

# English Transcript

Interview with Dr. Manvi Bansal

**Dr. Eyal Ben-Isaac:**

Hello and welcome to the Perspectives on Pediatrics podcast. I'm your host, Dr. Eyal Ben-Isaac recording from Children's Hospital Los Angeles. I have the pleasure of speaking with Dr. Manvi Bansal, who is an attending physician in the Division of Pulmonology and Sleep Medicine at Children's Hospital Los Angeles and an Assistant Professor of Pediatrics at the Keck School of Medicine at USC. She is the Co-Director of the Children's Hospital Los Angeles Infant Chronic Lung Disease Program, and today that will be our topic chronic lung disease in infants and children. Welcome.

**Dr. Manvi Bansal:**

Thank you very much for inviting me to this podcast.

**Dr. Eyal Ben-Isaac:**

So let's start off with the term chronic lung disease. What does it actually mean in pediatrics? And is it interchangeable with bronchopulmonary dysplasia or what we call BPD? Or what is the difference in the terminology?

**Dr. Manvi Bansal:**

So chronic lung disease of pediatric children or however you'd like to call it, and it's also known as chronic lung disease, which starts in infancy or chronic lung disease

of infancy. Chronic lung disease by definition, it's a very nebulous definition, which basically means that it's an ongoing inflammation to some extent, and there are repercussions going down the line, having more scarring in the airway or having airway being more reactive or airway being remodeled in a way that can affect the breathing of a child growing up and also sometimes can have effect into adulthood.

**Dr. Eyal Ben-Isaac:**

And when we use the word bronchopulmonary dysplasia, or BPD what are we referring to there?

**Dr. Manvi Bansal:**

So if we look at the guidelines that came out and actually, long time ago in 2001, when they looked at where does bronchopulmonary dysplasia fits in? So bronchopulmonary dysplasia is a type of chronic lung disease of infancy, which has its origin in infancy in the neonatal period. The difference is that it carries a specific sort of definition, specific histopathological findings, and a phenotype and that's where it makes it a little bit different from other chronic lung diseases. What I want is, if you think of it, that you have a one big circle of a chronic lung disease and PPD occupies a part of it, because there are other conditions or other diseases which are chronic in nature affecting the lungs, but we are not calling them BPD or bronchopulmonary dysplasia. And these are the conditions which can affect term-born infants or infants who actually acquire problems secondary to say meconium aspiration or chronic lung disease secondary to somebody who has bad cystic fibrosis, or somebody who has a bad asthma. So you're going to incur a

chronic lung disease because of many reasons. But so this is a one specific thing to consider.

**Dr. Eyal Ben-Isaac:**

Wonderful. So you already started talking about this, maybe we could go over who is at risk for developing chronic lung disease, infancy, children, and what are the differences that might be causing it in those children?

**Dr. Manvi Bansal:**

So the things which will basically make somebody a lot more prone for a chronic lung disease one is certainly a premature birth. So the earlier you are born, like in bronchopulmonary dysplasia, the chances are you are going to incur some degree of scarring, some degree of an inflammatory state, because you are given extra oxygen, they're giving you extra pressure during this time, and then there are so many other factors which actually lead to the generation of chronic lung disease in a premature infant. So I'd like to think of chronic lung disease or BPD, if I talk about it specifically, think of it like a pyramid, where on the top of the pyramid, you have this particular condition, and the base of that pyramid is formed by a multitude of things. Multitude of things can relate to not just a prematurity as in BPD, but in itself it has many other factors playing. Other things, chronic aspiration, problems with anytime you're not able to clean up your lungs very well, so you have impaired air recurrence or you're insulting your lungs a lot more with recurrent infections. So anytime you're incurring excessive lung injury, and you're unable to protect it,

which hampers your growth and development and generates a chronic inflammatory state, you are looking into the generation of chronic lung disease.

**Dr. Eyal Ben-Isaac:**

Wonderful, that's a great way of describing what happens. So some of the risk factors again would be things like prematurity, chronic aspiration, impaired airway clearance, anything that causes you to have repeated infections, and therefore potential for repeated scarring of the lungs.

**Dr. Manvi Bansal:**

Yes.

**Dr. Eyal Ben-Isaac:**

So, now that we have kind of gone over the disease process, or at least what leads to it, how do we make the diagnosis of somebody having chronic lung disease. Do we do it clinically based on what the history is telling us? Do we do it by imaging? What are the things that we combine to make that diagnosis?

**Dr. Manvi Bansal:**

That's a great question because that's where I think many people think it's about lungs. So let me just focus on lungs as the main problem. But it's not true, your lungs, they interact with so many other organs. Over a period of time as we have evolved in medicine, they have gone from doing everything in pediatrics to more specialized branches. But now we are realizing again that it's time to work together

again with my other core discipline colleagues, so that we can combine things together because our body works together. So in the same way, lungs don't just go by themselves. So when I think of chronic lung disease, I'm not just figuring out what's going on in the lungs. I am actually making a diagnosis of chronic lung disease but also understanding what is going on in the rest of my other systems. So for example, if we look at and I'll give you a couple of examples to make it understand. If somebody comes to me and I say I want to know if you have a chronic lung disease or not. I can get a chest x-ray. A chest x-ray, the way I define it for my patients' families, you're standing at the edge of a cliff and you're seeing there is a small, deep distance in a very far away part of a city. That little smoke is probably caused by a very large fire, very large pathology, but I can see it as a small amount of smoke. They can at least see it from the edge of the cliff. So that's what an x-ray does. It doesn't give you anything else, you have to have a substantial damage or some substantial change for you to be able to see from your eyes using a simple radiograph. So that's how much it will underestimate if I get a chest X ray for somebody I'm trying to understand who can have a chronic lung disease. Children who have bronchopulmonary dysplasia in this new era, as they see it in the last two decades, when we have surfactants, they have a new ways of managing the lungs. When you look at their x-rays, they look pretty good. Sometimes somebody would say they look normal. But however, they are not really normal. It carries a fine, sort of a ground-glass appearance to them. So is radiograph a good way to know somebody has a chronic lung disease? I would say probably not. And so what can I do? So if I want to figure out if somebody has a chronic lung disease, should I get a chest CT to be done for them. But that is not cost effective and has

more radiation exposure. So is it a good way to do it? I think it can give me some answers but not 100%, because now you think of it in you are looking through a satellite imagery and I can look at that place in a little bit more of a detail but I still don't know what else is going on, or how that thing is caused, or is it just an acute process versus something which is an ongoing part of constant insult, repair and growth, something that we forget in children. So it is a mixture of all the three things in kids. So how do I know what is happening? So I don't think a radiological means is the only way to assess it. So how do I assess is by combining my information from different viewpoints. My clinical judgment that would help me, how does the child is doing when they are healthy? How the child is doing when they are sick? Are they behaving like other children when they are able to recover from the sicknesses easily without having any lingering symptoms? What is happening? Do they have anything else that leads to their chronic sort of a status where they're either having a chronic cough or they're having any shortness of breath when they're exercising? Or are they wheezing? Do they have any form of airway reactivity? So I'm have to make a judgment on all of those fronts. So I think as a clinician, I prefer to have a good history and examination first, to basically understand how the child is in health and in a sick state, so I can determine how easily they can get better and do they carry any sort of a problem when they are doing well. For example, sometimes some children when they are having this cough on and on basis, people get used to it. Families get used to it because it's been happening, a little nagging cough every now and then it doesn't bother them. So people don't worry about it. And that's why certain diagnoses are missed for years. Something like primary ciliary dyskinesia, where the hair cells in your area tubes are

just not working really well. They need to perform a broom-like function to remove the mucus from the lungs, but they're not working very well. So the only thing which helps them is coughing that brings up the mucus. So what happens over here is this child who has this condition will be coughing every now and then, but family has gotten used to it. They don't even perceive it as abnormal. It's like, this is my child. So as a physician when such a child comes to me, I ask them "Do they cough anytime?" "Is there any cough in the morning or the night or anything that makes them ever cough?" Which always generally you don't hear them cough. And then I'll also point out to them that you may have gotten used to it. So it may be his normal for you. It's not that it is abnormal for him. So and then they might actually reveal more to you. So what I'm trying to say through this example is trying to know the child really well through a good history and a good evaluation that you do. Dozens of clubbing in the fingers and listening to their chest. So all of those things help. So as a clinician, that is always my priority. Knowing the child well through my history and examination. The second thing that helps us. I supplement it by getting radiological studies, areas of scarring. Now when you're getting an x-ray, don't get them when they are sick. Get them when they're well below for at least six to eight weeks. Because that's how you would know that there is no lingering effect of the prior sickness. They don't have any residual baseline symptoms, and then you're getting an x-ray. And having a good baseline chest x-ray in general is really good. Now, the next thing would be which actually I should have said first, why are you even thinking about a chronic lung disease in a child? Like what makes you think about a chronic lung disease in a child? So always think of it if you have a part of this child maybe having a chronic lung disease, then explore that a little bit more.

The next thing that you can do as a physician if you have an option of getting any pulmonary function test, try to get that, which I mean by is getting the handheld spirometer helps in getting an idea of any obstructive lung disease in the lungs. If it responds to any bronchodilators like albuterol, salbutamol, however, it exists in different places, then see if it actually makes any difference in their numbers when you're looking at their pulmonary function testing. And if you need to explore it further, yes, there are more investigational means or invasive means of understanding it more, but that which should be guided by your history and examination and your evaluations thus far. I would not go into performing say bronchoscopies, or any biopsies or anything else more invasive until I have known some basics, thus far. And this information combined with other investigations related to other organs will actually strengthen your idea of is this kid at a risk of some degree of an insult on ongoing basis that may be causing his chronic lung disease.

**Dr. Eyal Ben-Isaac:**

Wonderful summary. So, really, like everything in medicine, it's really going back to the history and a good physical exam. You know, looking at their past medical history, their birth history, seeing the characteristics of the cough when it occurs, how does it respond to medications, and then using supplementary things like a chest x-ray, spirometry and so on to help you guide your diagnosis. So thank you, that was wonderful. Now that we have let's say the potential diagnosis of chronic lung disease, how is a clinician not necessarily a pulmonologist but a general clinician managing it? What are some maybe medications that we should consider?



You already mentioned when should we use imaging, you also mentioned that you have to look at all the other systems so do we do other referrals besides pulmonary and when do we do those?

**Dr. Manvi Bansal:**

The treatment of a chronic lung disease depends, in my opinion, as what is causing the chronic lung disease. Without knowing the cause and what forms the base of that problem, I cannot adequately treat it. Treatment by most far, is it goes by most often by a personal preference for many of the pulmonologists and the clinicians in certain scenarios. However, say if I am treating somebody who has a chronic lung disease of infancy or infant chronic lung disease, or known as also bronchopulmonary dysplasia, I think I would really like to know what is going on at that particular time for that child. There are no set guidelines as to use this or versus use that people have tried many things. But I think when I say many things, it can be say inhaled steroids or systemic steroids, or bronchodilators or antibiotics. And all of those things only carry a meaning in the context of what is going on. So because chronic lung disease in itself is such a broad description of it's basically in everything a pulmonologist see pretty much. So it's such a broad group that I am not sure that I can pinpoint to you exactly give this medication. Even in the patients who have bronchopulmonary dysplasia I'm selective about what medications I'm giving it to them. If they're displaying more of a reactive pattern or they are showing some response to albuterol, which necessarily does not mean that they are having wheezing and I'm giving it and it's helping. If they have a cough, if I give them some albuterol it responds to it or at least helps with their work of breathing. I know

temporarily it has opened up the airways and not to take care of that work of breathing. So maybe there is some degree of an acute inflammatory component so let me try some steroids at that time. Some of the chronic lung diseases if you're including insult,, because you can clean up your lungs very well, I would be much more aggressive about choosing antibiotics for them as my first line because and I would focus more certainly on airway clearance which is cleaning of the lungs or techniques which can help them bring the secretions up from the lungs. So for what's worth, I think the management really depends upon what you were treating, and as I was saying, it is such a nebulous sort of an area where each clinician strongly holds on to they're afraid of this is how things work, and they do it. So my suggestion would be go back to the literature, review it and listen to your patient, understand your patient and do give them a trial of a medication if it fits their field. Try to see what is really most helpful to them.

**Dr. Eyal Ben-Isaac:**

Yes, clearly, the treatment plan is going to definitely depend on what is the etiology of the chronic lung disease but thank you for that review because we do have a lot of potential things to use: bronchodilators, inhaled corticosteroids, oral steroids, antibiotic use. Airway clearance is like you said the most important thing so doing as much as we can to help with that. Are there other organ systems that we should think about and referrals made for example to a cardiologist evaluating the heart or any other potential sub-specialist when we're not, you know, thinking specifically an immune problem or so on but just in general for the chronic lung inflammation?

**Dr. Manvi Bansal:**

That's great. Thank you for bringing that up. So I rather explain it by giving few of the examples because that would help. As we all see a child say who comes in with a chronic cough to your clinic now that chronic cough would be because of many things. So let's see a scenario one, here you have this chronic cough child who is coming in who was born say a full-term, and always has a congested chest and it doesn't matter. Like I was talking about primary ciliary dyskinesia. I would probably send that child to a pulmonologist, somebody who's coughing since birth. If during your history and evaluation, you would think that "oh that child, probably when they are eating or swallowing something they tend to gag and choke on their food, say more on liquids or say more on solids. So each of that has its own significance. So a child who has been coughing since birth on a liquid, I would be worried more about anatomical abnormalities, as long as they have no other neuromuscular problems that you can see. Because I know that when there is a tongue problem or a neuromuscular issues there can be coordination issues. So in a child who is otherwise doing well, but only gags and chokes invariably has a lingering cough, or a chronic cough, I would be really worried about anatomical problems. I would probably refer them to both pulmonary and ENT so they can assess the airway really well and make sure there's no abnormalities like tracheoesophageal fistula, laryngeal cleft, and I can speak on all of those names, but it's basically anatomical problems. A child in a same way who has a chronic cough but was born premature, and when running and playing tends to cough a little bit more. It almost sounds like asthma, but the child does not consistently respond to albuterol. However, they sometimes show a response and tend to benefit significantly from inhaled steroids or systemic steroids, if given I would be worried more about this

bronchopulmonary dysplasia in that child. So I think one symptom which overlaps the top of the pyramid can have a broad base again, going back to it. So those are the scenarios where I will choose a pulmonologist for that child. Problems with a reflux or choking on solids and having a chronic cough I would probably make sure the child does not have something like eosinophilic esophagitis which basically is another like inflammation of the food pipe or your esophagus. I would probably send that child to a gastroenterologist because only they do diagnosis endoscopy. And I have had patients and I have treated them with a lot of inhaled steroids thinking they have just asthma and they have not responded or partially responded. So that's where I need the help of my GI colleague. Or I can have a scenario, this child has been coughing all the time and is sick all the time. If there is anybody sick at home, this child gets sick. If anything else is going on, this child gets sick and has this chronic bad lingering cough. I would make sure that at the same time, I'm ruling out any immunological issues too. So maybe I can do a basic either you weren't even ologists. And so eventually it boils down to what's my underlying problem that I'm trying to identify and seek help of my other colleagues with their expertise in that field. Now with regards to the children seen when they incur a chronic lung disease originating in infancy or in the neonatal period, like BPD, it's very important to actually also keep my cardiology colleagues in mind. Because these children can not really have pulmonary hypertension, when they are still in the NICU. Sometimes they can have pulmonary hypertension before six weeks, but by the time they're ready for home they have no pulmonary hypertension, at least detected on echocardiogram. But at the same time and these kids are running around and playing and getting short of breath and that shortness of breath is

worsening, I am really worried about is there pulmonary hypertension coming back. I might worry about not just a pulmonary hypertension because we are learning more and more these kids can also have something called a pulmonary vein stenosis, and even as an adult, some of these patients continue to have higher mean pulmonary artery pressures. And these things are already well documented in the literature now. So sometimes shortness of breath which can be very innocuous and children, they know their limitations. They would not run and play like "I don't like to do it" because they can't do it. So knowing and understanding them again is important, and if somebody is born premature and they have shortness of breath, cardiology is somebody to look up to. So I think it eventually boils down to if I'm seeing problems beyond my lungs, I have to figure out why they're happening and again, send them to the respective specialist.

**Dr. Eyal Ben-Isaac:**

Wonderful those were a great examples of different etiologies and how we manage them and what specialists we need to get involved. Can I ask and then of course, this depends on again, the etiology of the lung disease, but what is the overall long term prognosis for let's say, you know, kids with BPD and no complications, or let's go over some of the potential complications. You mentioned pulmonary hypertension, we mentioned scarring briefly, but is there like specific things we need to be worried about in the lungs that are long term complications for these children that we should think about?

**Dr. Manvi Bansal:**

There are sometimes long term complications and some of them are sort of, I would say hidden in a way that they are not worth it unless you are doing certain tests or you are putting these children under certain scenarios where they tend to show as they have certain limitations. So the long term complications exist in a scenarios where you especially with a BPD let me talk about that first. So in the children who have BPD we are learning more and more before we're taught "oh after two years, you're fine if you're not on oxygen or on any drugs, you're perfectly okay". But now we have studies in the adults which have shown that they do develop COPD, if you do the chest CT scan, they show the signs of emphysema, so and they do have limitations in their exercise and we do we know that now they do have some degree of cardiac issues too as they are older. Children as they grow older, they gain lung functions. We all gain lung functions until we are like 21, 22, we are at the peak of our lung functions at that time, but our lung functions decline after that. We all lose a little bit, maybe like a half a percent to a percent. But over a period of time in children who only have some degree of scarring or some degree of ongoing inflammatory process, for them the rate of decline is faster and not just that, they may not be able to achieve their full potential of that peak lung functions. And that's where the responsibility increases amongst not just the pulmonologists but for all of us as clinicians, that we have to aim to keep them healthy so they're able to reach their peak lung functions by the time they are a young adult. So in order to minimize complications, such as COPD, development of chronic bronchitis, emphysema or early need of oxygen later on in their lives so those are the common things. In addition to that, vaccinations and keeping their lungs healthy is a really important to prevent the lung damage due to infections and other issues so that

again, their lungs are healthiest. So I think when I think about complications, my brain automatically thinks about how can I minimize those complications to happen first, and the things that can happen, scarring, COPD, are the things that actually are very high on my mind. Now if I think about I have a chronic cough or I have a problems or limitations with my breathing, because I am incurring more damage because of infections or something, say in the conditions of PCD, CF or any sort of an immunological disorders when I have impaired a sort of a cleaning of those bacteria from my lungs, and that particular scenario, bronchiectasis or a long term damage to the airway is something which is very commonly seen in these children as an adult. And again, that leads to a chronic bad cough for them, even as an adult, so chronic like sort of bronchitis they deal with. And eventually it shortens their life or increases the morbidity, going more to the doctor's office to the ER. I would say between 20 and 30 or 20 to 40 years of life most people are quite happy with it, but they age a little faster now for better outcomes later on."

**Dr. Eyal Ben-Isaac:**

That's a really great reminder for all of us as clinicians to think about how we can prevent problems when they're older and not followed by the pediatrician anymore. And all the things that you mentioned, the vaccinations to prevent infections, what if we can do to prevent the scarring for the future, even though they might look good right now what we can do for the future, that's a really great reminder for all of us who take care of children. So thank you for that. Maybe we can also just round this off by talking about as a general pediatrician or general clinician who sees a child in clinic, and we'll use an example of a child with BPD and

comes in with a URI, a cough or runny nose, some fever. How do we manage these children? How do we decide, do we want to just do their albuterol, their inhaled corticosteroids when maybe we should think about adding oral corticosteroids? We don't want to obviously give oral steroids all the time if we don't have to, but how do we distinguish when they do need them versus no "we can hold off"?

**Dr. Manvi Bansal:**

That's a great question and I think sometimes even I think twice when I am thinking about let me give you oral steroids. My first suggestion would be see them as any other child, because if they are doing well in a healthy state, so they're doing well in a healthy state, but chances are when they're sick, they're going to be a little bit off from work than a normal child when they're sick. So I would just encourage to go up on the inhaled medications at that time, and I would not do anything more than that. At the time when I think about steroids is if they're having an increased work of breathing, so I normally take my patients families as my partners in managing these patients, so I actually teach them what to look for and what does it mean. So that even if they tell me on their phone, I know exactly what is happening because I have built up that trust. So I think first is if they have increased work of breathing or any drop in the oxygen from their baseline, I would certainly consider doing the systemic steroids for them. You don't necessarily have to treat it like asthma for five days, you can do a shorter course. Or sometimes they may even need a longer course. So seeing a child swallow and decide they're on, but initially I would suggest treat them just like any other child, but ramping up their medications. Now when we do the inhaled medications we normally do like let's do the bronchodilators let's



open up their lungs but think of like this is like a Tylenol, it's only going to open up their lungs or kill their fever one time, you haven't treated the inflammation lower down. So that is going to be not affected by just by giving bronchodilators so I have to probably give a little extra inhaled steroids during those periods of exacerbation. As we have also learned from the new GINA guidelines too that they discourage just the use of a bronchodilator even in asthmatics, and it is not very different in a scenario of bronchopulmonary dysplasia. Because these kids, even if they're not reactive, as I was saying earlier, they can still have smaller sized airways compared to other children. And that's just a part of the BPD sometimes some of these kids have. They may still have Airway swelling, too. So doing some extra inhaled steroids goes a long way. So this is my way of doing it, and as I say every clinician has found their own path. I normally give an extra inhaled steroid like where every time they are doing an extra kind of extra bronchodilator or an albuterol that makes me feel comfortable that I gave them a little extra inhaled steroid. And the other thing which gives me a little peace is before I've given them say there are a few puffs, right, which is 0.5 or 0.25 dozen baseline doses the child is on. Or even if they're not on it, I will just do it like three times a day to four times a day, maybe even five times a day if I need to. Because if I add up all of it and compare it to the systemic doses, I'm still 1000 times cheaper. So I think that gives me a little bit of a sense of relief that I have not affected the rest of the organs by giving systemic steroids and I have also aggressively managed their lungs At the time of their sickness and I have seen invariably that ends up working.

**Dr. Eyal Ben-Isaac:**

I want to thank you so much, that was truly a wonderful review on chronic lung disease in infants and children. And I want to thank you very much for also the little tidbits that you taught us about how to manage these children. because we do see them a lot in the office, and it is sometimes hard to decide what to do and you taught me a lot today as well so thank you very much I really appreciate.

**Dr. Manvi Bansal:**

Thank you very much for inviting me. It's my pleasure.