

## Screening for Primary Hypertension in Children and Adolescents: Recommendation Statement

► See related Putting Prevention into Practice on page 257.

This summary is one in a series excerpted from the Recommendation Statements released by the USPSTF. These statements address preventive health services for use in primary care clinical settings, including screening tests, counseling, and preventive medications.

The complete version of this statement, including supporting scientific evidence, evidence tables, grading system, members of the USPSTF at the time this recommendation was finalized, and references, is available on the USPSTF website at <http://www.uspreventiveservicestaskforce.org/>.

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A collection of USPSTF recommendation statements published in *AFP* is available at <http://www.aafp.org/afp/uspstf>.

### Summary of Recommendation and Evidence

The U.S. Preventive Services Task Force (USPSTF) concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for primary hypertension in asymptomatic children and adolescents to prevent subsequent cardiovascular disease in childhood or adulthood (*Table 1*). **I statement.**

See the Clinical Considerations section for suggestions for practice regarding the I statement.

### Rationale IMPORTANCE

The prevalence of hypertension in children and adolescents in the United States has been reported at 1% to 5%. Primary hypertension in children and adolescents is associated with several risk factors, the strongest of which is elevated body mass index. The prevalence of hypertension in children and adolescents has increased over the past several decades, which is probably attributable to the increase in the prevalence of childhood overweight and obesity. The prevalence of hypertension among obese children in the United States is estimated at 11%.

One rationale for screening for hypertension in children and adolescents is that early identification of primary hypertension could lead to interventions to reduce blood pressure during childhood and adolescence, resulting in a reduced risk of cardiovascular events and death in adulthood.

### DETECTION

The USPSTF found inadequate evidence about the diagnostic accuracy of screening for elevated blood pressure with sphygmomanometry in the clinical setting. The two fair-quality studies available used different

diagnostic standards (ambulatory blood pressure monitoring and subsequent blood pressure readings).<sup>1</sup> Blood pressure screening with sphygmomanometry in the clinical setting may be reasonably sensitive for identifying children and adolescents with hypertension; however, false-positive results may occur with normalization of subsequent blood pressure measurements.

### ASSOCIATION WITH ADULT HYPERTENSION AND CARDIOVASCULAR DISEASE

The USPSTF found no direct evidence that routine blood pressure measurement accurately identifies children and adolescents who are at increased risk of cardiovascular disease in adulthood and inadequate evidence that routine blood pressure measurement accurately identifies children and adolescents who are at increased risk of adult hypertension or other intermediate measures of adult cardiovascular disease. Children and adolescents with hypertension are more likely to have hypertension as adults; however, predictive values of childhood hypertension for adult hypertension are at best modest (65%) and vary widely (19% to 65%).<sup>1</sup> Most studies examining the association of hypertension and subclinical cardiovascular disease in children are cross-sectional studies and limited to children with hypertension secondary to kidney disease. Evidence about the longitudinal association between hypertension in children and adolescents and intermediate outcomes indicating cardiovascular damage in adults, such as carotid intima-media thickening or microalbuminuria, is limited and conflicting.

### BENEFITS OF DETECTION AND EARLY INTERVENTION

The USPSTF found inadequate evidence to determine whether treatment of elevated

**Table 1. Screening for Primary Hypertension in Children and Adolescents: Clinical Summary of the USPSTF Recommendation**

Population	Children and adolescents without symptoms of hypertension
Recommendation	No recommendation Grade: I statement
Risk assessment	The strongest risk factor for primary hypertension in children is elevated body mass index. Other risk factors include low birth weight, male sex, ethnicity, and a family history of hypertension.
Screening tests	Blood pressure screening with sphygmomanometry in the clinical setting may identify children and adolescents with hypertension with reasonable sensitivity; however, false-positive results may occur with normalization of subsequent blood pressure measurements.
Treatment	Stage 1 hypertension in children is treated with lifestyle and pharmacologic interventions; medications are not recommended as first-line therapy.
Balance of benefits and harms	The USPSTF found inadequate evidence on the diagnostic accuracy of screening for primary hypertension. The USPSTF also found inadequate evidence on the effectiveness of treatment and the harms of screening or treatment. Therefore, the USPSTF cannot determine the balance of benefits and harms of screening for hypertension in children and adolescents.
Other relevant USPSTF recommendations	The USPSTF has made recommendations on screening for lipid disorders in children and adolescents. These recommendations are available at <a href="http://www.uspreventiveservicestaskforce.org/">http://www.uspreventiveservicestaskforce.org/</a> .

NOTE: For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, go to <http://www.uspreventiveservicestaskforce.org/>.

USPSTF = U.S. Preventive Services Task Force.

blood pressure in children or adolescents results in sustained decreases in blood pressure in childhood because studies in this area have been of short duration; trials of the effectiveness of antihypertensive drugs were typically four weeks in duration, whereas studies of lifestyle interventions ranged from two months to three years with a median duration of seven months.<sup>1</sup>

The USPSTF also found inadequate evidence to determine the health outcomes associated with interventions to treat primary hypertension in childhood or adolescence.

#### **HARMS OF DETECTION AND EARLY INTERVENTION**

The USPSTF found inadequate evidence to assess the potential harms of screening for primary hypertension in children and adolescents. Only one good-quality study was identified, and it did not find any adverse effects, as assessed by school absenteeism, of detecting primary hypertension in childhood.<sup>2</sup>

The USPSTF found inadequate evidence to assess the potential harms of pharmacologic or nonpharmacologic treatment of elevated blood pressure in childhood or adolescence. Short-term pharmacologic treatments

generally seemed to be well tolerated, with no serious adverse events during short-term treatment periods. However, adverse event rates were often incompletely reported, and the evidence is limited by a lack of studies with follow-up longer than several weeks. Information on adverse effects of lifestyle interventions or lifestyle interventions combined with pharmacotherapy is also limited.

#### **USPSTF ASSESSMENT**

The USPSTF concludes that the evidence to support screening for primary hypertension in children and adolescents is insufficient and that the balance of benefits and harms cannot be determined.

#### **Clinical Considerations**

##### **PATIENT POPULATION**

This recommendation applies to children and adolescents who do not have symptoms of hypertension.

##### **ASSESSMENT OF RISK**

The strongest risk factor for primary hypertension in children and adolescents is elevated body mass index. Other risk factors include low birth weight, male sex, ethnicity, and family history of hypertension.

## SUGGESTIONS FOR PRACTICE REGARDING THE I STATEMENT

When deciding whether to screen children and adolescents for hypertension, clinicians should consider the following factors.

*Potential Preventable Burden.* The increasing prevalence of hypertension in children and adolescents, possibly driven by childhood obesity, suggests that identification and treatment of hypertension are likely to become significant health care issues. The goal of identifying and treating children and adolescents with primary hypertension can be viewed within a larger framework of adult cardiovascular risk reduction, which includes addressing other biometric risk factors, such as elevated body mass index and lipid profiles and hyperglycemia. The variables for cardiovascular risk reduction in adults are better understood because hypertension in adults is defined by relatively consistent quantitative thresholds, the epidemiologic evidence demonstrates the association between hypertension and subsequent cardiovascular risk, and treatment trials have shown that reduction in blood pressure reduces the risk of cardiovascular events in older adults.

Extending the adult framework for cardiovascular risk reduction to children and adolescents is limited by several methodologic challenges that complicate determining the potential preventable burden. Blood pressure percentiles are used to define normative values for children and adolescents, and less is known about the clinical and epidemiologic significance of these thresholds in terms of their association with adult cardiovascular disease. In addition, the performance characteristics of current methods for diagnosing hypertension during childhood are limited and of concern because of false-positive rates (blood pressure measurements that later normalize). Evidence on the association between childhood blood pressure and adult hypertension is limited, as is evidence on the longitudinal association between childhood blood pressure and other markers of adult cardiovascular disease.

Most important, the limited data on treatment of hypertension in children and adolescents do not include longer-term follow-up to show reductions in surrogate, subclinical,

or clinical measures of cardiovascular disease in later adolescence or young adulthood. This limited evidence base makes it difficult to quantify the true significance and consequences of a hypertension diagnosis in children and adolescents and the potential benefit of early intervention.

One rationale that has been suggested for screening is to identify secondary hypertension—a relatively rare condition resulting from another underlying cause, such as renal parenchymal disease or renovascular disease. Younger children are more likely than older children and adolescents to have a secondary cause of hypertension; a recent study suggests that secondary causes of hypertension are significantly more common in children younger than six years than in older children.<sup>3</sup> Secondary hypertension is unlikely to be the only clinical manifestation of the underlying disorder in these cases, and management is primarily targeted at treating the underlying condition, as well as controlling hypertension. As children age into adolescence, 85% to 95% of all hypertension diagnoses are considered primary.<sup>1,4</sup>

*Potential Harms.* Although one good-quality study suggests that no adverse effects are associated with hypertension detection in childhood,<sup>2</sup> the evidence on the diagnostic accuracy of clinic-based screening for hypertension suggests that false-positive results may occur. Thus, unnecessary secondary evaluations or treatments may be common, particularly with frequent blood pressure screening. Pharmacologic interventions have been shown to be well tolerated over relatively short periods. Treatment of hypertension in childhood and adolescence with pharmacologic agents is given for a much longer period, and adverse effects of such pharmacotherapy can occur.

*Current Practice.* Current screening practice for elevated blood pressure typically involves measurement of blood pressure in office-based health care settings as part of well-child or sports preparticipation examinations, often in conjunction with other vital signs and growth parameters. The National High Blood Pressure Education Program (NHBPEP) percentile charts are used to interpret systolic and diastolic blood pressure measurements, and

categorize them as normal, prehypertension, or hypertension on the basis of the child's age, height, and sex for each year of the child's life from three to 18 years of age.

A 2012 study analyzing data from the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey assessed blood pressure screening during pediatric ambulatory office visits. It found that screening was done during 67% of preventive care visits and 35% of ambulatory visits. Screening was more common in children who were overweight or obese; 84% of these preventive care visits included screening for hypertension. It was also more likely to be done in older children.<sup>5</sup>

#### SCREENING TESTS

The consensus-based guidelines of the NHBPEP and the National Heart, Lung, and Blood Institute define hypertension in children on the basis of percentiles according to age, height, and sex. Hypertension is defined as systolic or diastolic blood pressure at or above the 95th percentile. Hypertension is classified as stage 1 (systolic or diastolic blood pressure from the 95th to 99th percentile, plus 5 mm Hg) or stage 2 (systolic or diastolic blood pressure greater than the 99th percentile, plus 5 mm Hg). The NHBPEP provides guidance on optimal blood pressure measurement techniques, such as appropriate cuff size and type of sphygmomanometer. Blood pressure should be measured in a controlled environment after five minutes of rest, with the patient seated and the right arm supported at heart level.<sup>6</sup>

#### TREATMENT

Stage 1 hypertension in children is treated with lifestyle and pharmacologic interventions. Medications are not recommended as first-line therapy. Lifestyle interventions for hypertension include weight reduction in children who are overweight or obese, increased physical activity, and restricted sodium intake, as well as education and counseling. The NHBPEP recommends medication for children with stage 2

hypertension or for hypertension that is unresponsive to lifestyle modification.<sup>6</sup>

Many medications have been approved by the U.S. Food and Drug Administration for the treatment of hypertension in children, including diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, and vasodilators.

#### SCREENING INTERVALS

Several organizations recommend routine screening of blood pressure at well-child visits starting at three years of age, based on consensus.

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The "Other Considerations," "Discussion," "Update of Previous USPSTF Recommendation," and "Recommendations of Others" sections of this recommendation statement are available at <http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/blood-pressure-in-children-and-adolescents-hypertension-screening>.

The USPSTF recommendations are independent of the U.S. government. They do not represent the views of the Agency for Healthcare Research and Quality, the U.S. Department of Health and Human Services, or the U.S. Public Health Service.

#### REFERENCES

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