





Hypertension across the lifespan: Adults

Learn how to identify at-risk patients to facilitate timely intervention and promote positive outcomes.

By Kellie Bruce, PhD, APRN, FNP-BC; Tara C. Hilliard, PhD, APRN, ACNP-BC; Karen A. Esquibel, PhD, APRN, CPNP-PC; Inola Mello, DNP, APRN, FNP-C; and Amy Moore, DNP, APRN, FNP-C

Editor's Note: Last issue, we took a look at pediatric hypertension. Join us this issue as we explore hypertension in adult patients.

The prevalence of hypertension (HTN) in the US adult population has neared an all-time high rate of nearly 45.4% in the past decade, which is significantly higher than the 26% of people diagnosed with HTN worldwide. These statistics are based on the American College of Cardiology (ACC)/American Heart Association (AHA) definition of HTN as a BP of greater than 130/80 mm Hg. This is more stringent than the Eighth Joint National Committee (JNC 8) guidelines, which recommend treating a BP of greater than 140/90 mm Hg in patients younger than age 60, including those with diabetes and/or chronic kidney disease (CKD). The JNC 8 guidelines define HTN in people age 60 and older as 150/90 mm Hg.

Younger adults who meet the more stringent criteria may be overlooked and underdiagnosed with HTN. Underdiagnosis can result from healthcare providers neglecting to screen this age group for HTN because younger adults often don't appear unhealthy. Another circumstance

is when a healthcare provider fails to identify a patient with HTN because of his or her expectation of who should have HTN. This may occur in as many as one in three cases. Healthcare providers may assume that older patients should be screened while overlooking patients ages 20 to 30. Within the entire adult demographic, male patients and those without medical insurance also tend to be screened less for HTN. Although many healthcare providers may be concerned about patient overtreatment with lower threshold definitions of HTN, others feel that current recommendations will provide identification of those whose diagnosis is missed.

Increased screening, along with early diagnosis and treatment of adult patients across all demographics, can prevent or slow the progression of long-term HTN-related complications.

Significant epidemiology

Cardiovascular disease (CVD) accounts for almost one-third of deaths in the US every year, with costs expected to exceed \$800 billion annually by 2030; HTN is the biggest contributor to CVD.



Adult BP categories

Category	BP reading	Follow-up
Normal	Systolic <120 mm Hg and diastolic <80 mm Hg	Annually
Elevated	Systolic 120 to 129 mm Hg and diastolic <80 mm Hg	Maintain BP log and return in 3 to 6 months
Stage 1	Systolic 130 to 139 mm Hg or diastolic 80 to 89 mm Hg	Maintain BP log and return in 1 month and then monthly until at goal BP
Stage 2	Systolic ≥140 mm Hg or diastolic ≥90 mm Hg	Maintain BP log and return in 1 month and then monthly until at goal BP

cheat

sheet

It's important to identify common CVD risk factors that are frequently seen in patients with HTN. These risk factors are divided into two groups: modifiable and relatively fixed. Modifiable risk factors include currently smoking and secondhand smoke exposure, having low fitness levels or increased physical inactivity, and consuming an unhealthy diet (such as fried foods, salty foods, sugar-sweetened beverages, and red and processed meats). Diabetes mellitus, dyslipidemia, and hypercholesterolemia are additional modifiable risk factors. Relatively fixed risk factors include CKD, family history, increased age, low socioeconomic/educational status, male sex, obstructive sleep apnea (OSA), and psychosocial stress.

Recent discoveries in research related to risk factors and causes of HTN include immune mechanisms, systemic vasoconstriction and arterial stiffness, and understanding the role of microbiota in the gut. The REGARDS study revealed that the incidence of increased BP is higher in those who consume a high-sodium diet, particularly in Black men who are overweight and Black women with a larger waist circumference. Body mass index (BMI) is one of the greatest modifiable risk factors of HTN, especially for those who are morbidly obese. Nurses should consider the MAP framework (measure

accurately, act rapidly, and partner with patients) for improving BP control. Education on the negative results of uncontrolled or untreated HTN in addition to expected adverse reactions of therapy is a significant step toward reducing disparities in treatment. Open and clear communication and being sensitive to the patient's belief system is necessary for patients who've often been disenfranchised from the healthcare system.

Guidelines for diagnosis

When exploring the translation of scientific evidence into everyday clinical practice, we find reliable guidance from the ACC/AHA guidelines for adult HTN. The ACC/AHA task force consistently updates these guidelines to deliver cardiovascular support and improvement opportunities to prevent CVD.

Systolic and diastolic BP are based on the average of two or more readings obtained on two or more separate occasions. BP in adults is classified as normal, elevated, stage 1, or stage 2:

- normal: systolic <120 mm Hg and diastolic <80 mm Hg
- elevated: systolic 120 to 129 mm Hg and diastolic <80 mm Hg
- stage 1: systolic 130 to 139 mm Hg or diastolic 80 to 89 mm Hg
- stage 2: systolic ≥140 mm Hg or diastolic ≥90 mm Hg.

It's critical that accurate measurement and recording of BP take place to minimize errors in diagnosis and treatment. The patient should sit quietly for 5 minutes before taking his or her BP. Selecting the correct cuff size, supporting the limb used to measure the BP, ensuring that the cuff is at the level of the heart, and deflating the cuff slowly while auscultating are necessary steps.

After an adult patient is diagnosed with HTN, he or she should be screened for secondary causes of HTN, including excessive use of alcohol, nonsteroidal

anti-inflammatory drug use, illicit drug use, OSA, and CKD. If any of these issues are identified, the clinician should include a plan to mitigate each problem. The diagnostic evaluation of patients with HTN includes a fasting blood glucose level, complete blood cell count, lipid profile, serum creatinine with estimated glomerular filtration rate (eGFR), complete metabolic panel, thyroid-stimulating hormone, urinalysis, and an ECG. Additional testing, such as an echocardiogram, should be considered in patients with significant comorbidities or concern for secondary HTN.

Guidelines for treatment

Treatment plans correlate with each category and should be individualized to the patient. The lifetime risk for atherosclerotic CVD (ACVD) must be considered when establishing a treatment plan for an adult patient with HTN. Patients with a lifetime ACVD score of greater than 10%, as calculated per ACC/AHA guidelines, should be treated more aggressively. Patients with confirmed HTN and an ACVD risk of 10% or higher should have a targeted BP goal of less than 130/89 mm Hg (see *ACC/AHA ASCVD risk estimator*).

Elevated BP is treated with lifestyle modifications and monitoring. Lifestyle modifications include the addition of the Dietary Approaches to Stop Hypertension, or DASH, diet, which is inclusive of lower sodium food choices, a variety of food groups, and portion control. Additional modifications include appropriate exercise (90 to 150 minutes of aerobic exercise per week), weight loss when appropriate, and alcohol use in moderation. Recommendations also include adequate dietary intake of potassium, 3,500 to 5,000 mg/dL per day if not contraindicated by CKD or medications that promote potassium excretion. BP should be rechecked after 3 to 6 months of lifestyle modifications.

Stage I HTN management includes lifestyle modifications and initial pharmacotherapy with the option of thiazide

ACC/AHA ASCVD risk estimator

The ASCVD risk estimator provides a percentage score for each individual based on his or her unique information. Data used to calculate the score include age, sex, race, total cholesterol, high-density lipoprotein cholesterol, presence of HTN, systolic and diastolic BP readings, presence of diabetes, and current smoking status. Scores of 10% or higher equate to an increased 10-year probability of heart disease or stroke. The risk estimator can be found at https://tools.acc.org/ldl/ascvd_risk_estimator/index.html.

diuretics, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers, or calcium channel blockers. Per guideline recommendations, these patients should initially be started on single medication therapy. An individual medication's efficacy and the source of an adverse drug reaction are easier to determine when using a single medication regimen.

The patient's comorbidities must always be considered when selecting a medication. For instance, a patient with a reduced ejection fraction due to heart failure shouldn't be treated with a non-dihydropyridine calcium channel blocker. Teach the patient how to properly check his or her BP at home routinely and keep a log of readings. The log should be brought to each office visit. Instruct the patient on proper medication administration, potential adverse reactions, and target BP parameters. After drug therapy is initiated, the patient should be seen in 1 month for follow-up.

Stage 2 HTN treatment also incorporates lifestyle modification strategies and pharmacotherapy. Patients with a baseline BP of 20/10 mm Hg above their goal should be treated with dual medication therapy. Two medications from the aforementioned first-line drug list should be prescribed. These patients should also be taught to monitor their BP regularly at home and keep a BP log. They should be

seen back in the office in 1 month for follow-up and then monthly until their goal BP is achieved.

Patients with uncontrolled BP of greater than 140/90 mm Hg may need immediate intervention to prevent additional sequelae. Hypertensive emergencies, if left untreated, may result in significant consequences, up to and including death (see *Hypertensive emergencies*).

Nursing implications

The nursing role in improving BP control in adults includes detection, referral, and patient education (see *Understanding hypertension*). Nurses are at the heart of the multidisciplinary team, providing holistic care and addressing social and ethnic disparities. Nurses have been recognized over decades for their participation in BP management.

With all ages, selection of an appropriate cuff is imperative to obtain an accurate measurement of auscultatory BP and detect HTN. Appropriate technique is also critical for accurate BP measurement. Ensure that the patient is sitting comfortably with his or her back supported, legs

uncrossed, and arms supported at the heart level. The cuff bladder must encircle 80% or more of the arm circumference and the mercury should be deflated at 2 to 3 mm per second. A mercury sphygmomanometer is the preferred device when available. BP may appear elevated if the cuff is too small, if the patient isn't sitting comfortably, or if his or her legs are crossed. A low pressure may result if the arm is elevated above the heart or if deflation of the mercury is too fast.

Provide education to patients about their medications, including the best time to take the medication; the appropriate route; the correct dosage, particularly if there's more than one pill; and potential adverse reactions, such as a cough when taking an ACE inhibitor and dizziness or hypotension with antihypertensive medications. Patients need to be aware of when to report serious reactions. Education on HTN must include teaching patients to take their BP accurately at home. Patients should compare their BP cuff with those used in the clinic to ensure accuracy. You may also provide nutritional, exercise, and relaxation techniques to help lower BP.

Hypertensive emergencies

Type	Parameters	Treatment
Malignant HTN	Either systolic BP >180 mm Hg or diastolic BP >120 mm Hg AND Acute target organ damage that includes papilledema and potentially additional clinical features, such as confusion, impaired renal function, hematuria, or left ventricular failure	Immediate referral to ED
Accelerated HTN	Either systolic BP >180 mm Hg or diastolic BP >120 mm Hg AND Absence of acute target organ damage	Immediate referral to ED
Uncontrolled HTN	Systolic BP >140 mm Hg or diastolic BP >90 mm Hg	Assess BP in both arms and with the patient supine and standing Emergent referral: Significant difference in BP readings and chest pain, confusion, or neurologic signs

Understanding Hypertension

What Is Hypertension?

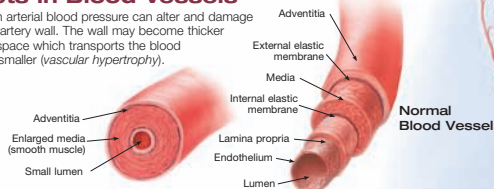
- **Hypertension**, or "high blood pressure," is a common, chronic condition that may cause long-term damage to the heart, brain, kidneys, eyes, and blood vessels.
- The entire circulatory system may be affected.
- Multiple blood pressure readings should be taken to establish if hypertension is truly present.

Types of Hypertension

- **White Coat Hypertension** – Elevated blood pressure readings only in a stressful setting, such as a physician's office.
- **Essential Hypertension** – Most common type with no specific cause. It is generally improved by a healthier lifestyle and medication, if needed.
- **Secondary Hypertension** – Result of an underlying disorder or abnormality of the kidney, major arteries, the adrenal gland, or other organs.

Effects in Blood Vessels

Increase in arterial blood pressure can alter and damage the inside artery wall. The wall may become thicker while the space which transports the blood becomes smaller (*vascular hypertrophy*).



Vascular Hypertrophy

A fatty build-up, also called *plaque*, develops in the damaged arterial wall, clogging the flow of blood throughout the artery (*atherosclerosis*). Blood clots may form and block smaller blood vessels further down the circulation if dislodged.

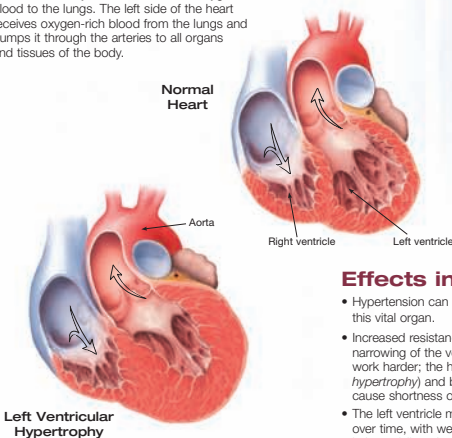


Atherosclerosis

Under increasing blood pressure, a weakening of the artery wall may balloon out (*aneurysm*) and even rupture, causing blood loss, tissue damage, and even death.

Blood Flow in the Heart

The right side of the heart receives blood from the veins of the body and delivers this unoxygenated blood to the lungs. The left side of the heart receives oxygen-rich blood from the lungs and pumps it through the arteries to all organs and tissues of the body.



Effects in the Heart

- Hypertension can cause serious damage to this vital organ.
- Increased resistance in the arteries and narrowing of the vessels cause the left heart to work harder; the heart muscle thickens (termed *hypertrophy*) and becomes stiff, which can cause shortness of breath.
- The left ventricle may also become enlarged over time, with weakened contraction, resulting in heart failure. In addition, the heart muscle may suffer from decreased blood flow due to atherosclerosis of the small arteries of the heart.

What Is Blood Pressure?

- Blood pressure is a measure of the force of blood against the walls of the arteries.
- It is dependent upon the action of the heart, the elasticity of the artery walls, and the volume and thickness of the blood.

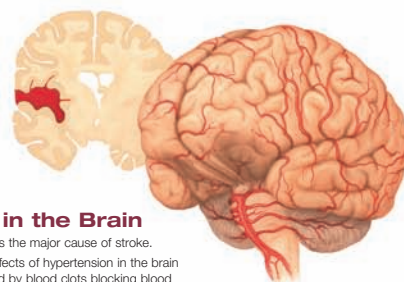
- Blood pressure readings are a ratio of the maximum or *systolic pressure* (as the heart pushes the blood into the arteries) written over the minimum or *diastolic pressure* (as the heart relaxes).

Systolic pressure
Diastolic pressure

An example of an optimal blood pressure is: $\frac{120}{80}$

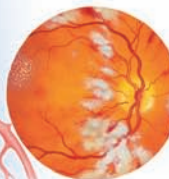
Effects in the Brain

- Hypertension is the major cause of stroke.
- The harmful effects of hypertension in the brain may be caused by blood clots blocking blood flow to parts of the brain.
- Aneurysms may burst under increasing pressure causing hemorrhage and damage to brain tissue.



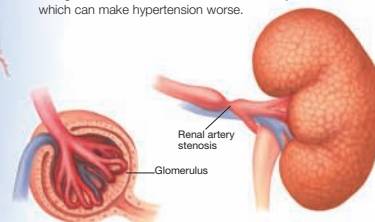
Effects in the Eye

Hypertension can damage the inner lining of the back of the eye, the retina. This can serve as a marker that a patient has hypertension, and can also affect vision.



Effects in the Kidneys

- Many kidney diseases cause hypertension.
- The kidneys are often damaged by chronic hypertension.
- Increased blood pressure disrupts the ability of the kidneys to regulate salt and water balance in the body, which can make hypertension worse.



Healthy Life Style Changes

Decrease your blood pressure by:

- Reducing body weight if overweight
- Restricting dietary salt
- Not smoking
- Avoiding excess alcohol
- Exercising regularly
- Developing relaxation techniques

It is very important to follow your health-care provider's instructions and to take any medications as prescribed.

Drug Treatment	What it Does
Angiotensin-converting enzyme (ACE) inhibitors	<ul style="list-style-type: none"> • Relaxes blood vessels • Lowers blood pressure • Prevents diabetes-related kidney damage
Angiotensin II receptor blockers (ARB)	<ul style="list-style-type: none"> • Relaxes blood vessels
Thiazide diuretics	<ul style="list-style-type: none"> • Increases urine production to eliminate excess sodium and fluid retention
Beta-blockers	<ul style="list-style-type: none"> • Slows heart rate • Decreases blood pressure
Antihypertensive drugs	<ul style="list-style-type: none"> • Lowers blood pressure
Calcium channel blockers	<ul style="list-style-type: none"> • Relaxes blood vessels • Some can slow heart rate
Vasodilators	<ul style="list-style-type: none"> • Works on muscles on the walls of the arteries to prevent tightening and narrowing

Follow-up appointments with the health-care provider must continue regularly to ensure that BP is within range, especially if patients experience changes in diet and weight. The nurse is vital in ensuring that patients understand the importance of continued follow-up care.

Case study

LT, a 23-year-old male, is seen for a sexually transmitted infection screening and has a BP reading of 146/94 mm Hg. He reports that he's had previous BP results that were similar when he was seen for sports physicals while in high school. He was advised to monitor his BP, but states that he didn't follow through. He doesn't snore and he denies daytime sleepiness suggestive of OSA.

LT is a graduate student who typically drinks four to five alcoholic beverages, two to three times a week. He doesn't smoke tobacco, but he reports vape use on occasion when out with friends. His only exercise is walking on campus. He prefers to play video games when he isn't busy with school. He smoked marijuana while in high school but denies any past or present use of stimulants or other recreational drug use.

LT's family history is as follows:

- father: HTN since age 25, obesity, diabetes mellitus diagnosed at age 45
- mother: healthy
- paternal grandfather: HTN, diabetes mellitus, deceased at age 74 of uncertain cause
- paternal grandmother: stroke at age 68, deceased at age 70 due to second stroke
- maternal grandfather: history of obesity, deceased at age 80 due to hepatocellular carcinoma
- maternal grandmother: healthy, deceased at age 84 due to pneumonia.

LT has the following risk factors: obesity, BMI of 39.3, sedentary lifestyle, family history, and male sex. He's instructed to have his BP checked at the local pharmacy or campus health clinic several times over

the next 2 weeks; decrease his salt, fast food, and alcohol consumption and increase consumption of fruits and vegetables; avoid vaping; exercise 150 minutes weekly; and practice mindfulness strategies for decreased stress.

At his follow-up appointment 2 weeks later, LT's out-of-office BP readings are documented as 142/94 mm Hg and 148/88 mm Hg. His office BP reading is 154/92 mm Hg. An ECG, urinalysis, fasting lipid panel, and comprehensive metabolic panel with eGFR are ordered and he's referred for an eye exam with fundoscopy. Screening for secondary HTN isn't initiated immediately due to multiple positive risk factors for primary HTN younger than age 30.

LT's diagnostic results are all within normal limits. He has cut back his alcohol consumption; however, he plans to continue to drink in moderation in social situations. He also agrees to continue to work on diet modifications but isn't interested in changing his sedentary lifestyle. He agrees to start antihypertensive medication, with a BP goal of less than 130/80 mm Hg. He's prescribed an ACE inhibitor plus a calcium channel blocker given his diagnosis of stage 2 HTN. He's instructed to routinely check his BP at home and keep a written log to bring with him to his follow-up appointment in 1 month.

Diligence needed

The identification, diagnosis, and management of adult HTN is multifaceted. With the rate of HTN diagnosis in the US significantly higher than in other parts of the world, we should be acutely aware of the risk factors, diagnostic parameters, and treatment guidelines for identifying and treating adult HTN. We must be diligent in recognizing possible external barriers and healthcare provider biases related to plausibility of an HTN diagnosis in younger patient populations. It's essential to understand the stages of HTN and use guideline parameters

for initiation of treatment using both nonpharmacologic and pharmacologic methods. ■

REFERENCES

- Berg S. Racial health disparities are rampant in hypertension. American Medical Association. 2018. www.ama-assn.org/delivering-care/hypertension/racial-health-disparities-are-rampant-hypertension.
- Himmelfarb CRD, Commodore-Mensah Y, Hill MN. Expanding the role of nurses to improve hypertension care and control globally. *Ann Glob Health*. 2016;82(2):243-253.
- Howard G, Cushman M, Moy CS, et al. Association of clinical and social factors with excess hypertension risk in black compared with white US adults. *JAMA*. 2018;320(13):1338-1348.
- James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;311(5):507-520.
- Leite-Santos NC, de Melo DO, Mantovani-Silva RA, et al. Guidelines for hypertension management in primary care: is local adaptation possible? *J Hypertens*. 2020;38(10):2059-2073.
- Meador M, Lewis JH, Bay RC, Wall HK, Jackson C. Who are the undiagnosed? Disparities in hypertension diagnoses in vulnerable populations. *Fam Community Health*. 2020;43(1):35-45.
- Miller RN. 4 ways to partner with black patients to control hypertension. American Medical Association. 2017. www.ama-assn.org/delivering-care/hypertension/4-ways-partner-black-patients-control-hypertension.

Ostchega Y, Fryar CD, Nwankwo MS, Nguyen DT. Hypertension prevalence among adults aged 18 and over: United States, 2017-2018. *NCHS Data Brief, No. 364*. Hyattsville, MD: National Center for Health Statistics; 2020.

Sigmund CD, Carey RM, Appel LJ, et al. Report of the National Heart, Lung, and Blood Institute working group on hypertension: barriers to translation. *Hypertension*. 2020;75(4):902-917.

Sterling S, Judd S, Bertrand B, Carson TL, Chandler-Laney P, Baskin ML. Dietary patterns among overweight and obese African-American women living in the rural South. *J Racial Ethn Health Disparities*. 2018;5(1):141-150.

Unger T, Borghi C, Charchar F, et al. 2020 International Society of Hypertension global hypertension practice guidelines. *Hypertension*. 2020;75(6):1334-1357.

Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines. *J Am Coll Cardiol*. 2018;71(19):e127-e248.

At Texas Tech University Health Sciences Center School of Nursing in Lubbock, Tex., Kellie Bruce is an Associate Professor and the Director of Family NP Studies, Tara Hilliard is an Associate Professor and the Director of Adult Gerontology Acute Care NP Studies, Karen Esquibel is an Associate Professor and the Director of Pediatric NP Studies, Inola Mello is an Associate Professor, and Amy Moore is an Associate Professor.

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