TRACKING AND MONITORING CHILDREN'S BLOOD PRESSURE:
THE VALUE, SIGNIFICANCE, AND CONSEQUENCES

By

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The first goal of Healthy People 2010 is to help individuals of all ages increase life expectancy and improve their quality of life (Office of Disease Prevention and Health Promotion, 2001). Hypertension in the early years of life can contribute to increased morbidity as well as a decreased life expectancy due to end organ damage. A child's low birth weight or family history may contribute to primary or essential hypertension; however, this disorder is increasing in frequency due to the childhood obesity epidemic.

Early identification enables health care providers to treat and educate the child and family thus preventing the progression of hypertension. The National Heart Lung and Blood Institute has established guidelines for identification and treatment of childhood hypertension. Nurses are positioned to identify child hypertension early in a variety of settings using the current guidelines. This article focuses on practical suggestions for nurses to improve the early identification of and education regarding childhood pre-hypertension and hypertension, thereby preventing the onset and minimizing the effects of hypertension in children.
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Introduction

Hypertension in children often goes undetected. Nurses can be instrumental in the early diagnosis and treatment of pre-hypertension and hypertension. This article focuses on practical suggestions for nurses to improve the early identification and education regarding childhood pre-hypertension and hypertension, thereby preventing the onset, and minimizing the effects of hypertension in children.

In the not too distant past, nurses were taught that growth measurement and heart and lung sound assessments were sufficient screenings during child healthcare visits unless there were pre-existing renal or cardiac disorders. Today, providers more often measure children’s blood pressure, but many are not well informed about how to evaluate the data. Hansen, Gunn, and Kaelber (2007) reported that hypertension and pre-hypertension were frequently undiagnosed in the pediatric population allowing abnormal blood pressure to go unidentified for many years, silently causing end-organ damage. Not only is the correct blood pressure technique necessary to obtain accurate readings, but identification and intervention of at-risk children are significant, as well. The techniques for blood pressure measurement in children have been well described including the devices used, the site and other application directions for the cuff, and the methods and interpretation of the sounds (Schell, 2006). The purpose of this paper is to provide the nurse with practical suggestions to improve the early identification of and education regarding childhood pre-hypertension and hypertension, thereby preventing the onset and minimizing the effects of hypertension in children.
Factors Leading to Hypertension in Children

Nurses need to have an understanding of the factors leading to hypertension in order to accurately and effectively educate families regarding pre-hypertension and hypertension. Historically, major investigations such as the Framingham Heart Study established in 1948, the 1976 Nurse’s Health Study, and Nurses Study II in 1989, researched adult cardiovascular disease (CVD) prevention and risk factors (Landrigan et al. 2006). These contributions have had significant impact on public health and the diagnosis, evaluation, and treatment of CVD. The Bogalusa Heart Study, conducted in Bogalusa, Louisiana, began in 1973 surveying 16,000 biracial residents from birth to 38 years of age (National Heart Lung & Blood Institute [NHLBI], n.d.). Subsequently, there have been over 160 sub-studies, 800 publications, and four textbooks developed that describe the work and findings from Bogalusa (Tulane, 2005). Berenson, Wattigney, Bao, Srinivasan, & Radhakrishnamurthy (1995) found through autopsies of children the existence of fatty streaks in their arteries at very young ages and the association between adult cardiovascular disease and child health characteristics. Prevention and public health were studied by Berenson & Pickoff (1995). Three years later, Berenson, Srinivasan, Bao, Newman, Tracy, & Wattigney (1998) reported on multiple cardiovascular risk factors and atherosclerosis in children and young adults. Li et al. (2003) studied the measurements of low density lipoproteins-cholesterol and BMI and their association with intima-media thickness to predict future coronary artery disease, a common cardiovascular disease. Results of the Bogalusa and other significant studies demonstrate that hypertension is linked to obesity, metabolic syndrome, lipid disorders, and insulin resistance (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, 2005). The longitudinal data and research analysis have contributed to the epidemiological framework for the prevention of cardiovascular disease and associated mortality. Adult cardiovascular disease begins not only
in childhood, but in utero (Lackland, Egan & Ferguson, 2003) and recent studies indicate low birth weight is a contributing factor (Ben-Shlomo et al., 2008; Hemachandra, Howards, Furth, & Klebanoff, 2007). The Muscatine study of childhood predictors of adult cardiovascular disease identified environmental and genetic predictors of childhood obesity (Landrigan et al., 2006).

**Obesity**

Childhood obesity and associated disorders are changing the health of America’s children. Children who are obese have three times the risk for hypertension than non-obese children (Sorof & Daniels, 2002). The Centers for Disease Control (CDC) (2008b) defines obesity in children as a body mass index (BMI) over the 95th percentile of age and gender, and overweight as BMI above the 85th percentile. Consult the CDC (n.d.) website for detail on proper measurement and evaluation of height, weight, and BMI.

While there are several factors leading to hypertension, obesity is a strong contributor to childhood hypertension (Table 1). Since the 1970s, obesity rates have more than doubled among children 6 to 11 years of age and more than tripled among those 12 to 19 years of age. (Nestle, 2006). In addition, pre-hypertension or primary hypertension is often seen in overweight children and adolescents (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, 2005). In 1976-1980, 5.6% of all children, 6 to 17 years of age, were overweight. In 2005-2006, 16.5% of children were overweight (Federal Interagency Forum on Child and Family Statistics, 2007). Because of the earlier onset of overweight and obesity, children, regardless of ethnicity, will bear obesity related risks, such as cardiovascular disease, for a longer period of time than prior generations. According to Olshansky et al. (2005), if obesity related effects are allowed to continue, today’s youth on average will live less healthy and possibly even shorter lives than their parents.
Table 1. Risk Factors of Childhood Hypertension

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Familial History</td>
<td>1. Renal-70%-80% of secondary cases</td>
</tr>
<tr>
<td>2. Body Size</td>
<td>2. Coarctation of the aorta-5%-10% of secondary cases</td>
</tr>
<tr>
<td>3. Low Birth Weight</td>
<td>3. Endocrinopathies</td>
</tr>
<tr>
<td></td>
<td>4. Central Nervous System Changes</td>
</tr>
</tbody>
</table>

Figure 1.

Metabolic Syndrome

Obesity itself increases the potential for hypertension; the location of adipose distribution is important as well. Metabolic syndrome was previously seen nearly solely in adults, and is characterized by central adiposity, hypertension, hyperlipidemia, glucose intolerance, and hyperinsulinemia. Munoz (2000), in reviewing clinical records of 287 children of both sexes, 6 to 15 years of age with elevated blood pressure, found that 17% (49) had primary hypertension, obesity and hyperlipidemia. Children aged 6 to 17 years with primary hypertension who were followed from 1980 to 1997 demonstrated an association of blood pressure with hypertension, abdominal obesity, hyperlipidemia, and glucose between 115 and 120 mg/dL. Janssen et al. (2005), in a study of 2597 male and female children, black and white race, 5 to 18 years of age, measured BMI, and waist circumferences (WC) to determine whether the BMI and WC could predict coronary artery disease. They found that WC provided information on coronary artery disease beyond what BMI could provide and that WC is an indicator of abdominal adiposity, one criterion for metabolic syndrome. However, the study
cautioned that it is important to note although measurements could be used in a clinical setting to identify elevated health risks, additional research is needed as cutoff points for youth do not yet exist.

Low Birth Weight

Low birth weight (LBW) is defined by the CDC as newborn weight under 2500 grams (National Vital Statistics Report, 2007). In 2005, the rate of LBW in the United States was 8.2% of all births, up from 7.6% in 2000 (National Vital Statistic Report, 2007). Reviewing individual state ethnicity data reveals varied statistics for low birth weight. For 2005, more than 11% of all infants in Louisiana, Mississippi, and the District of Columbia were born LBW, compared with 6.1–6.2 percent in Alaska, Oregon, Vermont, and Washington. Among states with at least 100 births to non-Hispanic, black mothers, in six states (Alabama, Colorado, Illinois, Louisiana, Mississippi, and South Carolina) reported LBW rates for non-Hispanic, black infants of at least 15.0% (National Vital Statistics Report, 2007).

The relationship of low birth weight to hypertension has been gaining interest because findings indicate that low birth weights are associated with higher blood pressures and altered glucose and insulin metabolism in children and adults as well as an inverse relationship between head circumference and systolic blood pressure in childhood (Huxley, Shiell, & Law, 2000). Lackland, Egan, & Ferguson (2003), in a review of literature, found that possible fetal development of the nephrons may play a role in the development of hypertension at a later date. While the mechanism for low birth weight and hypertension development is unclear, the association is significant.

Diversity

The population in the United States is becoming increasingly diverse. The Hispanic population is the fastest growing group comprising 9% in 1980 and 21% in 2007 (Federal
Interagency Forum on Child & Family Statistics, 2008). Since the establishment of the Bogalusa study, further studies have been conducted to determine the prevalence of childhood hypertension in various ethnic populations. These studies however, have mixed results due to varying research methods. Urrutia-Rojas et al. (2006) found the prevalence of hypertension was higher in overweight and Hispanic populations. Sorof, Lai, Turner, Poffenbarger, & Portman (2004) found no ethnic predisposition, but concluded that hypertension was more prevalent in Hispanics due to disproportionate overweight. A study of the U.S. National Health Survey data from 1963 to 2002, obtained blood pressure data from non-institutionalized 8 to 17 year old non-Hispanic blacks and whites and Mexican Americans. Researchers reported higher levels of hypertension and pre-hypertension in non-Hispanic blacks and Mexican Americans (Dindzietham, Liu, Vero Bielo, & Shamsa, 2007) as compared with whites. Obesity appears to be the commonality for these studies. The CDC (2004), reports Non-Hispanic black (21%) and Mexican-American adolescents (23%) ages 12-19 years were more likely to be overweight than non-Hispanic white adolescents (14%). Mexican-American children ages 6-11 years were more likely to be overweight (22%) than non-Hispanic black children (20%) and non-Hispanic white children (14%). While some studies may not be conclusive for hypertension, children, will suffer from obesity related disorders in the future, especially as they progress into adulthood.

Hypertension and Heart Disease

Hypertension is a complicated physiological process involving the sympathetic nervous system, salt and water retention by the kidneys, and over activity of the renin, angiotensin, and aldosterone systems. Hypertension is categorized as primary or essential, and secondary hypertension. While secondary hypertension, caused by renal or coronary disease, is most common in children, primary or essential hypertension is no longer an anomaly (Huether & McCance, 2004). Primary hypertension is found in 10% to 15% of childhood hypertension cases.
(Peters & Flack, 2003). According to the American Heart Association (2008) primary hypertension causes are not known. However, sedentary lifestyles and family history are strongly associated with the disorder. A contributing factor to Coronary Artery disease (CAD) is hypertension. Children with hypertension could develop CAD much younger than previous generations. Over the years, studies have reported elevated blood pressure measurements for children ranging from 5.4% to 19.4% due to differences in methodology; however, these numbers indicate an upward trend (Urrita-Rojas et al., 2006).

Public Health Issues

Hypertension is a public health issue. Heart disease and stroke are the leading causes of death in the United States, and their prevalence is strongly associated with hypertension (Williams, et al, 2002). Evaluating, treating, and tracking hypertension in children has the potential to contribute to health and longevity in adulthood. Systolic hypertension increases with age according to the NHLBI and National Institute of Health (NIH) (2004b). Fifty million or more Americans have hypertension that needs treatment in order to control stroke, cardiovascular mortality, end stage renal disease, and heart failure, which significantly impact health care expenditures, government programs, and mortality (Figure 2). More noteworthy are the approximately 30% of the population who are unaware of their hypertension (NHLBI & NIH) (2004b). This figure continues to rise, as the American Heart Association in 2008 (2008b) reports that there are 73.6 million people with hypertension and 21.3% are unaware of their hypertension. This significantly impacts health care expenditures, government programs, and mortality (Figure 2).
Table 2. End Organ Damage

<table>
<thead>
<tr>
<th>Organ</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Heart</td>
<td>Left Ventricular Hypertrophy (seen in children)</td>
</tr>
<tr>
<td></td>
<td>Angina</td>
</tr>
<tr>
<td></td>
<td>Infarction</td>
</tr>
<tr>
<td></td>
<td>Heart Failure</td>
</tr>
<tr>
<td>2. Brain</td>
<td>Stroke or Transient Ischemic Attacks</td>
</tr>
<tr>
<td></td>
<td>Dementia</td>
</tr>
<tr>
<td>3. Chronic Kidney Disease</td>
<td>End Stage Renal Disease</td>
</tr>
<tr>
<td>4. Arteries</td>
<td>Peripheral Arterial Disease</td>
</tr>
<tr>
<td>5. Eyes</td>
<td>Retinopathy</td>
</tr>
</tbody>
</table>

Lurbe (2007).  

Figure 2.  

Blood Pressure Guidelines

*Tracking*

The NHLBI & NIH (2004c) introduced a new definition of adult hypertension in The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7). Adults and adolescents are considered to have pre-hypertension when the range for systolic pressure is 120-139 mm Hg and/or a diastolic pressure is 80-89 mm Hg. Pre-hypertension is based on two or more properly measured seated readings over two or more office visits. However, when discussing children, the criteria differ. Hypertension in children over three years of age is defined as systolic blood pressure and/or diastolic blood pressure that on repeated measurements are ≥ to 95th percentile for age, height, and gender on at least three separate occasions. The 95th – 99th percentile plus 5 mm Hg is
considered Stage 1 hypertension and >5 mm Hg above the 99th percentile is regarded as Stage 2 hypertension. Blood pressures within these ranges necessitate treatment.

Blood pressure between the 90th and 95th percentile is considered high normal or pre-hypertensive and may be modified by lifestyle changes. Unless a child has a medical condition, blood pressure should be measured regularly at healthcare visits starting at three years of age (NHLBI & NIH, 2004e). Frequency of measurements may be modified depending on the reading (Table 3).

<table>
<thead>
<tr>
<th>SBP or DBP Percentile*</th>
<th>BP Measurement Frequency</th>
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<tbody>
<tr>
<td>Normal</td>
<td>Begin monitoring at three years old if no other circumstances exist. Recheck at next scheduled physical exam</td>
</tr>
<tr>
<td>Pre hypertension</td>
<td>Recheck in 6 months</td>
</tr>
<tr>
<td>Stage 1 hypertension</td>
<td>Recheck 1-2 weeks or sooner if symptomatic, if persistently elevated on 2 occasions, evaluate or refer to source of care within 1 month</td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>Evaluate or refer to source of care within 1 week or immediately if the patient is symptomatic</td>
</tr>
</tbody>
</table>

Note. *For gender, age, and height measured on at least 3 separate occasions, if systolic and diastolic categories are different, categorize by the higher value. The National Heart Lung Blood Institute, High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (2004a).

Using Blood Pressure Percentiles

The tracking of blood pressure using percentiles provides an opportunity for identification of health issues in children. Peters & Flack (2003) delineate three reasons for using
percentiles. First, the more severe the blood pressure elevation, the greater the deviation from the norm and more likely the child will encounter an underlying renal, vascular, or endocrine disease. Second, children in the high percentile range most often have a history of familial hypertension thus increasing the child’s risk of adult hypertension. Third, not unlike growth, children’s blood pressure percentiles, specifically systolic, tend to maintain a percentile curve as they grow older providing the ability to identify probable hypertension in adulthood.

When determining the blood pressure of children, it is necessary to determine the height percentile by using the CDC growth charts. To find the percentile for the child’s systolic and diastolic pressure, a comparison is then made with the NHLBI blood pressure tables. As with the growth grids, the blood pressure tables are specific for male and female, and age of the child. Detailed information regarding diagnosing, evaluating and treating hypertensive children and adolescents as well as the blood pressure tables can be easily obtained by viewing the web site from the NHLBI (2004a). Downloadable growth grids can be acquired at the CDC (2008a) website.

Although most children should have their blood pressure monitored beginning at three years of age, children under three years of age should have their blood pressure measured in special circumstances (Table 4).
Table 4. Conditions Under Which Children < Three Years Old Should Have Blood Pressure Monitored

- History of prematurity, very low birth weight, or other complications requiring intensive care
- Congenital heart disease (repaired or not repaired)
- Recurrent urinary tract infections, hematuria, or proteinuria
- Known renal disease or urologic malformations
- Family history of congenital renal disease
- Solid organ transplant
- Malignancy or bone marrow transplant
- Treatment with drugs known to raise BP
- Other systemic illnesses associated with hypertension
- Evidence of elevated intracranial pressure


*White Coat Hypertension*

The National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (2004) defines White Coat Hypertension as manifested by the patient with blood pressure readings > 95th percentile in a physician’s office or clinic which is normotensive outside a clinical setting. This type of hypertension lends itself to Ambulatory Blood Pressure Monitoring rather than the standard monitoring for children. Ambulatory Monitoring is useful in helping to differentiate between primary and secondary hypertension as well as White Coat Hypertension. This method is routinely used in children ages five years and older using oscillometric monitors rather than auscultatory equipment. The monitors record the pressure every 20 to 30 minutes during waking hours and every 30 to 60 minutes during sleep.
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(Urbina et al., 2008). Information on Ambulatory Monitoring as well as the normal values for Ambulatory blood pressure has further been described in great detail in Urbina et al., (2008).

Diagnosing Hypertension in Children and Teens

Hansen, Gunn, & Kaelber (2007), conducted research to determine the frequency of undiagnosed hypertension and pre-hypertension and the patient factors associated with the under-diagnosis of this disorder. In a chart review, the cohort study included 14,187 children and adolescents ages 3 to 18 years 50% were African American, and 49% were female. The participants were observed at least three times for well-child care between June 1999 and September 2006 in clinics located in a large metropolitan area. The researchers reviewed records for height, weight, sex, ethnicity, age, family history, and blood pressure readings for each well child visit. For the children who met the criteria for pre-hypertension or hypertension at three or more visits, the proportion of clients with codes from the International Classification of Diseases, Ninth Revision in the recorded diagnoses list, problem list, or past medical history lists was verified.

Of the 485 (3.4%) children with pre-hypertension, only 55 (11%) had an appropriate diagnosis documented in the electronic medical record, and of the 507 (3.6%) children and adolescents who had hypertension, only 131 (26%) had a diagnosis of hypertension or elevated blood pressure documented in the electronic medical record (Hansen et al., 2007). Investigators found that certain risk factors were associated with the health care provider diagnosing elevated blood pressure, where the child had an obesity related diagnosis and the child was older or taller. Factors that did not alert the provider were positive family histories for conditions such as familial hypertension, diabetes, metabolic syndrome, and obesity. This study clearly identified under-diagnosing of hypertension in children. The study limitations were that it did not examine clinician characteristics such as years of experience, practice, or the training of providers.
Consistency of providers may have been a factor as there usually was more than one health care provider over time seeing the patient. The study relied on diagnosis, medical history and problem lists, all of which were not consistent in notations.

The Roles and Influence of Nursing in Child Hypertension

Screening and identification of blood pressure in multiple settings as well as teaching about healthy lifestyle practices will contribute to the control of blood pressure levels. Nurses work in a variety of settings and have the potential to influence and affect change in children’s blood pressure screening practices and the follow-up education. Nurses have the potential to see a large, diverse population of children from all socioeconomic levels and ethnicities as they are seen for acute and chronic care, well child exams, immunizations, illness visits, in schools, in hospitals, and in the home. There are several windows of opportunity available to nurses to create the changes needed to identify a high-risk child and contribute to the success of decreasing childhood hypertension.

Nurses are aware there is a gap between research, guidelines, and the reality of a busy clinic. Taking three pressures over a period of ten to fifteen minutes (Luma & Spiotta, 2006) is not always realistic in a busy clinical setting. What is important is that the nurse recognizes a possible problem and takes actions to acquire the second or third pressure when indicated. Nurses will find that familiarity with the NHLBI guidelines can enable them to open dialogue with other providers and team members to develop forms that assist in the identification of potential problems. While developing a protocol, policy, or procedure may be required, a simple check in a box on a preexisting form can alert the provider of hypertension or need for follow up of hypertension noted on a previous visit. Most often the child’s height and weight percentiles are recorded along with blood pressure, temperature, pulse, and respirations. It is one more step to analyze and record the percentile for the blood pressure.
As a member of a clinic’s health care team, the nurse can teach medical assistants and other personnel to properly take children’s blood pressure and offer continuing education to evaluate and reinforce the skills. In addition, fire departments and other community partners often screen adults for blood pressure. By collaborating with community agencies, nurses can encourage organizations to begin focusing on children as well. Becoming knowledgeable regarding community screening clinics and activities is central for referring patients to the best possible resource.

Health promotion and education regarding obesity, blood pressure, diet, alcohol consumption, tobacco use, and physical activity should be topics of discussion with youth and families in many environments such as medical, governmental, businesses, and schools. Monitoring and educating a pregnant woman may have a direct impact on fetal and child well-being in the future. In the age of technology and video games it is prudent to question the number of hours spent in front of the television or computer. Nurses as community members can become involved with parents in lobbying for healthier livable communities, healthy school lunches, and a return to physical education classes. Nurses are in a position to speak to the local Parent Teacher Association to educate and encourage childhood blood pressure checks in school, or instituting a heart healthy curriculum.

Cottrell et al. (2007), in comparing parent cardiovascular knowledge, attitudes, and behaviors, found that while many parents understood healthy eating and cutting calories among children who were identified as being at risk or already overweight, a significant number of parents underestimated their child’s weight risks. Improving the parent assessment and supporting parents to become mentors will assist in health behavior modification programs. Interacting with several members of a family when the siblings accompany the child and parent or when an adult with hypertension is visiting a clinician for their own medical care is an
opportunity for a nurse to discuss children’s cardiovascular health. Individuals and families can be enlightened and educated regarding their child’s blood pressure. This presents a window of opportunity for a nurse to intervene in all levels of care focusing on motivation, education and self-monitoring not only for the patient, but siblings and parents as well.

Future Studies

There have been considerable studies of adult hypertension and the effects it has on the body; however, more longitudinal research is needed to identify the effects of childhood hypertension on development and adult characteristics. Some providers do not feel they have been adequately trained in blood pressure measurement and analysis (Landrigan et al., 2006), so intervention studies are needed to identify the best instruction for nurses and other healthcare providers for evaluating blood pressure, and the integration of the follow up when elevations are detected. A replication of the study by Hansen et al. (2007) is needed to determine if an increase in documentation of hypertension and pre-hypertension has occurred. Clarity surrounding obesity related issues such as increased lipids, medication, diabetes, and diet in addition to information regarding obesity related diseases, is needed on ethnic populations. Dispersing data regarding in utero developments or parenting outcomes would be welcome to the provider caring for children and pregnant women. In addition, more study is needed to improve evaluation, treatment, and to determine if end organ damage is reversible (Nguyen & Mitsnefes, 2007).

Conclusion

The first goal of Healthy People 2010 is to increase quality and years of life by helping individuals of all ages to increase life expectancy and to improve their quality of life (Office of Disease Prevention and Health Promotion, 2001). Hypertension continues to be a predominant health risk factor in the adult population, and the potential for pre-hypertension and primary hypertension in children cannot be ignored. From the early studies in Bogalusa, it is evident that
Children from diverse locations and backgrounds are at risk for cardiovascular disease. Prevention of risk factors for the development of hypertension, such as obesity, may either delay or prevent adult onset hypertension (Seikaly, 2007). Identifying children early to provide support and counseling is a goal towards early intervention and not hoping that the risk factors will resolve themselves in time (Nader et al., 2006). It takes little effort and knowledge to determine the child’s blood pressure percentile. Children and subsequently adults cannot be educated or treated unless the problem is identified.

While the studies are ongoing, nurses can initiate work on the early identification of hypertension to aid patients, their families, and ultimately society at large in the prevention of hypertension and end organ disease such as left ventricular hypertrophy and end stage renal disease. Whether a nurse works in the home, clinic, school, or hospital, there are opportunities to educate, appropriately assess, and document a child’s blood pressure. Although some children will need pharmacological intervention, non-pharmacological interventions are recommended for children with pressures in the 90th percentile or higher as long as no secondary hypertension is evident (Peters & Flack, 2003). The nurse can be active in teaching these interventions and performing ongoing monitoring.

Our future depends on the next generation to be educated and healthy in order to have a productive society. Humanity has been delivered a chilling wake-up call but nurses with their expertise in education, support and guidance are poised to lead the way for a healthier, stronger, population.
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