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EDITORIAL

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New guidelines for hypertension in children and adolescents

In 2017, the American Academy of Pediatrics (AAP) published new clinical practice guidelines (CPG) for the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents.[1] At the time of publication, over a dozen years had passed since the publication of the landmark 2004 Fourth Working Group Report from the National High Blood Pressure Education Program.[2] These new CPG build on the previous Fourth Report and include significant changes that simplify diagnosis and evaluation with the aim of enhancing both the recognition and evaluation of blood pressure (BP) abnormalities in youth.

Several issues underscored the need to update the old guidelines, beyond the matter of incorporating new evidence from the intervening 14 years. The older guidelines included obese children in the normative data, which was criticized for inflating thresholds for abnormal BP. Other issues included lack of congruence with adult guidelines for older teens and insufficient discussion of ambulatory blood pressure monitoring (ABPM).

To update the guidelines with current evidence, the committee performed a systematic review on an outline of predefined topics, resulting in the assessment of over 15 000 manuscripts published since the 2004 report. The evidence review was based around 4 key questions, including (1) how hypertension should be defined in children and adolescents, (2) what is the recommended workup for pediatric hypertension, (3) what are the optimal therapeutic goals, and (4) how do differing modalities of treatment (lifestyle versus pharmacologic) affect cardiovascular risk. Evidence-based answers to these questions led to the 30 key action statements (and an additional 27 recommendations) found in the new AAP guidelines.

The new CPG were designed to be not only comprehensive but also easier to implement in the primary care setting. In addition to having accurate and comprehensive diagnostic criteria, the committee wanted to ensure that primary care providers would have the tools and information necessary to make accurate blood pressure diagnoses in children and adolescents. Compared to the Fourth Report, the new guidelines have simpler definitions, easier-to-use tables, and most important, static blood pressure thresholds for teens that match the new adult guidelines.

The new guidelines recommend screening for BP abnormalities in children ≥ 3 years old at the annual preventative visit as opposed to every healthcare encounter. Methods of BP measurement, including the use of automated oscillometric devices to screen for BP abnormalities, are explicitly described and illustrated. An algorithm to aid in office recognition of abnormal BP is also included. To make implementation easier, the definitions of hypertension have not been changed greatly for children under 13 years old. Blood pressure thresholds are still based on population norms of age, height, and gender. Simpler BP tables are provided in the CPG, including a handy screening table as well as the complete BP percentile tables. Importantly, however, the normative blood pressure tables have been recalculated after removal of overweight and obese children from the sample. The resultant tables reveal thresholds that are a few mm Hg lower than the Fourth Report tables but are more accurate as truly normative data. For BP classification, normal BP for children is still classified as < 90th percentile, and hypertension is still defined at the 95th percentile across 3 separate office visits. Though formerly referred to as prehypertension, pressures between 90th and 95th percentile are now classified as "elevated blood pressure," a move that both mimics the adult definitions and also emphasizes that these pressures are already abnormally elevated (as opposed to being preabnormal). Another simplification of the new guidelines is the abandonment of the 99th percentile as a threshold. Instead, stage 2 hypertension is characterized as BP > 95th percentile + 12 mm Hg. This results in a range of stage 1 hypertension that is, by definition, 12 mm Hg wide for all children under age 13 (see Table 1).

To further simplify the classification of blood pressure abnormalities, the adult blood pressures thresholds have been adopted for all patients ≥ 13 years old.[1,3] These static thresholds of 120/80, 130/80, and 140/90 mm Hg form the boundaries for normal blood pressure, elevated blood pressure, hypertension, and stage 2 hypertension regardless of teen age, height, or gender. The adoption of uniform definitions for blood pressure classification in teens and adults will greatly facilitate transition of care from pediatric-centered practices to internal medicine or adult-oriented care (see Table 1).

Although the new guidelines explicitly describe the many causes of secondary hypertension, the diagnostic workup for patients with sustained hypertension is also streamlined because of the increasing prevalence of primary hypertension. All pediatric patients with sustained hypertension still undergo a workup, including urine and blood studies, to rule out renal causes. However, recognizing the increasing epidemiology of primary hypertension, much of the evaluation for secondary hypertension is relegated to optional evaluations for high-risk patients. An example of this modified approach is in the recommended imaging during evaluation: renal ultrasound is suggested only in children under 6 years old or in those with abnormal screening urinalysis or renal function. Perhaps the biggest change in initial workup of patients with sustained hypertension is the delay in obtaining an echocardiogram. The Fourth Report

TABLE 1 New blood pressure classification for children, adolescents, and adults. (Modified from references 1 & 3)

HTN classification	Children aged 1-12 years (percentile based)	Everyone ≥ 13 y old (mm Hg based)
Normotensive	< 90th percentile	< 120/<80
Elevated blood pressure	≥ 90th percentile or ≥ 120/80 mm Hg (lower) to < 95th percentile	120-129/< 80
Stage 1 hypertension	≥ 95th percentile to < 95th percentile + 12 mm Hg or 130/80 to 139/89 (lower)	130-139/80-89
Stage 2 hypertension	≥ 95th percentile + 12 mm Hg or ≥ 140/90 (lower)	≥ 140/90

suggested immediate echocardiogram at diagnosis, whereas the new guidelines recommend holding off on this expensive examination until pharmacologic treatment is considered. Furthermore, the new guidelines focus more on blood pressure control and move away from yearly surveillance echocardiograms in children with diagnosed hypertension.

In the 6 months since the guidelines were published, some have commented negatively about the increased reliance on ABPM in the diagnostic evaluation of elevated office blood pressures. Although the guidelines stop short of defining hypertension based on ABPM, assessing 24-hour pressures is the first step in analysis of persistently elevated office pressures. It is true that ABPM has a much more prominent role in evaluation of children and adolescents with abnormal office blood pressure, as is appropriate given the deluge of clinical evidence. The emphasis on confirming hypertension with out-of-office readings is based on multiple outcome studies in children, adolescents, and even adults. The guidelines cite many pediatric studies that have emerged since the publication of the Fourth Report that highlight the utility of ABPM both in the confirmation of elevated office blood pressure and in monitoring response to therapy. The presence of white coat (hypertensive BP in office but normal ABPM) or masked hypertension (normal BP in office but hypertensive by ABPM) is diagnosed only by performing out-of-office measures as is done in ABPM.

Treatment goals for pediatric hypertension have also been modified in the new guidelines. Though previous guidelines recommended treatment to < 95th percentile for children with uncomplicated primary hypertension, evidence has emerged that markers of hypertensive target organ damage might be found in children with BP > 90th percentile but < 95th percentile. As such, the current CPG recommended goal of therapy is now < 90th percentile in most children and even lower in special populations such as children with chronic kidney disease. Lifestyle modification, including dietary changes and increased physical activity, remains the cornerstone of initial treatment and should be attempted for at least 6 months. If these modalities fail to control BP, first-line pharmacologic agents to control blood pressure in children and adolescents have been clarified to include renin–angiotensin–aldosterone system (RAAS) blockers such as angiotensin-converting-enzyme (ACE) inhibitors or angiotensin receptor blockers, long-acting calcium channel blockers, or thiazide diuretics. Other antihypertensive medications should be reserved for children who fail to achieve adequate BP control with 2 or more of these preferred agents.

The new AAP CPG describe a rationale for evaluation and treatment in several special populations, including but not limited to children with chronic kidney disease, diabetes, solid organ transplantation, and coarctation of the aorta. Comorbidities such as dyslipidemia or cognitive impairment are also discussed.

On a population level, blood pressure in childhood may be rising. The new AAP guidelines provide an evidence-based approach to the diagnosis, evaluation, and management of abnormal blood pressure values in children and adolescents. Although there is an increased emphasis on confirming high BP readings with out-of-office measurements using ABPM, the core provisions of the CPG are designed for ease of identification and management in the primary care setting.

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