The Lead in Peds

Transcript: Season 1, Episode 1 – Beating Strong: The Lifelong Impact of Pediatric Cardiology

Guests: Dr. Mary Donofrio & Dr. Wayne Franklin

Dr. Nathan Kuppermann (00:00):

As parents, we all get super excited when we go in to get our first fetal ultrasound, but what happens if that ultrasound technician finds something abnormal with a vital organ, an organ as vital as the heart? Where do you turn? I'm Dr. Nate Kuppermann, chair of Pediatrics and chief academic officer here at Children's National. I'm a pediatric emergency physician and I've spent three decades caring for acutely sick children including those that have these cardiac crises. There's about 40,000 children born each year in the United States with congenital heart disease and my job in the emergency department is to stabilize them and then pass them over to my colleagues in cardiology and cardiac surgery. But then what happens?

(00:48):

I'd like to welcome to the show Drs. Wayne Franklin and Mary Donofrio, two of our leading cardiologists here at Children's National. Thank you both so much for being here.

Dr. Mary Donofrio (00:58):

Thank you.

Dr. Wayne Franklin (00:59):

Thanks Nate.

Dr. Nathan Kuppermann (01:00):

I'd like to quickly introduce you guys for our listeners. So Dr. Wayne Franklin, who I'm going to call Wayne, is the director of our heart center. He comes to us from Phoenix Children's, arrived here at Children's National, a similar time as I did last year, has lots of areas of expertise in pediatric cardiology including single ventricle Fontan physiology, pulmonary hypertension, cardiac disease in pregnancy amongst a number of other things. And Dr. Mary Donofrio, who I'm going to refer to as Mary, is an international expert in fetal cardiology, is the director of our prenatal cardiology program. Super well known as a national and international researcher with more than 150 publications, NIH grants and the lead author of a really important AHA guidelines on the diagnosis and treatment of prenatal cardiac problems. So welcome to you both.

Dr. Mary Donofrio (02:00):

Thank you.

Dr. Wayne Franklin (02:01):

Thank you.

Dr. Nathan Kuppermann (02:02):

But before we start, I just want to just raise one thing. So Wayne and I are relatively new to DC. We've been here just a few months. We've eaten together a couple of times, but we're just wandering in the darkness, trying to find a good place to eat. So Mary, as the seasoned experience Washingtonian here, do you have some advice for us about where to eat?

Dr. Mary Donofrio (02:26):

What a great question and I would say there's not a bad place to eat. I think Washington, what I love about it, is it's very diverse. There are so many cultures and ethnicities that you can really get anything. So my advice to you is to be bold and try something new.

Dr. Nathan Kuppermann (02:51):

And what is your favorite, by the way, what favorite ethnicity of food?

Dr. Mary Donofrio (02:52):

Well, of course Italian since that's my heritage-

Dr. Wayne Franklin (02:52):

There we go.

Dr. Mary Donofrio (02:53):

... and there are many good Italian restaurants, but certainly Middle Eastern, Spanish tapas is very good here, so many great options.

Dr. Nathan Kuppermann (03:03):

Sounds pretty good. Wayne?

Dr. Wayne Franklin (03:05):

I'll eat anything, so that sounds fine, that sounds fine. You could go high end like Michelin star and you could go regular diner.

Dr. Mary Donofrio (03:12):

Absolutely.

Dr. Wayne Franklin (03:12):

I'm just as happy.

Dr. Nathan Kuppermann (03:13):

Excellent.

Dr. Wayne Franklin (03:14):

Sounds good.

Dr. Nathan Kuppermann (03:14):

Great. So hey, so let's get into it here and I'm going to start with you first, Mary, just first of all, how did you get into your field? Just give us a little bit of a background on that.

Dr. Mary Donofrio (03:24):

I think the big question for my family is how did I even decide I wanted to be a doctor, there were no doctors in the family, and from the time I was a little girl, I just wanted to be a doctor. And in med school, I think the heart actually fascinated me. It is amazing. It is perhaps the hardest worker in the body. It's the first thing to start that gives us life and it's the last thing to stop when we die. And so I really found the heart and pump physiology fascinating. When I finished, I knew I wanted to be a cardiologist. I didn't really enjoy taking care of the grownups, I have to say, and fell into pediatric cardiology, which I thought was just an amazing field to be able to help kids right from the beginning.

(04:20):

And then fetal really didn't exist when I trained. And my first job was as an imager, as head of what we call the echo lab and my boss said, "I want you to start doing this new thing called fetal cardiology." So I went and I trained with actually a world expert. He was considered the Father of Fetal Cardiology at Yale and really had the opportunity to learn from a master and also work with obstetricians. And it was amazing taking care of the women during a really tough point in their life and being with the babies at the beginning of their journey. So what a great field to have fallen into and I can't imagine having done anything else.

Dr. Nathan Kuppermann (05:08):

So you actually knew as a child not only that you wanted to be a doctor, but you wanted to be a cardiologist. Is that what you're saying?

Dr. Mary Donofrio (05:15):

No, no, the cardiology part-

Dr. Nathan Kuppermann (05:16):

That part came later.

Dr. Mary Donofrio (05:17):

... came later. Yeah, yeah.

Dr. Nathan Kuppermann (05:17):

Got it. And let me just ask you, since you raised calling it the most important organ, I struggle between the brain and the heart and we'll be talking about that a little bit later. Ponder that one-

Dr. Mary Donofrio (05:29):

I will ponder that.

Dr. Nathan Kuppermann (05:30):
Because we'll come back to that though.

Dr. Mary Donofrio (05:32):
You can't live without your heart, I'll just say that.

Dr. Wayne Franklin (05:35):
That is right. That's true. We'll leave that one alone. That's good.

Dr. Nathan Kuppermann (05:40):
So, Wayne, I'm going to ask you a similar question. I also want to know how you got into pediatric cardiology, but also give us a little bit of the global perspective of pediatric cardiology and the science around pediatric cardiology and how it expresses itself at Children's National.

Dr. Wayne Franklin (05:59):
So I initially got into healthcare. My dad was a doctor and so he's a neonatologist and so I was always surrounded by it. Then I went to medical school, but it wasn't until I got into residency and I remember I was on call one night in the cardiac ICU and I was a med peds resident. This adult cardiology fellow came, crashing through the doors. He just put a stent in this patient and saved the guy's life and I was like, "I want to be that guy." I thought that was so cool and it was the time when healthcare was really on the way up and everything. And so I just followed in his footsteps. It turns out that that guy's name was Wayne as well, so that was a natural fit. We're actually still friends today and our wives are friends, so he's been a great role model for me.

(06:45):
And then cardiology, to Mary's point, so interesting we can do things with drugs and medicine, we can do things with surgery, we can do things with minimally invasive things with catheters, just through blood vessels. And so to be able to do that in one field is fantastic. The field of pediatric cardiology, the sky's the limit. I'm actually really excited, I know Mary is too, with the research potential that we have and really the progress that we've made. If you really look at pediatric cardiology and congenital heart disease, it's a relatively young field, but it's an amazing field because back before 80 years ago, 1940s or so, most or all these kids would die. And now we've essentially reversed that trend where most of them are surviving to adulthood with some big impactful advances that we've made. And so that to me has really shown the impact of both science, surgery, medicine and really just some great planning by a lot of the experts in the field.

Dr. Nathan Kuppermann (07:42):
It raises two things for me. First of all, the power of early examples in mentorship, right? We're really struck by people that we admire as trainees and whatnot, and they have the incredible potential to help direct our direction in terms of where we go. And that sounds like probably how you got there. The other thing I was going to say, as a pediatric emergency physician, I've resuscitated a lot of children with cardiac disease and then hand them off to you guys to the pediatric

cardiologists or the cardiac surgeons and then I move on to the next patient and I never get to really know exactly what happens. Part of the joy of this particular session with you guys is that I get to learn some of the things that happened after that handoff.

(08:29):
So I'm going to start going back to you, Mary. I know we mentioned just in the opening, you were the lead author of these important AHA guidelines about the diagnosis and treatment of the fetus with cardiac abnormalities. Why don't you just take us through that and tell us where that has gone?

Dr. Mary Donofrio (08:47):
Well, thank you for that question. Certainly, writing the guidelines with a group of 19 experts was certainly a highlight of my career. It took four years. We joke about that from the time of conception to delivery was a really long time and that was our labor. So it was certainly a long labor, but the results are really something we're all very proud of. These guidelines are used nationally and internationally and have been translated into Japanese, for example, which was really amazing to see. The guidelines, they cover every area of fetal cardiology, so things like who should get tested, what's the indications, who are the highest risk women, and then once you do get testing, what kind of testing do we do?

(09:49):
Our mainstay is ultrasound called echocardiography, but there's also other more advanced testing that we can do like MRI for example. From there, we talk about how to care for fetuses, so how do we follow them in utero, how do things progress, who do we have to worry about. I created a protocol where we could use ultrasound to identify those at risk and then plan who needed specialized delivery room care. And we tested it right here in Washington and then first wrote about it after eight years of experience with it and really showed that it worked. And so that was then carried to be part of the guidelines, which now are used everywhere.

Dr. Nathan Kuppermann (10:32):
This issue of risk stratification, this is something that as physicians we all do, and for our listeners, that's identifying which children or which patients' needs are high risk, need immediate care, need immediate referral versus those that can be referred later, etcetera. Are there other tools that you use beside the echocardiogram, beside the ultrasound? How do you do that risk stratification?

Dr. Mary Donofrio (10:57):
We've used fetal MRI for years and I've worked with our radiology colleagues and expert in the field herself to really look at the rest of the body, look at the brain, look at the lungs and the lungs are very important as you transition from fetus to baby. And so we spend a lot of time together trying to understand how the other parts of the body beyond the heart will affect what's going to happen in the delivery room. In addition, we are developing fetal EKG technology and that's right here at Children's as well where we're working with our researchers to develop that

technology. So hopefully, we'll be able to understand the rhythm better because that certainly can make babies sick in the delivery room as well.

Dr. Nathan Kuppermann (11:50):

Great. And actually, it leads to another question. As I mentioned at the start of our session here that about 40,000 children are born each year in the United States with congenital heart disease. And now with all this great new technology, about three quarters of them are diagnosed in utero. It does still leave a quarter who are not. So what happens to those infants that are not diagnosed prenatally? First of all, why does that happen and then what happens to them?

Dr. Mary Donofrio (12:24):

I think if you look at the data, yes, in our region, we have about a 60 to 70% detection rate. So if you look at babies born in our intensive care unit, about three quarters, as you said, are prenatally diagnosed, but in other parts of our country, that's not true and detection can be low as 20 or 25%. We participated in a study, we actually led the study here at Children's through an organization called the Fetal Heart Society, which is an international research collaborative that I was the founding president. So we started this in 2014 to really try to bring together researchers to answer these hard questions. And the first publication was from our group where we looked at barriers to detection and certainly found that things like socioeconomic status, ethnicity, all played a role in detection as well as distance from the tertiary care hospital, so if you lived in rural areas.

(13:29):

A follow-up study that one of our fellows did, who's now one of our attendings, was to use census data to identify hotspots where detection was less, even in our community, so in the DC area. And so now with this information, we can go into these communities to help them. What do they need? Do they need teaching or do they need ultrasound equipment or us to set up a clinic? And so it's enabled us to then increase our reach to hopefully improve detection even within our region. And so to be able to identify those babies and to set up protocols where we can initiate care really matters.What we're looking to do is to certainly prevent a baby from dying before they make it to us.

(14:23):

But other important things, if a baby is born with a low oxygen level, it can affect their brain, it can affect their kidneys. And so as we try to improve the overall outcome, which includes what we call neurodevelopment, we want to make sure these babies do well right from the start.

Dr. Nathan Kuppermann (14:43):

It's interesting, I'm going to get to this question of the brain and neurodevelopment, but one thing that this brings up when we're talking about pediatric subspecialties in general and pediatric cardiology is just like that there's not enough pediatric subspecialists in this country to reach every remote corner; it’s true in pediatric emergency medicine, my specialty. And it really raises an important question, I'll be asking Wayne this question as well as, how do we get our expertise that we have in the big pediatric centers? How do we get it, so it reaches every child in the coun-

try, much less every child in the world? That is really a challenge facing all pediatric subspecialties, but the ones that really deal with acute care where you don't have time to refer somebody and that is really an important challenge.

(15:35):

But I want to get back to the second thing that you had mentioned about neurodevelopment before I transition to you, Wayne. So we started by talking about, "Hmm, what's the most important organ, brain or heart?" I don't know, I have no skin in the game because I take care of all the organs, but just talk a little bit about neurodevelopment. How do you think about the developing fetal brain vis-a-vis the heart and how do you monitor and whatnot?

Dr. Mary Donofrio (16:04):

It's actually been my research interest since the beginning. I still think the heart's the most important, but certainly as Wayne said, our patients are now living. When I first started, we were just happy to get them out of the intensive care unit and now our expectation is that they will become grownups and most of them are. And to me, that is the most powerful thing to want to do better. And so what we know is that as these kids become grownups, many of them will have difficulties in school and the question is why? Why is that? And the answer is actually that there are multiple points in a kid's life that are critical to the brain and it's important for us to think about the brain, because certainly, what makes grownups happy and successful is to get through school, to get a job and to be able to live independently. So we want that for all of our kids to reach their full potential.

(17:12):

What we've learned is that it starts in the fetus, that the way the blood moves through the body and to the brain can affect the way the brain develops. There is a lot of research going on at Children's to try to understand this using very fancy technology with MRI. And then certainly, the delivery is another important timepoint as we talked about making sure the brain gets the blood flow that it needs. Surgery is important, protecting the brain, that's neuroprotection and our group is doing a lot of research in that, how to protect the brain during the actual operation.

(17:53):

What I am most proud of though is, in 2010, one of our neuropsychologists and I started a program that's called our Cardiac Neurodevelopmental Outcome Program or CANDO. And what this program is to assess our children from their birth, so right in the intensive care unit, looking at risk factors for neurodevelopmental outcome to make repeat assessments and including it in the outpatient setting. We follow them from birth until they're adults. My favorite part of it is called school readiness testing, which is when these kids are between four and six years old, a neuropsychologist assesses these kids and then can give families and schools advice on what kind of a learner a kid is and how to really maximize their potential.

(18:47):

So until we figure out why this happens, to prevent that very fragile brain from being affected, the Cardiac Neurodevelopmental Outcome Program I think will give every kid that we take care of a head start and the help that they need.

Dr. Nathan Kuppermann (19:05):

Great. So, Wayne, I'm going to turn to you and first of all ask you, what do you think? And what I'd like you to address, since one of your main focus areas is in the ICU, how do we do neuroprotection, that is protecting the brain in the operating room, in the ICU? What are your thoughts on this topic?

Dr. Wayne Franklin (19:23):

Yeah, one of the things that our surgical colleagues have shown now is that the way they do the operation and how much time it takes is directly correlated to outcomes, right? There's the old axiom, which is, "Time is tissue," right? We used to think that was strictly for cardiology. We also know it's related to the brain too. And if the brain becomes ischemic, we know that's a problem. So not only do our surgeons need to be facile and relatively quick with their operation, but they also have to be thinking about, what does the perfusion of the brain look like? Can they do different temperature regulations? Can they give different additives that might lead to better outcomes the way they did neuroprotection during the operation?

(20:02):

And then postop, in the ICU, to your point, Nate, we were talking about what does cardiac intensive care look like. It is its own subfield now, right? We know that it's a field outside of just regular pediatric cardiac critical care. So important to Mary's point, as we say in cardiology, the way the blood flows, really important and the way that the surgeons operate and they actually will change the blood flow hopefully to something more sustainable is really impactful. And so to be an intensive care doc, you have to know all of that. And so there's certain ways that we monitor these patients. We're very blessed to have a tele-command center in our hospital, Children's National, that we say there's a lot of command centers around the Washington, D.C., area and this is ours. Might be a little smaller, but hopefully just as effective.

(20:51):

And so we're watching every baby every day. Every heartbeat, every breath is being monitored by experts, by physicians, nurses in the command center, so we can try to predict if there's going to be a problem, predict deterioration or decompensation. And a lot of our outcomes and a lot of our data have shown that, if we can make certain tweaks or changes or things about even dressing changes or rotating a child or changing a central line, we know that that definitely leads to outcomes that are beneficial. And so we use all of that data in a data analytic way to address outcomes. It's a really exciting time because the whole catchphrase, AI, artificial intelligence, which I actually try to think it's more of augmented intelligence, it's not artificial because it's really happening in our ICU and so we're able to incorporate a lot of that and translate that right to the care of the patient.

Dr. Nathan Kuppermann (21:47):

The way I think about it in my simplistic version of how these children with congenital heart defects present to Children's National and hospitals like ours, so if they're diagnosed in utero and the physicians know they're going to be sick, the umbilical cord is clamped, cut. Patient's handed off to cardiologists, cardiac surgeon, that's one way. Another way is you can make the diagnosis of a stable child with a defect and then they get referred but not emergently. And then there's the patients that I deal with in the emergency department, they're frequently perhaps those children that are not diagnosed in utero and they present in emergency departments and are either in fulminant cardiac crisis or they have some red flags that make you think, "Wow, this kid is going to decompensate, get real sick," so then those patients, we turn them over to you in the ICU.

(22:42):

So I'm going to go back to something you said, you gave a nice overview, but you want to just walk through for our listeners, what does it look like in a pediatric cardiac ICU? What do you see and talk a little bit more about how we use AI to improve care, how we use monitoring, all those things, just to give a good visual for our listeners?

Dr. Wayne Franklin (23:06):

It is I think the most challenging area because we're dealing with sometimes the smallest patients, right? Talking about newborns. And sometimes we have large patients, teenagers, young adults, adults who also have congenital heart disease. And these are all done at Children's National. So when you go into our pediatric cardiac ICU, as we call it, CICU, CICU for short, it's a conglomeration of all these teams working together. So we have cardiac intensivists, we have cardiologists, we have fetal cardiologists, we have surgeons, residents, fellows and we're really bringing all that in together to care for one patient at a time. But it takes a team, sometimes 18 people and we're rounding bedside.

(23:48):

We're looking at all the vital signs, we're looking at oxygen saturation, blood pressure, urine output, neuro infrared spectroscopy, NIRS monitoring, all of that to be able to decide, "What's the next best step for the patient? Should they have an operation? Should they go to the catheterization lab? Should they get a CT? Should we just let the baby recover?" Right? And oh, by the way, a lot of times we're dealing with fresh postoperative cardiac patients who just had major cardiac surgery. So all of that is orchestrated by our intensive care team and it's really a wonderful place to be, but it's very challenging and it's very stressful. But I think, if it goes well, and most of the time, it does, then it's really amazing. And if it doesn't go well, our team gets together, we jump in there and we react. But we try to be proactive and prevent deterioration illness, but we just have to see what the patient gives us sometimes.

Dr. Nathan Kuppermann (24:50):

So I want to turn back to the question that I asked Mary about, how do we extend this expertise to areas that are distant and remote? And I know at Children's National, we do some remote monitoring of other centers. Do you want to talk about that?

Dr. Wayne Franklin (25:06):

Yeah, this is great. This actually was here when I started here and they've been doing it for several years now. So we're able to extend our expertise with really, we call it telemedicine, but we've been doing it for several years, even though that phrase is caught on now. And so we, every day, will be monitoring other children, other patients in other hospitals, sometimes in different states. We're certainly monitoring our 26 beds of ICU patients, but we can also monitor other patients with the doctors at that hospital. And we look at their vital signs, we round with them, we even have a camera, so we're doing visual inspection too of things. And so to be able to do that, Nate, is a way to bring our expertise to remote areas where there's physical barriers, there's geographic barriers we may not be able to get over and that's been outstanding. Because I think the receiving hospital likes having our expertise and we like being able to take care of these babies with the help of the team on the ground there.

Dr. Nathan Kuppermann (26:03):

And when you're doing this, are you able to interact with families as well, like the families of these patients, or is it strictly with the care providers, the physicians?

Dr. Wayne Franklin (26:13):

Mostly, it's the care providers there, but like us, if they are having the families at the bedside during rounds, which is really standard of care now, they're there as well, so it's quite beneficial.

Dr. Nathan Kuppermann (26:25):

This is totally amazing. Again, I started thinking, "Oh, I just resuscitate the baby and the kid and hand them off to you guys," and the technology has become really amazing. So one last question I want to ask you. Again, we're doing AI modeling to figure out who's going to decompensate. We're using all these tele technologies, we have these incredible ways to image fetus and infants. What do you anticipate, what do you think is the next big technology that's going to transform how we're taking care of children with cardiac defects?

Dr. Wayne Franklin (26:57):

I'll mention two. I guess one would be, I think, wearable technologies. I think we need to be able to have patients monitored at home. We're doing it very lightly, right? We're checking weights, we're checking feeds, we're checking maybe oxygen saturation, that's fine, but there's so many other vital signs, blood sugar, movement, heart rate, sleep time that we haven't quite figured out how does that relate to outcomes, right? And so they're doing research to do that and we want to be part of that. And the other thing I'll tell you, and I think hopefully Mary will agree, is that I'd love to be able to scan more patients because a lot of what cardiology is diagnosis with an echo, right?

Dr. Nathan Kuppermann (27:34):

So scan being just to image?

Dr. Wayne Franklin (27:36):

To image, to image and they're doing this at some places in Europe where they're actually having an echo probe being run remotely by me a thousand miles away, telling where the echo probe needs to move on the patient. So that's science fiction, but it's actually being done at some places.

So I think we should be able to do that. The last thing I'll say is that we actually can try to educate and teach the parents to do some of this. There was a study out of Stanford looking at teaching parents how to scan echo on their own patient as they're monitoring aortic root size for their patient who's got Marfan syndrome. And you can teach parents to do that, just a couple views that are being back to us or to the physician to then say, "Okay, that's an adequate study," or, "No, it's getting too big. You need to bring that patient in."

(28:25):

Now that's trusting the parent with a $100,000 echo machine, but there's smaller versions you can get that can be given to patients. So those things I'd like to see.

Dr. Nathan Kuppermann (28:35):

Let me follow up. So I'm going to ask this to both of you guys and then I'm going to see if I can synthesize a little bit all this incredible information that you've provided me, us, back to AI. So in the emergency department, we use ultrasound a lot, but there is different levels of comfort with ultrasound, particularly if you're putting it in the hands of parents. What's the role of AI? AI helping with the imaging and making the interpretations rather than leaving it up to the clinician or the parent where there's great variability in the ability to image a number of things? Is there a role for AI in the interpretation?

Dr. Mary Donofrio (29:18):

I do think there is a role for AI and I like Wayne saying it's augmented intelligence, because certainly, the machines are only as good as those of us who program them. AI has the ability to recognize key views of the heart, so the four chambers of the heart, the two arteries that come out. And by repetitive learning, it's called deep learning that the machine can recognize normal from abnormal. And then once it's tagged abnormal, then a referral is made. And so certainly, that's something that we can use particularly in regions where our reach is distant that we can't go there. I think the biggest challenge though is those regions that need it is, "How do we get that technology there?" And so that certainly is something that we need to work on.

Dr. Nathan Kuppermann (30:16):

So I'm going to try to synthesize what you guys have just told me and you tell me if I have this right. So 40,000 children in the United States are born with congenital cardiac disease. Overall, maybe a quarter of them are diagnosed in utero, greatly depends on where you live. If you're fortunate to live near a center that can do that, great, but others don't have that good fortune. Some get diagnosed and can be referred. Others can present in critical condition. And when they're in critical condition, they're transferred to a critical care ICU, cardiac ICU that is.

(30:54):

And there, we have amazing new technology, monitoring, ways to identify who's going to do well and who's not going to do well. We monitor to make sure that their brain, the second most important organ of the body, maybe we'll say today, remains healthy as best we can, both monitoring the fetus and the neonate and monitoring during surgery in the ICU. And then we have

novel noninvasive ways to treat a lot of these lesions and who knows what's to come afterwards. Did I summarize that more or less?

Dr. Wayne Franklin (31:33):

That's pretty good for an ER doc.

Dr. Nathan Kuppermann (31:36):

And I guess my parting question for you both is, what's the call to action? What do we really need to mobilize to do next to really take this already tremendous frontier of pediatric cardiology just to the next level? And I am going to give a shout-out to the great work that we do at Children's National and we are at the very leading edge of this and I would love to figure out how do we get to the next level.

Dr. Wayne Franklin (32:03):

Mary?

Dr. Mary Donofrio (32:04):

Sure, I can start. It does all start with the fetus.

Dr. Wayne Franklin (32:07):

There we go.

Dr. Mary Donofrio (32:09):

There we go. The way to sum it up is we've rebranded ourselves as prenatal pediatricians and that really is a big thing. What that says is that these are our patients from the time we first diagnose them in utero. So what can we do to improve their outcomes and care for them from the time of diagnosis? The first thing is early diagnosis is very important and the technology is helping us here. We were one of the first that started looking at the fetus in the first trimester. So at 12 weeks gestation, we can see the heart. The other thing that we can think about is, once we diagnose it, particularly if it's early, the genetics of it is very important and we certainly have an amazing genetics department.

(33:03):

The goal would be to identify the genes and maybe cure this at some point, "Can there be therapies that are initiated in the first trimester that will prevent the development of congenital heart disease, so that no baby is born with congenital heart disease?" And then from there, following these babies in utero, we've learned a lot about what happens, how things progress, "Can we intervene with authorization procedures where we minimize the severity of disease?" This is all things that are happening now. Wayne mentioned monitors. We give moms monitors to follow the fetal heart rate at home, so that they can be a part of the care. So really all of it together is to identify congenital heart disease early, identify it in as many patients as possible and then really try to figure out a way to either eliminate the heart defect or at least minimize the severity.

Dr. Nathan Kuppermann (34:13):

Wayne, last word to you.

Dr. Wayne Franklin (34:15):

I'm going to take a global perspective and say research. And without being too political, I think we need to really emphasize the really good pediatric and prenatal research that we're doing and that it matters, right? I think, Nate, I heard that 90% of healthcare dollars are spent in the last two years of life, right? The last two years of life. But if we can make that one or two changes in fetal life or in neonatal life to set this baby with heart disease on a different course, that baby has changed forever. And I think we need to get people to understand that and really emphasize that. So I'm calling out to the researchers, I'm calling out to the industry, right? They need to realize that there's a market in pediatrics, there's positive outcomes, it's better for society and that would be my call to action.

Dr. Nathan Kuppermann (35:02):

So Dr. Wayne Franklin, director of our heart center, Dr. Mary Donofrio, director of our prenatal cardiology program, thank you both for being here, for enlightening me, enlightening our audience here in The Lead in Peds.

Dr. Mary Donofrio (35:18):

Thanks, Nate.

Dr. Wayne Franklin (35:18):

Thank you.

Dr. Nathan Kuppermann (35:20):

Please subscribe to our show wherever you get your podcasts and learn about what we're doing to raise the bar of care for all children here at Children's National and around the world.

** This podcast has been edited for clarity. Some content may have been altered to enhance the listening experience.**