DR. GARY DV HANKINS: I want to share with you the folks who contributed to the new monograph, Dr. Mary D'Alton who's the chairman at Columbia, chairwoman at Columbia in New York, chaired the most recent task force. I was fortunate enough to be the vice chair. Other members, and I think you'll recognize several of the names included Richard Berkowitz, Jessica Bienstock, Alessandro Gandini, Jay Goldsmith, Renato Natale, Tom Moore, Karen Nelson.

And again, I'll just say publicly, Karen Nelson is one of my all-time heroes. She has contributed more to the knowledge in this area than any other living human being. LuAnn Papile, Donald Peebles, Diane Schendel. I also noticed, of course, some of these folks are from-- Peebles is from the Royal College of OB/GYN. Natale was from the Canadian. This time the task force truly is representative of international, not restricted to the US much as the first task force was.

You'll also notice that there's a lot more than just OBs on this. Yvonne Wu, for instance, is a pediatric neurologist. Dr. Spong was on the task force, and she heads the NICHD force currently. Rosemary Higgins, Richard Wollman, and Jerry Joseph representing the college.

So represented on the most recent task force that should be out hopefully in January were the American Academy of Pediatrics, ACOG, The Centers for Disease Control, the Council on Resident Education OB/GYN, NICHD, National Institute for Neurologic Disorders, the Royal College of OB/GYN, the Society Maternal Fetal Medicine, and the Society of Obstetrics and Gynecology of Canada. So we truly had reached out nationally.

This monograph, hopefully, everybody has looked at and at least read the executive summary. That monograph said that the criteria required to define an acute intrapartum event as sufficient calls cerebral palsy. There were four essential criteria, and this is going to change with the next monograph. The first of those criteria was evidence of metabolic acidosis and fetal umbilical cord arterial blood obtained at delivery, defined as a pH less than 7, and a base deficits greater than or equal to 12 millimoles per liter.

Second criteria-- and this criteria will change with the new monograph-- second criteria was early onset of severe or moderate neonatal encephalopathy in infants of 34 or more weeks gestation. That will change as well relative to gestational age.

The third was cerebral palsy of the spastic quad or dyskinetic type that will remain there. And the fourth criteria was exclusion of other identifiable ideologies such as trauma, coagulation disorders, infectious conditions, or genetic disorders.

Now, that does not mean that every test under the sun has to be run, but there should be a thorough examination of the newborn that has hypoxic ischemic encephalopathy. There should be a targeted history, and based upon the exam and the history, selective testing should occur. There were also criteria in the 2003 monograph that collectively suggest an intrapartum timing, but we acknowledge they are non-specific to asphyxial insults.

First is a sentinel hypoxic event occurring immediately before or during labor. Now, what might that be? How about an eclamptic seizure where the mom has a seizure out in the field or comes into the unit having ongoing seizures, or a uterine rupture, or an abruption? We know these, cord prolaps. So there are several sentinel events that could herald the onset of the injury and for which even with the absolute best physician and nursing care, we can't undo it. It's a done deal.

The second is a sustained and sudden fetal bradycardia or the absence of the fetal heart rate variability in the presence of persistent light or variable decelerations. Now, I want to call your attention to the phenomenon that the fetus never read the book on heart rate abnormalities. So we have lights, and we have variables, and we have hybrids where it may start as a variable but there's light recovery.

So it's not as simple as the books made it out to be originally. We also have had compressions which are unless you're Barry Schifrin, felt to be innocuous events. Sorry, Barry. Actually I'm not sorry. Barry and I don't like each other very much.

In the presence of later variable decelerations, usually after an hypoxic sentinel event when the pattern was previously normal, and this is important when the pattern was previously normal, if you had a nice heart rate, normal baseline, acceleration is good, variability, and then it goes into the patterns we're talking about, that speaks to a deterioration of the fetal status. And if we can't revert it back to normal, then my bias is going to be to tell you to bail out. Get the baby delivered.

Now, let's go the other one. The tracing is absolutely totally flat coming in and you never get an acceleration. And a lot of what I'm telling you is how Gary Hankins manages in addition to what the monograph says. A totally flat strip, the last thing in the world I'm going to do if it stays flat, I'm going to give oxygen, hydrate, et cetera. But if it stays flat, I want to get a biophysical profile as opposed to starting PIT.

Now, if their baby is already damaged and I start oxytocin, I'm going to get lay decelerations, and I'm going to get blamed. And I'm not interested in going there. If the baby is injured, it's likely the biophysical profile will score low, and I'm going to have a frank discussion with the family saying, what is done is done.

Now, I don't want to cause additional injury, therefore, I'm offering you delivery by section, and we'll monitor you right up until we make the incision. And we'll narrow the window of time between the incision and getting the baby delivered, but I make it clear up front that I can't undo something if it's already occurred with the baby.

And I think when you tell the parents, the family, that up front, they're going to be much more accepting than if you don't share that information and you deliver a devastated baby for them. I also tell them that most of the time even when I think the baby is bad, fortunately, I'll deliver a good baby.

The other criteria were APGAR scores of 0 to 3 beyond 5 minutes. Evidence of multi system involvement in the first 72 hours of life, and this is where we need the help of our colleagues, the neonatologist, the pediatricians to order the test. Early imaging studies showing evidence of acute, non-focal cerebral abnormalities. If this is from uteroplacental insufficiency or a chord accident, it's not going to cause a stroke.

It does not cause localizing lesions, it's going to be a global injury. Well, the new monograph, and I made to change it from 2013, which we thought it would be, out to 2014, these go through all sorts are peer review of many, many different societies because we ask that they endorse it. But here in the new monograph will be this diagram, and it shows that there are pre and perinatal causal pathways to cerebral palsy in term or near-term infants.

So we can have distal risk factors, we can have proximal risk factors, and at some point we get to the time of irreversible brain damage creating the anomaly of the cerebral palsy. So it can be just intrapartum. I want to point out again we recognize that it may occur after we pass that baby off to the nursery under e. There can be distal risk factors et cetera, but we don't get to injury until that baby goes to the nursery, and maybe it's not watched as closely as it might be, and it has seizures. It becomes hypoxic, and we end up with an injured baby.

The new monograph is going to state that knowledge gaps still preclude a definitive test or set of markers that accurately identifies with high sensitivity and specificity an infant whose neonatal encephalopathy is attributable to an acute interpartum event. Science has not advanced to where we can do it with high sensitivity and high specificity.

Now, I want to ask you, what's the picture here? Anybody? We don't have enough pieces, do we? And I'm going to use this analogy because figuring out what happens to these babies means we have to go back and try to reconstruct as best we can with as many pieces as we can assemble.

How about now? Does that help you and any?

SPEAKER 1: It's a baby.

DR. GARY DV HANKINS: It's a baby? Who said baby? I think we should award you free admission to the next course. That exceeds my ability to do, but maybe Dr. Destefano can award a free admission on the next course.

But look as we get more pieces, we can see what happened, can't we? And the very same thing is going to be true when we try to piece together, when did something happen to that baby? Pretty picture, isn't it? When you get all the pieces, it's a lovely picture. So what are those pieces of the puzzle?

Well, internal medical history. If you go back to the syllabus that's the old monograph, maternal medical history, for lots of things, was predictive statistically significantly predictive of babies that end up with injury. Obstetric antecedents, intrapartum factors, placental pathology, now, that doesn't ever help us to manage the pregnancy at the time or manage it, but it certainly can shed light into perhaps what happened to the fetus. And then very importantly, the newborn course, to include labs, to include EEGs, to include neuroimaging, and I think we now will have the American Academy of Pediatrics and neonatologists generally on board with what a standardized work up for a baby with suspected HIE should be.

So for the first time ever, we're going to come out with, I think, a very good recommendation for how the assessment should occur. So what's the purpose anyway? I mean, I was talking to Dr. Gordon, and he said people still to this day say that the only purpose of this was to protect doctors practicing bad medicine.

Well, the purpose of what we're trying to do is many, many, many fold. So if we can identify an acute interpartum event as contributing to neonatal encephalopathy, it could to guide the treatment by the pediatric team. It allows them to judge the prognosis of that baby, to do appropriate family counseling, improving clinical practice both for the pediatricians as well as the OB.

If I look back, I see I made a mistake. I miss something, hopefully, next go around won't make that mistake and won't miss it. So it's an opportunity for us to debrief and to learn going forward. One of the things I've tried to instill in my residents is, we make mistakes, but I feel obligated to learn from those mistakes and hopefully, not ever make the same mistake with the next family, the next pregnancy. And it can also form and guide research efforts.

So the definition has changed slightly. Before it said 34 weeks. Notice it's now going to say beyond 35 weeks. So a syndrome of disturbed neurological function in the earliest days of life in the infant at or beyond 35 weeks. This was per the neonatologists who were very adamant that going back to 34 to took it too far back.

It's manifest by a sub normal levels of consciousness or seizures and often accompanied by difficulty with initiating and maintaining respirations and depression of tone and reflexes. So you see this is a clinical diagnosis, isn't it? It's a clinical diagnosis. At least the suspicion or the diagnosis is clinical and then there comes a determination of where did it come from.

Well, when we look at the type and timing of contributing factors that are consistent with an acute interpartum or peripartum event-- and we're going to go over each of these as per the new monograph. Again, we have this in an hypoxic or ischemic event occurring immediately before or during labor, and we've talked about some of these. Hopefully, most of you have never had a woman sustained an AFE, but oftentimes, if she has an AFE, the fetus will signal almost as the pulse oximeter before mom even has symptoms that something has gone awry.

Second is the fatal heart rate monitor patterns consistent with an acute peripartum or interpartum event. And we add some specificity this time that we did not have earlier. So a category I or a category II fetal heart rate tracing when associated with APGAR scores greater than or equal to 7 at 5 minutes, normal arterial cord gases to find this plus or minus 1 standard deviation or both is not consistent with an acute hypoxic. Ischemic event. Is not.

So this helps us at least to find some where we shouldn't be accused of it. Now, if I have a baby that's going to have low APGAR scores, I pass it to the pediatricians or the nurse practitioner to resuscitate. What's generally the tone of the baby?

SPEAKER 2: Floppy.

DR. GARY DV HANKINS: Floppy. Now, what's the tone of the cord? What's the tone of the umbilical cord? Baby's floppy. Floppy cord. Floppy babies, floppy cords.

Why? Because the baby probably had very little cardiac output. Takes cardiac output to pump that blood. If I pass-- where's a nurse? if I pass you a cord with no blood in it, how good are you at drawing it for me?

SPEAKER 3: Not.

DR. GARY DV HANKINS: Not. So if you have a floppy baby and you want the cord blood, massage the uterus and milk some blood into the cord to give the nurse a chance to draw it. In Texas, there is a concept called spoilage, a legal concept known as spoilage. Y'all ever heard of spoilage? That's where they say, Dr. Hankins knew the gas was bad, therefore, he didn't collect it.

And the judge can give a directed verdict against me because I destroyed or failed to collect pertinent and important information. So a clinical take home I would want you to leave with is, if you deliver that floppy baby with that floppy cord, you need to get a cord arterial and venous gas, and you get it by massaging the uterus and putting the blood in it so that you can draw it.

If you don't, you're only likely to get a venous. Now, a venous gas will make the baby, of course, look better than an arterial would, in general, but I submit that more often than not, the gases are your friends and not your enemy. They help you more than they're ever going to hurt you.

Second point here is there's a great distinction to be made between a patient who presents with an abnormal fetal heart rate pattern and one who develops an abnormal fetal heart rate pattern during labor. We talked earlier about that. The totally flat strip or the strip with the T-cells or the bradycardia off the get go, that is completely different than the category I strip that goes bad.

The fetal heart rate pattern are identified on presentation with persistently minimal or absent variability and lacking in accelerations, lasting 16 minutes or more, even the absence of the decelerations is suggestive of a previously-compromised or injured fetus. Again, I'm going to emphasize we can't tell which with the strips, only in retrospect can we tell.

If fetal well being cannot be established, the patient should be evaluated for the method and timing of delivery. What does that mean? The intent is, with a strip like this, don't make the strip deteriorate and degrade and give blame for an injury that you didn't cause. So if you can't perk the baby up, I recommend to the family that we go to Cesarean delivery to at least make sure I don't cause any additional injuries to that fetus.

In the decades since this guideline, I'm referring to the first monograph was first published, considerable advances have been made there, knowledge and understanding of the processes contributing to neonatal encephalopathy and long-term neurodevelopmental outcomes. The recommended multi-dimensional assessment process for a neonatal encephalopathy reflects the current state of scientific knowledge, and acknowledges the limitations and definitively distinguishing HIE from other forms of neonatal encephalopathy within the array of clinical tools currently at our disposal.

The multi-dimensionality of the assessment process is key to recognizing that no one strategy to identify HIE, at present, is infallible, and that no single strategy will achieve 100% certainty of the causes of neonatal encephalopathy in all cases.

Now, the next rendition of the monograph is going to say, basically, that the essential criteria pH base deficit is not an essential criteria. If it's there, it's highly suggestive, but we now understand the lesser degrees of acidemia can result in injured babies. We also understand that babies can reverse this process fairly quickly.

I will again tell you I never go back for a C-section with a bad strip that I don't administer terbutaline to the mom on the way back. I never go back to the OR with a bad strip with a scalp clip on that doesn't stay on until I'm ready to make the uterine incision. My apologies to the nurses for making you go under the drapes to get it off, but I don't want to be in that vacuum.

If that baby is still down, then I'm going as fast as I can go. If I have recovered the baby by my efforts with terbutaline to get rid of the contractions, completely even if there's no tachysystole and the baby comes up, I'm going to take my time. If babies recovered, it'll continue to recover.

Now, would you rather give the pediatrician a floppy baby? What's the first thing they do with that baby is floppy and not breathing?

SPEAKER 4: They suction breathing.

DR. GARY DV HANKINS: They suction any oxygen that might be there out. They put a laryngoscope in so they can intubate to suction the rest of the oxygen out. And does the laryngoscopy cause bradycardia?

SPEAKER 5: Yes.

DR. GARY DV HANKINS: So I'm interested in giving them a vigorous baby. And when I go back for one of these were baby has been down and I bring the baby out and the baby is vigorous, or I've got good tone in that cord, I'm going to stimulate their baby and get cry on the field, on the field.

My folks in the OR are standing there and they want the baby. Give me the baby. Give me the baby. No. If I can get this baby crying and vigorous on the field, that's what I do. And the neonatologist should be happy with me for that.

What if there's meconium? Does that matter? Not one bit. Because meconium aspiration syndrome doesn't occur because a baby aspirates intrapartum, it's not about the particular debris. It's about histologic changes that take hours and hours to occur. So that's not a reasonable I'm going to whisk the baby off either.

So the bottom line of what this is going to come down to is what the neonatologist have to evaluate, which is the baby. It's going to be neuroimaging is going to be the primary factor that's used to judge timing. If it's going to be used to judge the timing, ideally, it'll be done between 72 hours and seven days of life, and we're talking about MRI. Done in that window.

It won't bring it down to an hour or two, but it brings it down to 12 to 24 hours and timing the injury. If you miss that window and sometimes the windows miss because the baby is just too sick to take to the magnet, and that's understandable. But neuroimaging is going to be the primary factor that's going to be used to judged whether I did a good, bad, or indifferent job as the obstetrician.

The next backup is going to be the EEGs and the brain wave patterns and whether there is suppression or whether there is seizures. And then, of course, whether or not we end up with liver function injuries, oliguria in the baby, a bump in creatinine, the nucleated red blood cells, thrombocytopenia. All those will go in as pieces of the puzzle.

Now, there will be folks that like the new monograph, and there will be folks that don't. I've never been able to please more than probably 50 and 1/2% But it's going to be the best science that's out there for the moment. Admittedly, there is a huge dichotomy between what the neuroimagers see and what the epidemiologists report, a very significant dichotomy, and that is recognized in the new monograph.

Now, as the obstetrician taking care of high-risk pregnancies, my biggest fear is there is emerging data that suggests that the misbehavior of my children when they were teenagers is also the obstetrician's fault. So there are drifting over to allegations of injuries that are far broader than cerebral palsy, spastic quad, and dyskinetic movements. That'll be a story for the next monograph five to six years from now.

I stop for comments or questions. Yes.

SPEAKER 6: Does this monograph come to ACOG members automatically when it's released?

DR. GARY DV HANKINS: Yes, sir. It does.

SPEAKER 6: And do you advocate getting the cord blood? I do a cord blood gas every delivery I do. Thinking that if the cord blood gas is normal, nobody can go back and look at the strip and say, you should have done a C-section. Do you do routine gases on every delivery?

DR. GARY DV HANKINS: I got all the way to professor based on publications on cord gases. So yes, sir. All my life, I've done artery and vein. I've done them with chorioamnionitis with pre terms across the board, and I think it's prudent. And if I were the president of a hospital, give me a guess. How much does it actually cost the hospital to do a blood gas?

SPEAKER 7: $10.

SPEAKER 8: $0.10

DR. GARY DV HANKINS: With the equipment, the reagents, and the technicians to do it, less than $2. Less than $2. You don't need a pulmonologist to read the thing. Right? They'd get all confused looking at cord gases. So we don't need a pulmonologist to read it. We look at it, and I think that for the amount of money cost, if I were president of a hospital system, I would ask that we routinely do arterial and venous gases.

I've got in the syllabus a case of the previous presentation where I delivered a baby that scored APGAR scores of 0, 0, 0, 0, 0, and was pronounced with a totally normal arterial and venous gas, both of them. But for that gas, I'm doomed. In fact, for the autopsy, and I don't even remember pissing off the pathologist, but for the autopsy, he said that he suspected either trauma or a traumatic delivery or I forget the other thing.

He damned OB care, and there was not a shred of evidence supporting any trauma or anything else with that baby. When neuropathology did finally come back and that's delayed, the neuropathologies showed that that baby sustained an injury about 96 hours before she was ever transferred to my facility where I took care of her.

So gases are a good deal. They will never make it look worse than it is, and you're going to avoid the attorneys saying you destroyed information. Yes.

SPEAKER 9: You were saying for the new, the updated [INAUDIBLE] as far as present diagnosis. I mean, is there information on a higher incident less than 7.0. Because of that new information that injuries had been sustained at a higher arterial gas.

DR. GARY DV HANKINS: That's right, and those will all be referenced.

SPEAKER 9: Consider if we got it with less than 7.0 What is it based on?

DR. GARY DV HANKINS: 7.0 was based on two or three publications when the last monograph came out, and it's true that if you're below 7.0 and it is metabolic, and they're usually mixed. Rarely are they purely metabolic. So they're usually mix, but they'll have a big metabolic component. If you are there, then the chances of a neurologic injury go to 30% to 40%.

That's not to say that you can't be 7.10 with a base deficit of minus 11, and I resuscitated that baby between the time that it was acidemic and I delivered it. That can occur, and there's data that shows that. That's why it's not a criteria, it's what do the pieces of the puzzle determine the likely truth to be.

So there's no one criteria that's going to do it. Not even neuroimaging and isolation can do it. It's a composite. That should give us the best answer to the question. Yes.

SPEAKER 10: The big [INAUDIBLE] that you had of all the people that participated, was the American Academy of Pediatrics on that list?

DR. GARY DV HANKINS: Yes.

SPEAKER 10: So that thing about non-vigorous and stimulating them rather than intubate with [INAUDIBLE], is that eventually modified to where we're not doing that?

DR. GARY DV HANKINS: Well, we should-- if the baby is vigorous, the neonatologists have even come on board and said they don't look, they don't suction, they don't do anything. So that shouldn't change.

SPEAKER 10: But I thought you said the non-vigorous things, so the floppy baby that comes out.

DR. GARY DV HANKINS: The floppy baby that comes out, I'm going to milk volume into that baby from the uterus and the placenta. Keep in mind that the blood volume for the fetus across gestational age is weigh based, and it's about 90 to 100 cc per kilo for the fetus. So a 3-kilo baby has a total blood volume roughly of 300 cc.

The blood volume for the uteroplacental unit is 135. 35 times 3 is 105. Is that right, Mike?

MIKE: Yeah.

DR. GARY DV HANKINS: If I could have done math, I'd probably be something else. So 105 cc. I've got 105 cc right there that I can give that baby what it needs on the field, by milking. Massage the uterus and put blood in the baby. Now, what if I cause the baby to have too much blood? The pediatrician should get a [INAUDIBLE] and they can draw some out and pour it down the sink.

But if I give them a baby that is in hypovolemic collapse, how long is it going to take them to get a line in? I mean, even if they're really good with UACs and UVCs, it takes a while to get the lines in and give that baby some volume. I have never been able in that circumstance to make a baby have a problem in the nursery because I gave it too much blood.

You have a great opportunity right at the moment of that delivery, if the baby is floppy to give it volume. Don't miss that opportunity. Did I answer the question, or did I skirt it?

SPEAKER 10: You put in some more good information, but that was not the question.

DR. GARY DV HANKINS: Try me again. We're going to keep going until I get it.

SPEAKER 10: It sounded like you said the non-vigorous babies were not going to get intubated in suction, rather you were going to stimulate them in a C-section?

DR. GARY DV HANKINS: At the section, it stays on the field. It takes me a while to massage a uterus, put volume in, and stimulate it.

SPEAKER 11: --from the meconium standpoint?

DR. GARY DV HANKINS: Meconium is the pediatrician's problem.

SPEAKER 12: You said you liked a baby that was non-vigorous.

DR. GARY DV HANKINS: Yeah.

SPEAKER 12: Try to. The delay--

DR. GARY DV HANKINS: The baby's got to breathe. OK? So you have to weigh all this stuff. So if I can give that baby volume, I'm going to suction it on the field too. We have bulb suction. We suction. I don't intubate it on the field, but I'm going to suction the baby with the bulb suction like we generally do with every baby.

SPEAKER 12: I don't know if you recommend it or not for a non-vigorous meconium baby. So I'm getting confused. I'm sorry. I don't want to be an instructor here.

DR. GARY DV HANKINS: Yeah.

SPEAKER 12: JUST trying to get the facts.

DR. GARY DV HANKINS: Well, they're not scrubbed in with me.

SPEAKER 12: I'm standing there holding my drape like you handed that baby though.

DR. GARY DV HANKINS: Yeah. My nurses do that to me too. They want the baby, want the baby, want the baby. You'll get the baby when I'm ready to hand it to you, after I make the baby better.

SPEAKER 12: But if you stimulate my baby, then I'm supposed to be intubating and suctioning. In the past period before this monograph, was it wasn't making it better. Is that not?

DR. GARY DV HANKINS: That's not the case. Yeah. That's not the case. You missed that opportunity to give the baby volume on the field, and to get it to start to breathe, then what are you going to do when you get a baby that's not breathing, you're going to do the things I said. You're going to bag it. You're going to suction it first--

SPEAKER 12: You're going to intubate it.

DR. GARY DV HANKINS: -- intubate it, and suction it.

What good does that do? Meconium aspiration syndrome is not from particulate debris that it just aspirated. The baboon studies done by actually Michael helped me with a neonatologist, Dr. deLemos a giant in nanotechnology in San Antonio did elegant studies with primates. Meconium freshly aspirated does nothing. It is a long-term aspiration that sets up pulmonary hypertension because it causes histologic-- those are not instantaneous.

That baby that we deliver that's depressed needs most immediately volume more than anything else. And when I've given that baby volume, and you come work with me. I'll promise you, I'll give you better babies not worse babies. Yes,

SPEAKER 13: When you say giving the baby volume, you just simply milk the cord or do you actually massage the uterus?

DR. GARY DV HANKINS: Massage the uterus as well as milk it. Any of you do cord collections? Cord Blood So you know how much blood you can get, right? There's a lot of blood there. And it's precious for the baby that is volume down, and they're volume down if there's no tone to that cord. Now, I also try to preserve enough to give you a chance to get my arterial and venous gas, and those are really important to get in those circumstances. Yes.

SPEAKER 14: Do you recommend milking the cord towards the baby, in general?

DR. GARY DV HANKINS: No, sir.

SPEAKER 14: No?

DR. GARY DV HANKINS: Not in general. No. If the baby is vigorous and there's been no issue with the baby, then if I milk the cord, I can make the baby polycythemic, contribute to hyperbilirubinnemia, so I don't know. Now, some people would like to drop the baby down and let it automatically get some blood, and that's fine. I view that as very different though than the massaging the uterus and milking blood actively into the fetal circulation.