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>> Hi. This is Aaron Carroll. I'm the digital media editor for JAMA Pediatrics. In this podcast I talk about interesting articles featured in the journal and what they might mean to you.

This week I'm focusing on increased prevalence and severity of high blood pressure among children based on the 2017 American Academy of pediatrics guidelines. By doctors Atul Sharma, Daniel Metzger, and Celia Rodd.

In August 2017 at the American Academy of pediatrics released updated guidelines in the diagnosis and management of high blood pressure. Full disclosure, I was one of the authors of that guideline. Part of what the new guideline did was to update the blood pressure norms in a number of important ways.

First, recognizing that the increasing prevalence of obesity is shifting the 95th percentile in the general population. Children who are overweight or obese were excluded from reference data. This shift the percentile curves down.

Second, new cutoffs were set to now define elevated blood pressure which we used to call pre-hypertension. There's also now stage I hypertension and stage II hypertension. These new definitions brought recommendations more closely into alignment with the 2017 American College of cardiology guidelines for the adult population.

Finally, information was provided to define blood pressure percentiles based on sex, age, and height. Any time you change the definitions of a condition, like blood pressure, you change its prevalence. I wrote about this issue with respect to adult blood pressure definitional changes in the New York Times in December.

In this study researchers wanted to see how they changed things for children. They also wanted to see if they could characterize risk factors for children with either nuance [phonetic] at hypertension or hypertension that was now advanced in clinical staging. The researchers took data from the Ann Haynes [phonetic] database from 1999 through 2016 which has information on demographics, diet, labs, surveys, and physical exams. Z scores for BMI were calculated for all children. Cardiovascular risk data included cholesterol levels, triglycerides, and hemoglobin A1C levels. Data were available for more than 15,600 children aged 5 to 18 years most of whom were generally healthy.

It's also worth noting that blood pressure was measured according to strict criteria. Children had to rest quietly for five minutes before the first measurement. Then 3 to 4 consecutive blood pressure measurements were recorded. The mean it was recorded after dropping the first measurement. This is of course to account for white coat syndrome where nerves and fear result in elevated blood pressure.

Too often in the clinical setting we don't take the time to do this right. We just take a quick reading and move on. If you want to use the guidelines correctly, though, you need to take the time to follow directions for proper blood pressure measurement.

Anyway, if the children were reclassified upwards they were paired with control children who had normal blood pressure but were matched on sex, age, and height. The new guidelines made a difference. Using the old definitions 12.8% of children had high blood pressure. Under the new definitions, 15% of the exact same cohort had elevated blood pressure. The estimated weighted population prevalence went from 11.8% to 14.2%.

Switching from WHO reference charts from CDC reference charts with respect to BMI Z scores also made a difference. That switch led to an increase in the prevalence of overweight from 35.9% to 40.6%. And an increase in the prevalence of obesity from 10.3% to 19.5%.

With respect to classifications, 5.8% of kids in the cohort were classified upwards. Very few were reclassified downwards. About 85% of kids were normotensive under both sets of criteria. Kids who are reclassified upwards were more likely to be overweight or obese have higher weight Z scores larger waist circumference is and a higher BMI. They were also more likely to have an adverse lipid profile and higher hemoglobin A1Cs. With respect to the lab values for instance, 3.4% of reclassified kids had elevated A1C versus 0.6% of non-reclassified kids. Before we get too far into a discussion of what this means, it's worth pointing out a major limitation of this study.

The diagnosis of hypertension requires multiple measurements of the same patient over a period of time and then hopefully ambulatory blood pressure measurements for 24 hours outside of the clinical setting. And Haynes can't provide that. It is entirely cross-sectional and can only give us one point in time. It can measure the prevalence of elevated blood pressure at one visit but not necessarily hypertension. And also, all cards on the table. If you've read my New York Times column on the new adult blood pressure guidelines, I worry about those with respect to their reclassifying so many Americans to have hypertension. Especially since the guidance for so many of them is diet and exercise with or without the definitional changes. I worry that many more Americans will be placed on pharmacotherapy with an unknown benefit because we are chasing a number.

That said, it's significant that the kids who are reclassified here seem to be at higher risk by other factors as well. The accompanying editorial by Dr. Steven Daniels who was also an author of the new guideline points out what we really want to know is how we can figure out which kids in adolescence are at the highest lifetime risk of developing serious cardiovascular disease. We don't know how to do that yet. We also don't know how many of the kids was newly reclassified elevated BP will actually be diagnosed with reclassified hypertension.

Given that the vast vast majority of kids in adolescents with elevated blood pressure and hypertension will be treated with diet and exercise which again we should be getting them to do already. It's unclear how many newly classified and reclassified kids will be told be more

afraid but eat better and be physically active. Will that make a difference in a positive direction? We don't know. Hypertension and cardiovascular risk are real and it's a good thing that we are trying to improve our ability to recognize both. But there's still much work to do when determining what kids are truly at high lifetime risk and what we can do to help them minimize that risk while they're still young.

The article is free this week so please do go read it and the accompanying editorial online at jamanetwork.com/journals/jamapediatrics.