

# Childhood Hypertension: An Underappreciated Epidemic?

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It is no secret that the United States and much of the developed world are in the midst of a pediatric obesity epidemic. Perhaps less recognized is that childhood hypertension is now one of the most common health concerns in children. Recent data from NHANES demonstrate prehypertension or hypertension in 19.2% of adolescent-age boys and 12.6% of girls, an estimated 38% increase compared with NHANES III data collected from 1988 to 1994.<sup>1</sup> In their analysis in this issue of *Pediatrics*, Kaelber and colleagues<sup>2</sup> used data from the Comparative Effectiveness Research from the Collaborative Electronic Reporting Consortium, a network of over 2000 pediatric primary care clinicians coordinated by the American Academy of Pediatrics, to evaluate the diagnosis and treatment of pediatric hypertension. Their study population included just under 400 000 children (ages 3–18 years) evaluated in primary care settings between 1999 and 2014. They document a 3.3% prevalence of hypertension, consistent with multiple previous analyses where the prevalence has ranged from ~2% to 5%.<sup>1,3–6</sup> Most notably, they report low rates of diagnosis and treatment. Of 12 138 children and adolescents with charted blood pressures (BPs) >95th percentile (at a minimum of 3 separate clinic visits), only 23% had associated *International Classification of Diseases, Ninth Revision, Clinical Modification* codes for a hypertension-related diagnosis and only 5.6% of those with diagnosed hypertension received antihypertensive drug treatment. There is now substantial evidence linking childhood hypertension

to long-term cardiovascular risk. Childhood hypertension is associated with increased carotid intima media thickness, increased left ventricular mass, and increased arterial stiffness,<sup>7–13</sup> all precursors to adverse cardiovascular outcomes in adulthood. It is safe to assume that the current childhood metabolic syndrome (hypertension/obesity/insulin resistance) epidemic will eventually reverse several decades of improving cardiovascular outcomes in the United States. For these reasons, current guidelines recommend pharmacologic treatment of children with documented stage I hypertension (BP >95th percentile), if lifestyle therapy fails to sufficiently improve BP, and also for children with symptomatic hypertension, secondary hypertension, or hypertension associated with diabetes or target organ damage.<sup>14</sup> According to Kaelber and colleagues,<sup>2</sup> we are falling well short of these recommendations.

There may be some who question these findings. Are electronic health record (EHR)-charted BPs as accurate as those obtained in a research setting? How reliable are *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnostic codes, and how well do clinicians document EHR medication use? These are legitimate study limitations, yet there are compelling reasons to believe the results. The study definition of hypertension is consistent with current diagnostic guidelines.<sup>14</sup> The reported 3.3% prevalence of hypertension is consistent with previous studies<sup>1,3–6</sup> and the authors excluded practices that



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did not consistently capture key EHR-based data points.

In short, these findings are compelling and highlight the shortcomings of our current practice. As pediatricians, we must carefully consider whether we are appropriately diagnosing and managing hypertension in our patients. Hypertension is indeed more challenging to diagnose in children because of age, sex, and height-related variability in BP norms. A BP of 112/76 may not seem high, but it meets the definition for stage I hypertension in, for example, a short 8-year-old boy.<sup>14</sup> To avoid underdiagnosis, evaluation of BP percentiles should be a routine part of pediatric practice.

Appropriate treatment is another issue. A prevalence of 3.3% suggests that 2.2 million children and adolescents require evaluation and possible treatment of hypertension. These patient numbers exceed the capacity of subspecialist providers in the United States and, therefore, primary care pediatricians will have to become more comfortable prescribing antihypertensive drugs. This burden could be eased if the next iteration of pediatric hypertension guidelines were to provide expert consensus to guide treatment initiation. These recommendations could borrow from a wealth of new data on antihypertensive drug dosing, safety, and efficacy in children. Since publication of 2004 guidelines from the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents for diagnosis and treatment of high BP in children, 13 different antihypertensive drugs have been evaluated in clinical trials in children under the pediatric exclusivity provision. Nine of these drugs received a new labeled indication for treatment of pediatric hypertension.<sup>15</sup> Moreover, new safety data have emerged, such as

the potential teratogenic effects of angiotensin converting enzyme inhibitors.<sup>16</sup>

Despite progress, there is a continuing need for additional study. Future antihypertensive drug trials need to consider stratified enrollment to evaluate safety, efficacy, and dosing based on race, sex, and/or presence of other important comorbidities, such as insulin resistance and obesity. There is a need for head-to-head comparisons of drugs in different classes and studies are needed to better evaluate effectiveness of lifestyle interventions, which are currently appropriately recommended as first-line therapy for children with stage I hypertension.<sup>14</sup> Despite these unanswered questions, it is clear that childhood hypertension is a major public health concern. The clinical manifestations may be silent during childhood, but this should not deter early diagnosis and treatment.

#### ABBREVIATIONS

BP: blood pressure  
EHR: electronic health record

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