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Preventing Malnutrition: Addressing Undernutrition in Young US Children

Narrator:
Welcome to CME on ReachMD. This segment, “Preventing Malnutrition: Addressing Undernutrition in Young US Children,” is sponsored by Prova Education and supported by an educational grant from Abbott Nutrition. Your host is Dr. Jennifer Caudle, who welcomes Dr. Robert Murray, professor in the Department of Human Nutrition at the Ohio State University. Prior to beginning the activity, please be sure to review the faculty and commercial support disclosure statements, as well as the learning objectives. Or, if you’re listening to this as a podcast, go to this activity on ReachMD.com/prova on your computer, smart phone, or tablet device.

Dr. Caudle
Obesity is a major public health concern that is highlighted almost on a daily basis. But what about the underweight patients? How do we define underweight, specifically in the pediatric population, and how can clinicians best address this issue?

This is CME on ReachMD, and I’m your host, Dr. Jennifer Caudle. Today, our guest, Dr. Robert Murray, will discuss the public health problem of undernutrition in US children. He will also offer interventions for children at-risk for growth faltering.

Dr. Murray, welcome to ReachMD.

Dr. Murray:
Thank you, Jennifer.

Dr. Caudle:
So, overweight, and underweight are both public health problems around the world. How do we define underweight in pediatric populations, and what’s the scope of this issue?

Dr. Murray:
It’s a fascinating issue for us in the 21st century, in that now the number of overweight people in the world has gone beyond the number of underweight for the first time in history. In the US, the obesity problem, I think most people know, has become a major one for children. One in three children are overweight or obese, and that has waffled a little bit lately, but has continued to climb for almost all the age groups. But at the same time, we still have 21% of children in this country who are food insecure, and 22% who live in poverty. And when we describe poverty, we’re really talking about a level of $23,000 for a family of 4, so these are extremely poor situations for children. What I find fascinating about overweight and underweight is that when you look over their lifetime, these kids both develop risks for hypertension, cardiovascular disease, stroke, obesity, diabetes later in life. They both share nutrient insufficiencies as a common path. And the unique thing about underweight compared to overweight is that it generally occurs early in life and it comes at a time when the brain is being wired and structured. We don’t get a second shot at building the brain up; it doubles in size in the first year, triples in size by the third year, and it’s all occurring at a time when diet quality is really, really important. So, even though they share a lot of chronic diseases, it’s underweight that is a particular danger in early childhood compared to overweight.

So, the way that we track any of this weight and movement is in terms of the body mass index and plot it on a growth curve to determine if the children are in a very high category or a very low category.

Dr. Caudle:
Is screening for failure to thrive or growth faltering mainly a question of using the growth curves in clinical practice?

Dr. Murray:
It is at the very start. These are screening growth curves. And so, you look at the child on the growth curve, and overweight is defined as greater than the 95th percentile of body mass index for age, or weight for height for age, and underweight is listed as under the 5th percentile. In between the 5th and 95th, typically clinicians will say that these children are growing normally, but that's a big territory, you're talking about 90 percentile points, and a lot of movement can occur within that, that might signal a problem to the clinician. If you have only a single data point, in terms of height and weight, usually the best advice is to use a growth curve that uses a population reference, like the WHO growth curve, and use Z score, which is deviation from the mean, as your guide to where that child is falling.
But many of us in primary care have a great opportunity to get multiple growth points over time, and this is very powerful for tracking a child and their relative risk. So, if a child is moving from the 50th percentile to the 70th percentile or so, I would be concerned about their eating pattern and their activity pattern, and I would probe that. If a child is falling in that range, I would again look very closely at that child. So, the screening of the growth curve is step one but, at that point, the clinician really needs to look at the patient, the family, the diet, and use their clinical judgment in determining how concerned they are about this particular child.

Dr. Caudle:
So, do you think primary care clinicians are missing growth faltering and malnutrition?

Dr. Murray:
Surprisingly, even in developed countries like United Kingdom and the United States, the data says yes, we are missing it. When people go out into the community and screen, they'll find that as many as 10-15% of the kids out there are being missed, and they are falling low on the growth curve. We see this also in kids who are admitted to the hospital. when they're evaluated on admission, we find a fairly high percentage of kids who are already showing signs of being at-risk. And of course, within the hospital, because of the complexity of the hospital environment and acuity levels and the like, those kids tend to develop growth faltering at a much, much higher rate than their peers out in the community. And so, we see a lot of problems with calcium, vitamin D, fiber, folic acid, vitamin A and C, zinc. These kind of things keep showing up in US populations among kids that we have considered to be healthy and growing normally.
Dr. Caudle:
What are the etiologies through which infants and toddlers develop growth failure?

Dr. Murray:
Well, there's three possibilities when you look at a child who is faltering on the growth curve or is falling. One, is that their intake is not adequate to meet their needs. Two, is that they're getting good intake, but they're losing it, and there's only two ways, really, that you can lose it clinically, you can either have vomiting or diarrhea, so that tends to make itself known usually with a good history. And then three, they may have a problem that's hidden, that's causing them to have higher needs than they typically would. Cancer, for example, or a metabolic disease, thyroid disease or something, might be an indication of a child who really needed more and it wasn't necessarily picked up previously. So, either intake is low, they're losing it, or they need more.

Of those three, it's intake that's the most common. That is the most common thing in the United States, anyway, for growth faltering. If a child is not getting enough in, it's a behavioral issue and you need to look at the child in terms of their eating pattern. Or is it a parent-child issue where the child has increasingly pushed for more and more specific foods and they've ended up with some kind of a crisis of negotiation where the parent's giving them a very, very poor diet that's inadequate? Is it a milk baby, for example, in the second year when they're supposed to transition towards more solid foods, has this child failed to do that? If you don't feel that there is a loss of calories and you don't feel that they have higher needs or are ill, you focus in and look closely at the patient, the patient's diet, and then the family and social situation around that child.

Dr. Caudle:
Are there any special populations that you worry about, in terms of growth failure or malnutrition?

Dr. Murray:
Yes, and as I said, it's most common early in life, and so, you really need to look closely at the history of the child during those early months and years. Preemies, for sure, are always at the top of the list for growth failure, and we don't do a good job of getting them out of the hospital at normal weight. So, they need to have really high quality nutrition over a long period of time to do catch-up. Hospitalized patients, in general, as I mentioned, are always at-risk. Children with chronic disease, special needs kids who have problems with many different things, chronic seizures, athetosis and other things, may have difficulty getting in their dietary needs. Children with repeated infection, either respiratory or particularly gastrointestinal, will be at a much higher risk, and then, I worry about kids who come in to me who have multiple allergies or dietary restrictions for any reason. If there's difficulties in the first month of life, or if there is difficulty in the

second year of life advancing to solid foods, I really look really carefully at that group of kids.

Within the family, food insecurity and poor diet quality are high on the list. If it's a family with socioeconomic struggles or even situational poverty—a car broke down and suddenly the dad lost a job or something—those are the kind of things that can set a child up for food insecurity and then growth failure. Neglect, obviously, we always look for as pediatricians and family physicians. And then, family chaos and stress in the family will definitely be reflected in the child and the child's anxiety, and that sometimes leads to difficulty with intake. So, I really look carefully, after screening, look carefully at the child first, and then look at the diet, and then look at family issues, in that order.

Dr. Caudle:
If a clinician identifies a child as being at-risk for growth faltering, what is the best way to intervene?

Dr. Murray:
Well, the first thing is to ty and decide the extent of the risk if the child is growth faltering, and you will get a height and a weight. A head circumference, which actually is a good proxy for brain size, so children who have trouble with their head circumference curve, that is a really serious level of growth faltering, and then, a weight for height, which gives you a sense of how the body mass, lean body mass and fat mass, hangs on the body's frame. BMI, as I said, is a good proxy for that. There is a 4th thing that you can add to height, weight, and head circumference, and that is the mid upper arm circumference, which is being used now around the world. It's extremely reliable, it's very sensitive for early signs of trouble and there are tables that give you a mean and Z-scores away from the mean, and kids who are dropping in their upper arm circumference relative to the mean, that is a great concern.

And then, the new guidelines on malnutrition urges us as clinicians to make a determination whether the child's growth problem is related to illness or to non-illness situations. If it's related to illness, chronic disease, inflammation, and the like, then it's a more complex problem, in terms of protein, energy, and micronutrients probably all playing a role in that. If the child does not have an apparent illness and it's behavioral and energy related, then we need to get more energy into their diet and possibly deal with some hidden micronutrient problems.

The second thing you should do after you determine whether it's illness-related or not is look at them on a physical exam for any signs of muscle weakness or vitamin deficiencies that might become apparent like periorbital rash or something that might suggest zinc, those kinds of things.

The third thing is to review their dietary intake, and if it looks like it's going to be complex, I always ask a registered dietician nutritionist to do that, because what they'll do is they'll not only take a dietary history on the child, but they'll look at the family eating patterns, they'll help the parents with shopping and thinking through meal planning. And if it's a mild problem with a relatively low risk, an RDN at the right time can sometimes turn that quickly and get them back on track. So, I kind of go through that, but either under the direction of an RDN or directly, I put a nutritional floor under that child and by that, I mean I look for some way, nutritionally, to stabilize the child's weight and get them started back with catch-up growth while I'm doing either my behavioral intervention or my workup for a potential illness or disease. So, that's a really important part of my initial assessment is putting a nutritional floor under that child to make them stabilized.

Dr. Caudle:
Are there other recommended interventions, and how do you counsel your patients to consider oral nutritional supplementation as part of the intervention?

Dr. Murray:
It's really a process of going through a number of decisions. So, I know that if I can get energy into the child, studies all over the world have shown that that child, as they begin catch-up growth, their appetite will improve. So, irrespective of why they're in the situation they're in, the first order of business is to protect them, so I look for this nutritional floor and I look to start catch-up growth and get them growing again, and that will improve their appetite. So, I'm really shooting for that slightly down the road. You can increase caloric density of individual foods, or you can increase frequency of eating. And the studies on frequency of eating indicate that one or two supplemental feedings a day can really make a huge difference in daily energy intake and in rapidly reacquiring weight for height. But this is something I always stress to physicians; it needs to be well-balanced. I really think it's important that you look for not just energy, but also nutrient quality. It needs to be a nutrient-rich food or snack or drink that you're giving to the child once or twice a day to really boost their catch-up growth. Oftentimes, if I'm not using an oral nutritional supplement, I will make it a milk-based supplement anyway, because milk is so strong.

But oral nutritional supplements that are available on the market have the advantage of being complete in macronutrients, fats, carbs, and protein, as well as complete in micronutrients and minerals, and I think that's a really reassuring thing to me and to the family when

I'm using those oral nutritional supplements. So, if I put the floor under the child with a couple of supplemental feedings, either snacks or liquid, a day that are well-balanced, then I can begin my workup or my behavioral interventions with the family and address social concerns.

Dr. Murray:
The studies have shown that counseling alone often is not adequate to push the family and the child back into catchup growth and bring them back quickly to an adequate weight for height. And so, the studies where counseling has been coupled with oral nutritional supplements really show the power of doing both for long term improvement of the child's weight gain, and then, over time, height for age improvement. And that's been shown on multiple occasions.

When I speak with families about the advantages of an oral nutritional supplement, I point out the fact they have several attributes that are very positive for the child and the family.

The second thing is that they are convenient. They come in a relatively concentrated form and they are portable, they have a good shelf stability and they are liquid which means I can usually get the child to consume quickly rather than getting full from solid food and stopping eating before they are getting in the calories that I think they need. Compliance in studies on oral nutritional supplements have been excellent. Kids have consumed these for weeks. As I said, it can be sole source nutrition.

And then, finally, the last thing I point out to the families is that these are effective. Whether they are used as sole source nutrition or as a supplement, we can show from studies that they do rapidly improve the child's weight for height and, over time, can improve height for age.

The other thing that I think is important to remember clinically is that as these kids gain weight and begin to show an improvement in their weight for height, their appetite improves and you can find it much easier to counsel with them and improve their diet after they are starting to eat well again. So, this combination of oral nutritional supplement in the acute phase and nutritional counseling in the more chronic phase really pays off for these children who are consuming inadequate calories for growth when you diagnose them.

The only other caveat to that I say is there is another decision point, which is when do you stop nutritional supplementation? And one of the things I think we've learned from recent studies is you want to stick with it long enough to assure that they've fully caught up, not just in terms of weight, but also if there's been any growth delay you want to be sure and make sure that they're growing again and approaching their normal weight for height.

Dr. Caudle:
Is there solid evidence that oral nutritional supplements make a difference?

Dr. Murray:
They do make a difference, and we've seen it in studies all around the world. There was a study that was started way, way back in the 1960s called INCAP, I-N-C-A-P, and it was a randomized group controlled trial where they compared villages, and in one village, they gave pregnant females and young children up to age 7 oral, liquid supplements that contained protein, calories, vitamins, and minerals. But it was by no means complete, and yet, when they offered that and they gave it freely to the children to drink as much as they wanted, they found that it was a great supplement to their intake, to their nutrition, but over time, as they followed them over 40 years, they found tremendous differences between kids who got the supplement and ones who didn't. They grew better, they went through puberty more strongly, they had kids with less infant mortality, their IQ was higher, their school performance, and eventually their health in middle-age and early senior years was much, much better in the group that were given the supplement. And that study really raised the question, well that was an incomplete supplement and it was kind of just given adlib—they were allowed to drink it adlib. What would happen if you intervened with a full-power supplement for kids? And those INCAP kids were at-risk, but were not yet failing to thrive, so it was a population of very poor kids.

Well, a study was done by Alarcon where he compared a complete oral liquid supplement versus a dietary counselling in the control group, and he followed these kids over 8 weeks and saw a dramatic improvement in weight for height in kids who had received both counselling and oral nutritional supplement, but not in the kids who simply got counselling alone. So, actually getting the nutrition made a huge difference than just talking about it with families.

That study was kind of repeated, but over a much longer period of time by Huynh did a study that was published over a year ago, where he looked at kids over 48 weeks getting a complete oral nutritional supplement. Again, these were at-risk kids who were between the 5th and 25th percentile but had not yet been labeled as failing to thrive or malnourished. And he gave them two 8-ounce servings a day and simply followed them over 48 weeks. The outcome of that was pretty dramatic in terms of their weight gain was very rapid. By 4 weeks, their weight-to-height had normalized and stayed stable for the whole 48 weeks. Interesting to me is the height for age didn't pick up

immediately at 4 weeks, but steadily and slowly increased over the course of about 40 weeks, and those kids improved their height for age over time. And that really taught me a lesson that I don't want to stop this too early, I want to be sure that I'm watching for that height increase as well. Compliance was great with this liquid, because it tasted good, it was convenient, it was fairly easy to do with the family. And interestingly enough, it did not cause obesity and that has been a concern in this country with using oral nutritional supplementation is that they'll over-consume and that they'll, even when they get beyond their height-weight correction, that now they'll just keep eating and they'll actually become overweight, and that was not seen in the 48 weeks that they received this therapy. It also didn't cause any detriment to their dietary diversity score. So, their intake of other foods continued; it truly was a supplement, as opposed to something that pushed out other foods. And that, again, was extremely reassuring.

I think the takeaway to all of that with oral nutritional supplement is that it's safe, it's effective, it's convenient and it can do the job. But, in the end, it really reminded me, as I was looking at it, that we need to follow these kids very closely. It isn't enough to just show that they're starting to gain weight again, but we really need to ensure that they do gain weight, they do get back on the growth curve at the right percentile, and that their linear growth catches up over time.

Dr. Caudle:
Well, before we close, can you briefly talk about your 2016 publication in the Journal of Nutritional Science that focused on diet diversity and how it relates to this discussion?

Dr. Murray:
Well, the study that was done used a diet diversity score, and there's a number of them around the world that are used where you're looking at diet quality, essentially. And the worry is, when you give supplements that kids will become kind of dependent on them and decrease other eating and narrow, rather than expand, it'll narrow the diversity of the food. And the study showed exactly the opposite, that over time, over about a period of 16 weeks, gradually the diet became increasingly diverse and stronger with the use of supplementation. So, it doesn't supplant, it augments, and that's so important for clinicians to know, because we have so many concerns about kids when we're doing interventions. That was the main takeaway. I think when you look back at all these studies, the INCAP study—in America, we had one called the Abecedarian Study with very, very poor Carolinian, African-American kids who were at very high risk. There are four factors that always come out. The child needs to be healthy and have good access to healthcare. They need to have play, areas where they're allowed to play freely, because play is how children learn early in life. They need really strong social and emotional support and they need diet quality. If they get those four things, you see a long tail of benefit, including academic performance in school and social health and physical health later in life.

Dr. Caudle:
Well, Dr. Murray, thank you so much for joining us today.

Dr. Murray:
Thank you.

Dr. Caudle:
I'm your host, Dr. Jennifer Caudle, for ReachMD.

Narrator:
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