Clinical Guidelines For Family Physicians

Hypertension in Children and Adolescents

BY NEIL S. SKOLNIK, M.D., AND MATTHEW KING, M.D.

The potential long-term health consequences of hypertension in children and adolescents have prompted increased awareness and the establishment of firm screening guidelines. The fourth report from the National Heart, Lung and Blood Institute's National High Blood Pressure Education Program outlines the essential components of diagnosis, evaluation, and management of hypertension in children and adolescents (Pediatrics 2004;114[2 Suppl.]:555-76).

Guidelines are most useful when they are available at the point of care. A concise yet complete handheld computer version of this guideline is available for download, compliments of Family Practice News, *at www.redi-reference.com.*

Screening and Diagnosis

All children over 3 years who present for medical care should have their blood pressure (BP) measured at least once during every visit. BP should be auscultated over the brachial artery pulse using a standard sphygmomanometer and a properly sized cuff. Abnormal measurements taken with automated devices should be repeated by auscultation.

Hypertension is defined as an average systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) in the 95th percentile for gender, age, and height on three occasions. Prehypertension is defined as average SBP and/or DBP levels that are in the 90th percentile but less than the 95th percentile. Adolescents with BP levels of 120/80 mm Hg should be considered prehypertensive. BP consistently in the 95th percentile to the 99th percentile should be considered stage 1 hypertension. BPs greater than the 99th percentile are considered stage 2 hypertension. Revised BP tables which include the 50th, 90th, 95th, and 99th percentiles are available at http://pediatrics.aappublications.org/cgi/content/full/114/2/S2/555.

Clinical Evaluation

Once the diagnosis of hypertension is made, further evaluation should seek to define primary vs. secondary hypertension and identify additional risk factors. The strong association between elevated BP and obesity makes the measurement of BMI essential. A fasting lipid panel and fasting glucose are warranted in all overweight patients with BP in the 90th-94th percentiles and all patients with BP in the 95th percentile.

Because secondary hypertension is more common in children than adults, steps should be taken to rule out underlying renal disease, including measurement of BUN, creatinine, electrolytes, CBC, urinalysis, and urine culture. A renal ultrasound should be done to identify obvious structural abnormalities.

Target-organ damage is commonly associated with pediatric hypertension. Patients with comorbid risk factors and prehypertension and all patients with confirmed hypertension should be evaluated with echocardiography and a retinal exam. An echocardiogram assesses left ventricular hypertrophy (LVH) or other evidence of cardiac involvement. If LVH is present, echocardiograms should be repeated periodically to follow left ventricular mass index. The retinal exam can identify vascular changes consistent with chronically elevated blood pressures.

Lifestyle Changes

Although evidence that supports the efficacy of lifestyle modifications on blood pressure reduction in children is "limited," there is a significant amount of data showing a relationship between lifestyle and BP.

Emphasis should be placed on weight reduction, regular physical activity, restriction of sedentary activity, and dietary modification. Identifying hypertension as a complication of obesity may help motivate patients toward weight loss goals. A goal of at least 30-60 minutes per day of physical activity should be established while reducing sedentary activities to a minimum. Fresh vegetables and fruits, fiber, and nonfat dairy products should be emphasized and sodium reduced.

Pharmacologic Therapy

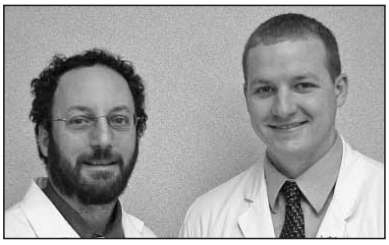
Indications for antihypertensive drug therapy in children include symptomatic hypertension, secondary hypertension, hypertensive target-organ damage, diabetes (types 1 and 2), and inadequate response to lifestyle modifications. The goal BP for children with uncomplicated, primary hypertension without evidence for target-organ damage should be less than the 95th percentile. The goal BP for children with chronic renal disease, diabetes, or target-organ damage should be less than the 90th percentile.

Antihypertensive classes that may be used in children include ACE inhibitors, angiotensin-receptor blockers, η-blockers, calcium channel blockers, and diuretics. The choice of initial drug therapy must be individualized to each patient and may be impacted by concurrent medical conditions.

The Bottom Line

Starting at the age of 3 years, all children should have routine BP measurements at every visit. Elevated pressures need to be repeated on multiple occasions to confirm a diagnosis of hypertension. The diagnostic work-up that follows must distinguish primary from secondary hypertension and assess for the presence of target-organ damage.

Treatment of uncomplicated, stage 1 hypertension should begin with therapeutic lifestyle changes and progress to pharmacotherapy as needed.



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CPR Study: Compression Rate Often Too Slow

BY TIMOTHY F. KIRN
Sacramento Bureau

Cardiopulmonary resuscitation is often done improperly by rescuers who give too few chest compressions and the wrong amount of ventilation.

These findings from two new studies that are among the first to precisely measure the performance of CPR in real-life situations inside and outside the hospital.

Although CPR guidelines are frequently revised, there has not been a reliable, objective way to measure how well it is being performed until now, said Lance B. Becker, M.D., a coauthor of the in-hospital study and a professor of emergency medicine and director of the Emergency Resuscitation Research Center at the University of Chicago.

"Now we find that CPR is not being done very well," he said.

The two studies' investigators used a new monitor/defibrillator device that can count how often compressions are given and how much pressure is exerted with each compression. The device, developed by a Norwegian company, also records the rate of volume of ventilations.

In the in-hospital study, Dr. Becker and his colleagues examined the first 10, 30-second segments recorded by the device during 67 cardiac arrest rescue attempts made by CPR-trained rescuers.

CPR guidelines call for 100 compressions per minute and 12-16 ventilations per minute. In 28% of the cases, however, the average compression rate was less than 90 compressions per minute during the first 5 minutes of resuscitation. In 61% of the 30-second segments, the ventilation rate was more than 20 ventilations per minute. Moreover, 37% of the compressions were too shallow (JAMA 2005;293:305-10).

The out-of-hospital study looked at the use of the device in 176 patients, treated by paramedics or nurse anesthetists, who went into cardiac arrest in three European cities. The researchers found that in 48% of the times that the rescuers were performing resuscitation, they were not actually giving compressions. When they did perform compressions during the CPR episode, they gave compressions at a rate of 121 per minute—close to the study's target values of 100-120 compressions per minute. But the average number of compressions delivered in a minute was only 64. Rescuers gave an average of 11 ventilations per minute (JAMA 2005;293:299-304).

Neither study was able to look precisely at whether poor performance of the CPR affected patient survival, because neither had enough patients to make that determination. However, in the study performed by Dr. Becker and his colleagues, the investigators did note that patients who had longer intervals without chest compression had worse resuscitation results.

Speaking at the 2004 American College of Emergency Physicians Scientific Assembly, Dr. Becker said that he and his colleagues have performed another study, of 100 patients, in which the compression rate was counted and recorded by a trained nurse at the scene. In that study, he said, those patients who received 80-100 compressions a minute were significantly more likely to survive than those who did not.

The results of the in-hospital and out-of-hospital CPR studies are not surprising, noted an editorial that accompanied the studies (JAMA 2005;293:363-5). Prior studies have shown low chest compression rates and high ventilations rates, and they have also shown that CPR training is poorly retained, said Arthur B. Sanders, M.D., in the editorial.

The studies suggest that CPR and advanced cardiac life support (ACLS) training need to be simplified to stress managing cardiac arrest and to emphasize compression over breathing, said Dr. Sanders of the department of emergency medicine at the University of Arizona, Tucson.

ACLS training has become more and more complicated over time so that it now includes instruction on stroke and shock and even managing electrolyte imbalances and asthma, he said. Both the American Heart Association and the International Liaison Committee on Resuscitation are due to update their CPR and emergency cardiovascular care guidelines in the coming year, Dr. Sanders noted.

He called on the groups to simplify their guidelines, and to "return to the core mission" in ACLS training. "It is time to simplify the CPR guidelines and educational programs so that all patients who sustain cardiac arrest can receive optimal treatment," Dr. Sanders said.

Dr. Becker said the device used in his study could also be a major aid in improving resuscitation efforts because it can tell someone administering CPR when they need to speed up their compressions and when they need to slow down their breathing.

Dr. Becker disclosed financial relationships with a series of companies involved in developing the device and is a paid consultant to two of them. ■