

Hypertension in Children

Description/Etiology

In adults, hypertension is defined as a sustained elevation in blood pressure (BP) above a fixed number (i.e., 140/90); in children (including adolescents), frequency-distribution curves of normative data for BP by age, height, and gender are used to define the normal range of BP and to diagnose hypertension based on percentile curves. As children grow, the acceptable standard for normal BP increases until it approaches adult levels. BP in children is considered normal when the measurement is less than the 90th percentile for age, height, and gender. According to standardized tables, hypertension in children is defined as an average systolic or diastolic BP that is in the 95th percentile or higher for the child's gender, age, and height when measured on three separate occasions. For example, the 95th percentile/defined hypertension in a child of average (i.e., in the 50th percentile) height at age 1 is about 104/58; at age 6 is about 113/74; at age 12 is about 123/80; children exceeding the 90th percentile but below the 95th percentile are considered prehypertensive. (Gender causes minimal variation in BP norms for children prior to age 6.)

Hypertension can be primary (i.e., idiopathic; also called essential) or secondary as the result of an identified underlying disease or condition (e.g., Wilms' tumor, neuroblastoma, coarctation of the aorta, renal parenchymal disease). Primary hypertension accounts for 95% of hypertension cases in adults. Although secondary hypertension has historically been more common in children, primary hypertension is becoming more prevalent as rates of obesity rise. Typically, younger age and higher BP in children increases the likelihood that hypertension is secondary to an underlying disease. Primary hypertension is more likely after puberty.

Children with prehypertension should receive frequent medical surveillance to monitor BP levels and education about a healthy lifestyle. Referral to a clinician who specializes in pediatric hypertension is recommended for treatment of all children with hypertension; children with secondary hypertension may require a multispecialty team of clinicians that includes endocrinology and surgery, depending on underlying disease. Treatment of hypertension in children involves lifestyle modifications (e.g., dietary restriction, exercise, and weight loss), with the goal of normalizing BP and avoiding the need for antihypertensive medications. Close monitoring for target organ damage (e.g., brain, eyes, kidneys, heart, and blood vessels) is essential. Antihypertensive medications are given to children with severe hypertension and target organ damage, and children whose BP is not controlled by lifestyle modification alone. Pediatric dosing is available in angiotensin-converting enzyme (ACE) inhibitors; beta blockers; thiazide, loop, and potassium-sparing diuretics; calcium channel blockers; angiotensin-receptor blockers [ARBs]; and other antihypertensive agents. Patient and family member education and emotional support are essential to ensure treatment regimen adherence and a favorable prognosis.

Facts and Figures

Approximately 1 in 4 American adults has hypertension; although the exact prevalence of hypertension in children is unknown, it is assumed to be far lower in children than in adults. An estimated 1–2% of children in the U.S. have hypertension; the majority of these are adolescents.

Risk Factors

There are many risk factors for hypertension, including family history, obesity, sedentary lifestyle, diabetes mellitus, metabolic syndrome, smoking, alcohol use (even in small amounts), excess dietary sodium, and underlying heart or renal disease.

Signs and Symptoms/Clinical Presentation

Hypertension in children is usually asymptomatic. Severe hypertension presentation may include headache, fatigue, blurred vision, epistaxis, Bell's palsy, abdominal pain, or chest pain, and children may exhibit subtle symptoms of irritability, school performance changes, or personality changes.

Assessment

▶ Patient History

- Ask about family history of hypertension or cardiovascular disease
- Assess for normal levels of growth and development, causes of secondary hypertension, and concomitant disease

▶ Laboratory Tests That May Be Ordered

- CBC, electrolytes, lipid profile, BUN, creatinine, glucose, and other tests may indicate abnormalities

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- Urinalysis may reveal proteinuria and elevated levels of blood urea nitrogen [BUN] and creatinine, indicating kidney dysfunction
- Urinalysis may indicate microalbuminuria, a marker for cardiovascular events

▶ **Other Diagnostic Tests/Studies**

- Assess target organ damage by brain MRI for abnormal brain changes, eye exam for retinopathy, and glomerular filtration rate measurements for renal dysfunction
- Echocardiography may show left ventricular hypertrophy in a hypertensive child
- Renal imaging may show renal dysfunction in children with hypertension related to underlying renal disease

Treatment Goals

▶ **Resuscitate During Hypertensive Crisis and Maintain Optimum Physiologic Status**

- Monitor vital signs (especially frequent BP checks), assess all physiologic systems (especially for crisis-related underlying disease), and review laboratory results; immediately report abnormalities and treat, as ordered
- Closely monitor for cerebral edema, seizures, heart failure, pulmonary edema, and renal failure; treat presenting complications, as ordered (commonly used drugs in hypertensive emergencies include nicardipine, labetalol, and sodium nitroprusside)
 - Seizures should be treated with fast-acting antihypertensives; anticonvulsant drugs are usually ineffective for hypertensive crisis-related seizures
- Monitor drug treatment efficacy; closely monitor to prevent underperfusion of vital organs resulting from an excessively rapid BP decrease
- Follow facility pre- and postsurgical protocols if patient becomes a surgical candidate (e.g., for surgical intervention in severe renal vascular hypertension, renal segmental hypoplasia, coarctation of the aorta, Wilms' tumor, or pheochromocytoma); reinforce pre- and postsurgical education to patient/family members; ensure informed consent
- Encourage family member visitation and rooming-in, as appropriate

▶ **Initiate Antihypertensive Treatment, Provide Emotional Support, and Educate**

- Assess patient/family member anxiety level and coping ability; educate and encourage discussion of the target BP, individualized treatment regimen of antihypertensives and lifestyle modification, and treatment risks and benefits; give antihypertensives, as ordered; monitor treatment efficacy and for adverse effects
- Request referral to a dietitian for education on nutrition and dietary restriction (e.g., decreased sodium and avoiding processed foods)
- Educate and promote regular physical activity and weight loss, as appropriate

Food for Thought

- ▶ The effect of height and weight on BP are not usually apparent until children are of school age
- ▶ Best practice standards require annual BP measurement in every child older than 3 years
- ▶ There are no evidence-based recommendations that guide the clinician in making an antihypertensive drug choice for a specific patient because—although effectiveness of multiple antihypertensives in lowering BP has been studied in pediatric patients—long-term clinical outcomes are unknown

Red Flags

- ▶ In adolescents, a BP of 120/80 mmHg or greater is considered prehypertensive even if it is lower than the 90th percentile for the adolescent's age, height, and gender
- ▶ BP elevation in children increases risk of adult-onset cardiovascular complications, although the frequency of complication development is currently unknown
- ▶ Appropriate cuff size is crucial for accurate BP measurement in children. The width of the rubber bladder in the cuff should cover about 40% of the child's arm circumference at a point midway between the olecranon and the acromion; the length of the bladder in the cuff should cover about 90% of the arm circumference

What Do I Need to Tell the Patient/Patient's Family?

- ▶ Strict adherence to the individualized treatment regimen (that includes lifestyle modification and may include antihypertensive agents) is essential for a good prognosis

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