what? It's about that timeframe. It's normal for babies to cry a lot then. It's normal. So if we can just say, "Look, every baby cries a lot," I mean the simplicity of this program is beautiful. There is a 10-minute DVD, there's an 11-page booklet in North Carolina, parents, any newborns--parents of newborns are not allowed to leave the hospital until they do this. So while the mom is sitting there, she can go through this. It's educational, done on the first day of life, written at a third grade level. So we've tried to--I shouldn't say we, because I haven't done much with this. But it's--but, you know, the developers tried to keep it so that its access to everybody. It's
in multiple languages. It's--also, there are visuals that'll accompany it. Public health nurses do this and it's free. They all get this. You have a baby in North Carolina, you go through this. And if you happen to be hearing impaired, guess what, there's captions that will facilitate it. There are several randomized controlled trials that have done--that have showed that this program increases the simple knowledge that it's okay for a baby to cry, and that it's expected that it will go up and be frustrating. And that you never shake a baby because there are a lot of dangers associated with that. Because remember, for the most part, parents who shake really don't want to hurt their kids. They're just at a breaking point. And the simple advice is, put the baby down and walk away and they will continue to cry for hours, but they're okay. Their baby--the babies aren't in pain. They're not--you know, check on them and make sure, but, you know, babies are going to be fine. There was a casual--causal relationship found if the mothers read and watched the materials given to them. So for this situation, there were less instances of mothers getting to the point of frustration. And by increasing maternal knowledge and behavior surrounding shaken baby syndrome, in fact we're hoping we can drop the occasions of this unfortunate situation. So we've got a lot to do here with pre-schoolers. Remember, we only have about a dozen evidence-based studies here. And there are may be some big differences between birth to two and two to five in terms of brain development and what we know. But we know unquestionably that if you get a TBI in these infant-toddler preschool years, you probably are going to have a negative effect on your outcome especially if it's moderate to severe in nature. And we know that sometimes those problems aren't going to just last in the acute phase, but there may be things that are laying silent in terms of the developmental epic. We know that severity, age of injury, and mechanism all can affect outcomes. And so, this tells us that we really need to be getting this information when we have a child with a brain injury. And if a child has an inflicted injury, it should pull for your particular attention because it seems to be that the inflicted cases actually seem to have a worse developmental outcome. And then of course you have all of these associated family factors associated with that in terms of where is the perpetrator, is the child in foster care, et cetera. So, we have to continue to examine this question and you guys are really going to be the active players in all of this in terms of your front and center role with these kids. So let me stop. I promised you that we would get you out of here on time. We have time for questions. Brenda, I don't know if there are questions coming from the sites.

BRENDA EAGAN BROWN: Yes.

DR. STEPHEN HOOPER: Okay. Questions here. Yes?

AUDIENCE MEMBER: A question regarding the [inaudible] information, one of the challenges that we really face is [inaudible] school age, pre-school, but kids who have sustained brain injury really [inaudible] injuries through surgery related to brain cancer, falling out windows, those kinds of components that weren't necessarily addressed because it wasn't necessarily [inaudible] we have a huge [inaudible] really, really significant behavioral issues [inaudible] an autism diagnosis, not really, but, you know, it was kind of all going together. But a specific strategy--I mean I haven't seen a lot out here to really [inaudible] to really do something [inaudible] behavior.
AUDIENCE MEMBER: I don't know if there's some place you can go to actually try and find that because some of the standard of why behavior analysis approaches don't necessarily work, it is because it's the result of that trauma to emotion regulations and [inaudible] regulation areas of the brain.

DR. STEPHEN HOOPER: Your question is spot on. Question for those in the other sites relates to, you know, early brain injuries and subsequent later behavior problems and what you do about it. I think what you just said a few moments ago is really critical and I don't know whether everybody caught that, but sometimes with a brain injury--you know, one of the best evidence-based approaches that we have is applied behavior analysis. We know ABA works. However, if you have a child with a brain--frontal lobe brain injury and they perseverate, you can reward, punish, or provide consequences all day long for that situation and the child is still going to perseverate because it's neurologically driven. So how do you address that? Well, it's got to be done by using other aspects--if you go with ABA, other aspects of ABA. You have to think about the antecedents as opposed to the consequences. So that's one approach. Second thing is, there aren't many other evidence-based approaches that have been developed yet. So one that's out there, Mark Ylvisaker put one together. I don't know whether you know of Mark Ylvisaker's work. It's a big long name of Y-L-I-S-A-K-E-R. Ylvisaker actually has put together a sequenced evidence-based module for how you train somebody to have a script. So I do this first. I do this second. I do this third. And then you over-train that so that it becomes automatic. That's the other way to do this. The third way to do it is sometimes you got to take the edge off--with medication, the problem is, is that if you've changed the neurons, and the synapses, and everything that we talked about earlier, sometimes the pharmacology works differently and it may take a little longer for typical approaches to take the edge off behavior to be titrated and/or correctly dosed. So I think it's got to become--come at from multiple perspectives. There's not a lot out there. So you're grasping for straws and there aren't many there. And I think that's sort of where the feel is right now. But there is this sense that, "Well, we do ABA," well that's great for some situations because it works. But if a child is perseverating on something that's not, you know, adaptive, they're going to do that regardless of what you do to them. And so that's the piece that's really critical because then you got to back up and say, "Okay. Is it the antecedence or is it the--you know, do we have to do something else in terms of pharmacologic control?" The--I had a kid one time that actually had a brain injury where he shot him--he got shot and the bullet basically severed his frontal lobe from the rest of his brain. And if you evaluated this kid, he looked great except that, you know, he would go to class. He would sit there. The teachers would give them work to do and he'd do this, shake his head and he wasn't going to do it. And they didn't know how to get him to do it. And so you had to step in and say, "Okay. It's not the consequence that we're looking for here. How do we do the antecedent?" And so this kid, if you could get him to mimic, I just started doing this. "Okay. Robert, we're going to do your math questions. We're going to start with number one and we're going to do this and I want you to show me how to do it." And he started to move his head up and down. And guess what, this movement got this movement. But it had to happen every time, because when you'd go back to him, he'd go like
this. How did I know he'd do that? Well, first of all, I didn't. I didn't know because I—it was a tough question. But I also know with Lurias—remember I mentioned the kinetic melody? Your behavior sometimes is driven by how you move, you know. Sometimes when you go up steps, you go, "One, two, three," and it helps you. And that's why our aerobics instructor, you know, they get you moving and that's why they're doing all the cadence stuff because it gets you going. That's a kinetic melody and they're capitalizing on that. They don't know that. It's like the cops doing the sobriety test. But, you know—but I do think that—I figured if I could get him doing an adaptive kinetic melody, well maybe he would do this. And guess what, he did. But it had to happen every single time. And quite frankly, unfortunately, this boy was 14. It's probably going to have to happen the rest of his life, you know, because he's probably never going to adapt that given the nature of his injury. So the behavior stuff is real critical. The other thing that I think is really important is, a lot of those kids end up in psychiatric hospitals, right, because some of the stuff is really awful that they get into. The problem is, is they get treated psychiatrically and not neuropsychiatrically. So somebody—even our psychiatry colleagues have to really understand that this a brain injury, here's what was hurt, here's when it was hurt, here's the time point of the injury, here's how long it's been. And now, where do we stand with this injury as opposed to saying, "Yes, it looks like depression," or, "Yes, it's a conduct problem," or, "Yeah, he's into antisocial behavior." All that stuff may be true, but until you have the neurologic overlay on that, you're never going to sort of attack it. And so, I think that's the other part that happens. We've got to have more resources where we have neurobehavioral units that can attack this from that perspective. And I don't think every unit has to be that way, but I think some place—every hospital should have a couple of beds with that expertise is available. So it's a hard question to ask, but you're really—right now, there is not a lot of data out there. There's one other study done in Ohio where they've actually begun to look at parent training models, where they actually look at these scripts, and these models, and mentors with video feedback to kids. And again, that's just another form of antecedent interaction. But if you go to the…

BRENDA EAGAN BROWN: Cincinnati.

DR. STEPHEN HOOPER: Yeah, the Cincinnati Brain Injury Program and you just Google—what's her name?

BRENDA EAGAN BROWN: Shari Wade.

DR. STEPHEN HOOPER: Shari Wade, they'll—thank you, Brenda. Shari Wade, W-A-D-E. You'll see that. But it isn't even stuff that's out there in terms of popular press yet, but it's coming. I think people are struggling with this. So you put your hands on a really though, though one to deal with. Other questions? Anything from the sites? I am here. Thank you very much. I hope today was useful.