

## EVIDENCE-STATEMENT:

# HYPERTENSION (Screening, Counseling, and Treatment)

Why This Chapter is Important for Employers: An Overview

- Hypertension (high blood pressure) is the most common primary diagnosis in the United States and is responsible for 35 million office visits each year.<sup>1</sup>
- Nearly 1 in 3 U.S. adults has high blood pressure.<sup>2,3</sup>
- Adults with untreated or poorly controlled hypertension are at increased risk of heart disease and stroke, peripheral artery disease, end-stage renal disease, retinopathy, and aortic aneurysm.<sup>3</sup>
- The diagnosis and management of hypertension cost \$63.5 billion in 2006, including \$47.5 billion in direct medical expenses and \$16 billion in lost productivity.<sup>3</sup>
- Hypertension is one of the 10 most expensive health conditions for U.S. employers. Its complications are a major cause of preventable absenteeism, reduced productivity, and disability.<sup>4</sup>
- Screening for hypertension allows clinicians to identify affected patients and begin treatment early.
- Controlling blood pressure with medications is one of the most cost-effective methods of reducing premature cardiovascular morbidity and mortality.<sup>1,5</sup> A 12 to 13-point reduction in blood pressure can reduce the number of heart attacks by 21%, strokes by 37%, and all deaths from cardiovascular disease by 25%.<sup>1</sup>

## Clinical Preventive Service Recommendations

U.S. Preventive Services Task Force Recommendation

The U.S. Preventive Services Task Force recommends that clinicians screen all adults aged 18 years and older for hypertension.<sup>6</sup>

Evidence Rating: A (Strongly Recommended/ Good Evidence)

The U.S. Preventive Services Task Force found good evidence that (1) screening for high blood pressure can identify adults at increased risk for cardiovascular disease, (2) treating high blood pressure can significantly decrease the prevalence of cardiovascular disease, and (3) the benefits of screening outweigh the harms.<sup>6</sup>

Centers for Disease Control and Prevention (CDC) Guidance

The Centers for Disease Control and Prevention (CDC) supports the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure<sup>1</sup> recommendations for blood pressure screening, prevention, and control (described in the next section).<sup>7</sup> More information on the CDC's hypertension-related guidance is available online ([www.cdc.gov/dhdsp/library/fs\\_bloodpressure.htm](http://www.cdc.gov/dhdsp/library/fs_bloodpressure.htm)).

Other Recommended Guidance

Like the U.S. Preventive Services Task Force, the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that clinicians screen all adults aged 18 years and older for hypertension.<sup>1</sup>

Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7)

Guidance for the prevention and management of hypertension is provided in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.<sup>1</sup> In this report, the Committee recommends that clinicians incorporate its recommendations into the management plans of their patient groups by (1) ensuring that screening and detection of hypertension is provided in the medical practice and community; (2) evaluating all patients with hypertension for accompanying risk factors and target organ damage; (3) promoting lifestyle management to prevent hypertension; (4) setting a target blood pressure for each patient with hypertension and monitoring progress toward that goal; (5) recognizing that a blood pressure goal of less than 130/85 mm Hg is appropriate for many patients; (6) monitoring special diseases and conditions, such as diabetes, congestive heart failure, and renal dysfunction; (7) considering combination therapy for patients with hypertension; (8) maximizing staff efforts to enhance patient adherence to hypertension therapy; and (9) encouraging patient, family, and community activities to promote healthy lifestyles and blood pressure control. In addition, clinicians should encourage persons with pre-hypertension, defined as systolic pressure of 120–139 or diastolic pressure of 80–89 mm Hg, to adopt lifestyle modifications to prevent the development of hypertension.<sup>1</sup>

*Evidence Rating:*

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure is based on peer-reviewed scientific literature, including observational studies and clinical trials (from January 1997 through April 2003), and on expert opinions from 33 national hypertension leaders.<sup>1</sup>

National High Blood Pressure Education Program Working Group on Children and Adolescents

The authors of the Fourth Report from the National High Blood Pressure Education Program Working Group on Children and Adolescents recommend that children older than 3 years have their blood pressure measured at least once during every healthcare visit.<sup>8</sup> Although the U.S. Preventive Services Task Force did not find evidence to support screening children, many professional organizations such as the American Academy of Pediatrics, the American Heart Association, and the American Medical Association (AMA) recommend that children aged 3 years and older who are seen in medical care settings should have their blood pressure measured at least once during every healthcare episode.<sup>9</sup>

*Evidence Rating:*

Not Specified

Information Sources

The recommendations and supporting information in this document came from several sources, including the:

- American Academy of Family Physicians (AAFP)
- American Academy of Pediatrics (AAP)
- American Dietetic Association
- American Heart Association
- American Medical Association (AMA)
- Centers for Disease Control and Prevention (CDC)

- Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
- National Heart, Lung, and Blood Institute (NHLBI)
- Peer-reviewed research
- U.S. Preventive Services Task Force (USPSTF)

The background and supporting information in this document is based on a compilation of research findings. All information presented in this document should be attributed to its referenced sources and should not be considered a reflection of the opinions of other organizations cited in the text.

### Condition/Disease-Specific Information

#### Explanation of Condition

Blood pressure is often expressed as two numbers — the top (systolic) number represents the pressure while the heart is beating, while the bottom (diastolic) number represents the pressure when the heart is resting between beats. Normal blood pressure is a systolic blood pressure less than 120 mm Hg and a diastolic blood pressure less than 80 mm Hg.

A person is considered to have high blood pressure (also called hypertension) when he or she has a systolic pressure of 140 mm Hg or above, a diastolic blood pressure of 90 mm Hg or above, or both.<sup>3</sup> Once hypertension occurs, it generally remains a life-long, chronic condition. A person who is being treated for high blood pressure, even though repeated blood pressure readings are recorded in the normal range, still has high blood pressure.<sup>3</sup> If treatment stops, the hypertension will almost invariably recur.

Pre-hypertension is defined as systolic pressure of 120–139 mm Hg or diastolic pressure of 80–89 mm Hg.<sup>3</sup> Persons with pre-hypertension are at increased risk of progressing to hypertension. About 28% of American adults aged 18 and older have pre-hypertension.<sup>3</sup>

Information on the classification and management of blood pressure for adults aged 18 years and older is provided in Table 1. The table lists lifestyle modification and drug therapy recommendations for adults by risk category.

**Table 1: Classification and Management of Blood Pressure for Adults Aged 18 Years and Older**

<b>Blood Pressure Classification</b>	<b>Lifestyle Modifications (e.g., Increasing Physical Activity, Reducing Dietary Salt Intake)</b>	<b>Recommended Drug Therapy for Patients Without a Compelling Indication</b>	<b>Recommended Drug Therapy for Patients With Compelling Indications (Heart Failure, Post-Myocardial Infarction, High Coronary Disease Risk, Diabetes, Chronic Kidney Disease, Recurrent Stroke)</b>
<u>Normal</u> : systolic blood pressure <120 mm Hg and diastolic pressure <80 mm Hg	Encourage		
<u>Pre-hypertension</u> : systolic blood pressure 120–139 mm Hg or diastolic pressure 80–89 mm Hg	Yes	No antihypertensive drug indicated	Drug(s) should be given for the compelling indications. Patients with chronic kidney disease or diabetes should be treated with antihypertensive drugs to achieve a blood pressure of less than 130/80 mm Hg.
<u>Stage 1 hypertension</u> : systolic blood pressure 140–159 mm Hg or diastolic pressure 90–99 mm Hg	Yes	Thiazide-type diuretics are appropriate for most patients with stage 1 hypertension. Clinicians may consider angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, $\beta$ -blockers, calcium channel blockers, or a combination of these drugs.	Drug(s) should be given for the compelling indications. Other antihypertensive drugs (diuretics, angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, $\beta$ -blockers, calcium or channel blockers) should be given as needed.
<u>Stage 2 hypertension</u> : systolic blood pressure 160 mm Hg or higher, or diastolic pressure 100 mm Hg or higher	Yes	Two-drug combinations (usually thiazide-type diuretics and angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, or $\beta$ -blockers) are recommended for most patients with stage 2 hypertension. Initial combined therapy should be used cautiously in those at risk of orthostatic hypotension.	Drug(s) should be given for the compelling indications. Other antihypertensive drugs (diuretics, angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, $\beta$ -blockers, calcium or channel blockers) should be given as needed.

**Note:** Initial treatment should be determined by the patient's highest blood pressure category (e.g., a patient with a systolic blood pressure of 110 mm Hg and a diastolic blood pressure of 90 mm Hg should be treated for stage 1 hypertension).

**Source:** Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. JAMA 2003;289:2560-72.

<p><b>Epidemiology of Condition/Disease</b></p>	<p>Nearly 1 in 3, or 65 million, adults in the United States has high blood pressure.<sup>2</sup> High blood pressure affects about 2 in 5 African-Americans, 1 in 5 Hispanics and Native Americans, and 1 in 6 Asians.<sup>3</sup> High blood pressure was the primary or a contributing cause of death for 277,000 people in the United States in 2002.<sup>3</sup></p> <p>Hypertension is the most common ambulatory care primary diagnosis in the United States and is responsible for 35 million office visits each year.<sup>1</sup> Although hypertension is the most common chronic medical condition to be treated in primary care settings, only about 34% of people with hypertension have their blood pressure controlled to a level of less than 140/90 mm Hg, and another 30% are unaware of their condition.<sup>1</sup> As a result, about two-thirds of Americans with hypertension are at increased risk of heart disease and stroke, which are both leading causes of death in the United States. They also have an increased risk of developing peripheral artery disease, end-stage renal disease, retinopathy, and aortic aneurysm.<sup>3</sup></p>
<p><b>Condition/Disease Risk Factors</b></p>	<p>Risk factors for hypertension include increased age, smoking, heavy alcohol use, family history, obesity, physical inactivity, and moderate salt intake.<sup>1,3</sup> The prevalence of hypertension in African-Americans in the United States, in people with low levels of education or low socioeconomic status, and in those who live in the southeastern United States is among the highest in the world.<sup>3</sup> The rate of fatal strokes is 1.8 times higher in blacks than whites, while their rates of death from heart disease are 1.5 times higher and of kidney disease are 4.2 times greater. These disparities are caused, in part, by their higher prevalence of hypertension.<sup>10</sup></p>
<p><b>Value of Prevention</b></p>	
<p><b>Economic Burden of Condition/Disease</b></p>	<p>The costs associated with hypertension accounted for \$63.5 billion of the total costs associated with cardiovascular diseases in 2006.<sup>3</sup> This figure includes \$47.5 billion in direct medical expenses and \$16 billion in lost productivity.<sup>3</sup> When the costs of other conditions and diagnoses attributable to hypertension were included, the direct healthcare expenses associated with hypertension were \$108.8 billion in 1998.<sup>11</sup></p>
<p><b>Workplace Burden of Condition/Disease</b></p>	<p>Hypertension is one of the 10 most expensive health conditions for U.S. employers. Its complications are a major cause of preventable absenteeism, reduced productivity, and disability.<sup>4</sup></p> <p>A recent study found that the overall economic burden of illness to employers was higher for hypertension than for nine other conditions — \$392 per eligible employee per year (based on average impairment and prevalence estimates using 2001 average hourly wages and benefits). On-the-job productivity losses (employees with uncontrolled hypertension who were less productive at work than healthy employees) accounted for 63% of this total.<sup>12</sup></p>
<p><b>Economic Benefit of Preventive Intervention</b></p>	<p>Screening, detection, and early treatment can significantly reduce the medical care costs associated with hypertension and the other diseases for which people with hypertension are at increased risk. Estimates of full economic benefits</p>

should also take into account productivity gains due to better on-the-job performance and added years of life, as well as to declines in disability, absenteeism, and employee turnover.

A meta-analysis of four trials involving more than 20,000 patients with hypertension showed that reducing their blood pressure led to a 15% reduction in major cardiovascular events, a 20% reduction in strokes, and a 10% reduction in coronary heart disease events.<sup>4</sup> According to another study, reducing blood pressure from less than 140/90 mm Hg to less than 130/85 mm Hg in high-risk individuals would increase life expectancy by 16.5–17.4 years and decrease total lifetime medical costs by \$1,450.<sup>13</sup> A third study found that total life expectancy was about 5 years longer for adults with normal blood pressure than those with hypertension.<sup>14</sup>

These studies suggest that reducing blood pressure in patients with hypertension saves money and extends life expectancy. They also suggest that the medical, economic, and human costs of untreated and inadequately controlled high blood pressure are enormous.<sup>13,15-16</sup>

Estimated Cost of Preventive Intervention

The cost of screening for blood pressure in a clinician's office as part of a routine physical examination is minimal.

Estimated Cost of Counseling and Treatment

Lifestyle counseling to promote a healthy diet and physical activity is usually the first step in preventing or treating hypertension and remains important throughout all stages of treatment. The cost for these services varies.<sup>1</sup> In 2004, the private-sector cost of preventive medicine counseling averaged \$39; approximately 95% of all paid claims fell within the range of \$0 to \$129.<sup>17</sup>

If lifestyle changes do not achieve blood pressure control, antihypertensive medications are typically used. Many types of antihypertensive medications are currently available. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure states that thiazide diuretics are among the most effective drugs for hypertension, are available in generic form, and are also among the least expensive.<sup>1,16</sup> The JNC-7 further states that more than one antihypertensive medication may be needed in order to achieve hypertension control, the combination of which should be based on the physician's treatment decisions in order to achieve the most optimal results.

The cost of follow-up or treatment-related appointments varies by type of provider, location, and practice setting.

Disease management programs and centralized blood pressure control clinics have been judged to be useful to encourage compliance with treatment and to meet treatment goals. The costs of these services also vary considerably.

Cost-Effectiveness  
and/or Cost-Benefit  
Analysis of  
Preventive  
Intervention

Controlling blood pressure with medications is one of the most cost-effective methods of reducing premature cardiovascular morbidity and mortality.<sup>1,5</sup> This is particularly true for older men and women and those with high pretreatment blood pressure levels.<sup>13,18</sup> The ALLHAT Study concluded that thiazide-type diuretics are at least as effective as newer drugs in preventing one or more forms of cardiovascular disease and are less expensive.<sup>19</sup>

### Preventive Intervention Information

Preventive  
Intervention:  
Purpose of Screening  
and Treatment

Screening for hypertension allows clinicians to identify affected patients and begin treatment early in the disease course to prevent the serious consequences of high blood pressure, including stroke, coronary artery disease, heart attack, and heart and kidney failure.<sup>1</sup>

High blood pressure is easily detectable and can be controlled by lifestyle modifications, such as increasing physical activity or reducing dietary salt intake, and a variety of medications.

Benefits and Risks of  
Intervention, Risk  
Reduction, and  
Treatment

The benefits of screening and detecting high blood pressure are substantial. Screening identifies patients with hypertension and allows them to begin treatment for their condition early in the course of the disease.

Some studies have suggested that screening for hypertension and labeling individuals as having hypertension could result in adverse psychological effects and transient increases in absenteeism.<sup>20</sup> However, these studies had inconsistent results and the causes of absenteeism related to screening and diagnosis were not well established.<sup>20</sup> The risk of false-positive classification can be reduced by multiple measurements.<sup>1</sup>

The benefit-to-harm ratio of treating hypertension overwhelmingly argues for treatment. A 12 to 13-point reduction in blood pressure can reduce the number of heart attacks by 21%, strokes by 37%, and all deaths from cardiovascular disease by 25%.<sup>1</sup> In clinical trials, antihypertensive therapy has been associated with a 35% to 40% mean reduction in stroke incidence, a 20% to 25% reduction in myocardial infarction incidence, and a decrease of more than 50% in heart failure incidence.<sup>1,21-22</sup> Providing antihypertensive medications to adults with severe hypertension reduces their odds of developing congestive heart failure by 86% and active treatment of isolated systolic hypertension in elderly patients reduces the incidence of both stroke and coronary heart disease events by 30%, coronary vascular disease by 18%, and total mortality by 13%.<sup>9,23</sup>

The side effects of antihypertensive medications (such as dizziness, lightheadedness, or fainting) can interfere with patient adherence, but side effects can usually be minimized by patient education and by modifying medications or their dosages. Serious side effects (such as fever or chills, joint or stomach pain) are rare and can be reduced or eliminated by switching medications or reducing drug dosage.<sup>20</sup> Clinicians should also discuss with their patients the benefits of adopting a healthy lifestyle (such as increasing physical activity and reducing dietary salt intake) to prevent and treat high blood pressure.<sup>1</sup>

Initiation, Cessation,  
and Interval  
Screening

Blood pressure screening should be conducted routinely among all patients aged 18 or older, or as deemed necessary by a physician. Children older than 3 years who are seen in medical care settings should have their blood pressure measured at least once during every health care episode.<sup>8-9</sup> Evidence is insufficient to determine the optimal interval for screening. Expert opinion captured in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure indicates that people with a systolic blood pressure of under 130 mm Hg and a diastolic blood pressure of under 85 mm Hg should be screened every 2 years, while people with elevated blood pressure (130/85 mm Hg or above) should be screened more frequently.<sup>1</sup>

Counseling and  
Treatment

All patients with diagnosed hypertension should be counseled and encouraged to make therapeutic lifestyle changes in order to lower their blood pressure. Many patients will also require antihypertensive drug therapy. Once this is initiated, most patients should return for follow-up and adjustment of medications at monthly intervals or less until the blood pressure goal is reached. More frequent visits are necessary for patients with stage 2 hypertension or with complicating comorbid conditions. Comorbidities such as heart failure, diabetes, and the need for laboratory tests influence the frequency of visits. Other cardiovascular risk factors should be monitored and treated to their respective goals. After blood pressure is at goal and stable, follow-up visits can usually be at 3- to 6-month intervals, or more often if necessary.<sup>1</sup>

Intervention Process  
Screening

Blood pressure screening is usually conducted in a clinician's office using an arm cuff and a calibrated sphygmomanometer (blood pressure meter). Ambulatory blood pressure measurement techniques, conducted outside of the clinical setting, can be particularly helpful in identifying patients who have elevated blood pressures only in the clinic environment, known as "white-coat hypertension."<sup>24</sup> However, due to its high costs, ambulatory blood pressure monitoring is rarely used to screen for high blood pressure.<sup>24</sup> Due to natural variability in blood pressure in humans and the possibility of equipment or observer error, the U.S. Preventive Services Task Force recommends that a diagnosis of high blood pressure be made only after two or more elevated readings are obtained on two or more occasions over a period of several weeks.<sup>9</sup>

Counseling and  
Treatment

Beginning at the initial visit with a patient who has hypertension, the clinician should counsel and encourage the patient to make therapeutic lifestyle changes — such as dietary changes, increased physical activity, tobacco avoidance, and weight control — and monitor the patient's progress. Therapy begins with lifestyle modification. If the blood pressure goal is not achieved thiazide-type diuretics should be used as initial therapy for most patients, either alone or in combination with one of the other class of medications that have also been shown in clinical trials to reduce one or more hypertensive complications.<sup>1</sup>

Persons who are diagnosed with hypertension should start a treatment plan to lower their blood pressure. Treatment plans usually include non-pharmacological therapies, pharmacological therapies, or a combination of the two.<sup>1</sup>

**Lifestyle Interventions (Initial Treatment/“First-Line” Therapy):** Healthy lifestyles are critical in preventing and managing hypertension.<sup>1</sup> Lifestyle interventions decrease blood pressure, enhance antihypertensive drug efficacy, and decrease cardiovascular risk. The major lifestyle modifications that have been shown to reduce blood pressure are listed in Table 2. They include weight reduction in obese or overweight individuals,<sup>5</sup> programs to assure adequate physical activity, and adoption of the “Dietary Approaches to Stop Hypertension Eating Plan,” which calls for reduced consumption of saturated fat, cholesterol, and total fat and increased consumption of potassium and calcium,<sup>25</sup> reduced intake of dietary sodium,<sup>26</sup> increased physical activity,<sup>27</sup> and moderation of alcohol consumption.<sup>28</sup> The Plan has been clinically proven to enhance blood pressure reduction.<sup>1</sup> Information about the “Dietary Approaches to Stop Hypertension Eating Plan” is available online ([www.nhlbi.nih.gov/health/public/heart/hbp/dash/](http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/)).

- Lifestyle modification is encouraged for those with a systolic blood pressure greater than 120 mm Hg or a diastolic blood pressure greater than 80 mm Hg.
- People with multiple coronary heart disease risk factors that place them at high risk for coronary heart disease (10-year cardiovascular event risk of 10% to 20%) should be encouraged to change their lifestyles to achieve their blood pressure goals. If lifestyle changes are unsuccessful, drug therapy should be considered.
- People with coronary heart disease (10-year cardiovascular event risk greater than 20%) need to reduce their blood pressure to the target level and should consider drug therapy *in addition to* lifestyle interventions if their systolic blood pressure exceeds 140 mm Hg or their diastolic blood pressure is higher than 90 mm Hg.

A risk assessment tool is available online (<http://hp2010.nhlbihin.net/atp/iii/calculator.asp?usertype=prof>).

Table 2: Lifestyle Modifications to Prevent and Manage Hypertension\*

Modification	Recommendation	Approximate Systolic Blood Pressure Reduction Range
Weight reduction	Maintain normal body weight (body-mass index of 18.5 to 24.9)	5–20 mm Hg per 10-kg weight loss
Adopt Dietary Approaches to Stop Hypertension eating plan	Consume a diet is rich in fruits, vegetables, and low-fat dairy products, with little saturated and total fat	8–14 mm Hg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 2.4 grams of sodium or 6 grams of sodium chloride. (6 grams of sodium equals about 1 teaspoon of table salt (sodium chloride))	2–8 mm Hg
Physical activity	Engage in regular aerobic physical activity, such as brisk walking, at least 30 minutes per day on most days of the week	4–9 mm Hg
Moderation of alcohol consumption	Limit consumption to no more than two drinks per day (1 ounce or 30 ml ethanol [e.g., 24 ounces of beer, 10 ounces of wine, or 3 ounces of 80-proof whiskey]) for most men and no more than one drink per day for women and lighter-weight persons.	2–4 mm Hg

\***Note:** For overall cardiovascular risk reduction, individuals should stop smoking. The effects of implementing these modifications depend on dose and duration.

**Source:** Dietary Approaches to Stop Hypertension. JAMA 2003;289:2560-72.

**Pharmacologic Treatment:** Lifestyle interventions may not be sufficient to reduce blood pressure in many patients. In those cases, the addition of pharmacological therapy to a treatment plan is often beneficial. In fact, most people with hypertension require two or more antihypertensive medications to achieve their target blood pressure.<sup>29-30</sup> Clinical trial outcome data indicate that several classes of drugs — including angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers,  $\beta$ -blockers, calcium channel blockers, and thiazide-type diuretics — can reduce the complications of hypertension. A detailed list of antihypertensive drugs and recommended dose ranges is provided in Table 6 of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure Express ([www.nhlbi.nih.gov/guidelines/hypertension/jncintro.htm](http://www.nhlbi.nih.gov/guidelines/hypertension/jncintro.htm)). The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that patients with pre-hypertension or stage 1 hypertension return for follow-up and adjustment of medications approximately once a month until they reach their blood pressure goal. More frequent visits are necessary for patients with stage 2 hypertension (160/90 mm Hg or higher) or who have complicating comorbid conditions.

### Other Important Information

The most effective therapy prescribed by clinicians will control hypertension only if the patient takes the prescribed medication as instructed and establishes and maintains a health-promoting lifestyle. Electronic and paper clinician decision support systems, flow sheets, feedback reminders, and involvement of nurse clinicians and pharmacists are important program components aimed at controlling hypertension.<sup>31</sup> Furthermore, cost-effective healthcare interventions to prevent and control hypertension can only be implemented if the capacity of primary health care system, policy environment, and financing enable delivery of services.<sup>32</sup>

For more information on medication adherence, please refer to Part VI of the *Purchaser's Guide*, "Leveraging Benefits: Promoting the Delivery and Use of Preventive Services."

For more information on healthy diets, refer to the National Heart, Lung, and Blood Institute (NHLBI) tipsheets which are available online ([www.nhlbi.nih.gov/chd/Tipsheets/daily.htm](http://www.nhlbi.nih.gov/chd/Tipsheets/daily.htm)).

### Strength of Evidence for the Clinical Preventive Service

The levels of evidence supporting the recommendations in this chapter is described below.

#### ***Evidence-Based Research:***

U.S. Preventive Services Task Force (USPSTF)

Strength of Evidence: A (Strongly Recommended/Good Evidence)

- The USPSTF found good evidence to support the routine screening of all adults, aged 18 and above, for hypertension.<sup>6</sup>

#### ***Recommended Guidance:***

Seventh report of Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure

Strength of Evidence: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure is based on peer-reviewed scientific literature on observational studies and clinical trials (conducted in January 1997 through April 2003) and on expert opinion from 33 national hypertension leaders.

#### ***Screening***

- The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that all adults aged 18 and above be routinely screened for hypertension.<sup>1</sup>

#### ***Treatment***

- The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that clinicians provide primary

and secondary prevention services to reduce elevated blood pressure, including lifestyle consultations and medications.<sup>1</sup>

National High Blood Pressure Education Program Working Group on Children and Adolescents

Strength of Evidence: Not Specified

*Screening*

- The National High Blood Pressure Education Program Working Group found evidence to support routine screening for hypertension in children aged 3 and older and adolescents during routine preventive care visits and at every episodic healthcare visit in medical care settings.<sup>8</sup>

This recommendation of the National High Blood Pressure Education Program Working Group is supported by the:

- American Academy of Pediatrics (AAP)
- American Heart Association (AHA)
- American Medical Association (AMA)

**Authored by:**

Matson Koffman D, Chattopadhyay S. Hypertension evidence-statement: screening and treatment. In: Campbell KP, Lanza A, Dixon R, Chattopadhyay S, Molinari N, Finch RA, editors. *A Purchaser's Guide to Clinical Preventive Services: Moving Science into Coverage*. Washington, DC: National Business Group on Health; 2006.

**References:**

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension* 2003;42:1206-52. Available from: <http://www.nhlbi.nih.gov/guidelines/hypertension/jncintro.htm>.
2. Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P. The burden of adult hypertension in the United States 1999 to 2000: a rising tide. *Hypertension* 2004;44:398-404.
3. American Heart Association. Heart disease and stroke statistics—2006 update. At-a-glance. Dallas (TX): American Heart Association; 2006. Available from: <http://www.americanheart.org/downloadable/heart/1140534985281Statsupdate06book.pdf>.
4. Goetzel RZ, Hawkins K, Ozminkowski RJ, Wang S. Top 10 physical conditions and related medical costs to employers. *J Occup Environ Med* 2003;45:5-14.
5. He J, Whelton PK, Appel LJ, Charleston J, Klag MJ. Long-term effects of weight loss and dietary sodium reduction on incidence of hypertension. *Hypertension* 2000;35:544-9.
6. U.S. Preventive Services Task Force. High blood pressure screening. Summary of recommendations/supporting documents. *Clinical Guide to Preventive Services*. 2nd Ed. Rockville (MD): Agency for Health Care Research and Quality; 2003.

7. Centers for Disease Control and Prevention. Division for Heart Disease and Stroke Prevention. Available from: <http://www.cdc.gov/dhdsp>.
8. National High Blood Pressure in Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics* 2004;114:555-576. Available from: <http://pediatrics.aappublications.org/cgi/content/extract/114/2/S2/555?maxtoshow>.
9. Berg AO, Atkins D. Screening for high blood pressure: recommendation and rationale. *Am J Prev Med* 2003;25:159-64.
10. White JV. Hypertension: nutrition management for older adults. Leawood (KS): The American Dietetic Association; 2002.
11. Hodgson TA, Cai L. Medical care expenditures for hypertension, its complications, and its comorbidities. *Med Care* 2001;39:599-615.
12. Elliott WJ, Weir DR, Black HR. Cost-effectiveness of the lower treatment goal (of JNC VI) for diabetic hypertensive patients. *Arch Intern Med* 2000;160:1277-83.
13. Franco OH, Peeters A, Bonneux L, de Laet C. Blood pressure in adulthood and life expectancy with cardiovascular disease in men and women: Life course analysis. *Hypertension* 2005;46:280.
14. Elliott WJ, Maddy R, Toto R, Bakris G. Hypertension in patients with diabetes. Overcoming barriers to effective control. *Postgrad Med* 2000;107:29-21, 35-36, 38.
15. Esposti LD, Valpiani G. Pharmacoeconomic burden of undertreating hypertension. *Pharmacoeconomics* 2004;22:907-28.
16. Fischer MA, Avorn J. Economic implications of evidence-based prescribing for hypertension: can better care cost less? *JAMA* 2004;291:1850-6.
17. Thomson Medstat. MarketScan. 2004.
18. Johannesson M, Jonsson B. A review of cost-effectiveness analyses of hypertension treatment. *Pharmacoeconomics* 1992;1:250-64.
19. The ALLHAT Study Group. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002; 288:2981-2997.
20. Screening for high blood pressure: Recommendations and rationale of the U.S. Preventive Services Task Force. Rockville (MD): Agency for Healthcare Research and Quality; 2003. Available from: <http://www.ahrq.gov/clinic/3rduspstf/highbloodsc/hibloodrr.htm>.
21. Neil B, MacMahon S, Chapman N. Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overview of randomised trials. *Lancet* 2000;356:1955-64.
22. Gueyffier F, Froment A, Gouton M. New meta-analysis of treatment trials of hypertension: improving the estimate of therapeutic benefit. *J Hum Hypertens* 1996;10:1-8.
23. Staessen JA, Gasowski J, Wang JG, Thijs L, Den Hond E, Boissel JP, et al. Risks of untreated and treated isolated systolic hypertension in the elderly: meta-analysis of outcome trials. *Lancet* 2000;355:865-72.
24. Sheridan S, Pignone M, Donahue K. Screening for high blood pressure: a review of the evidence of the U.S. Preventive Services Task Force. *Am J Prev Med* 2003;25:151-8.
25. Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *N Engl J Med* 2001;344:3-10.
26. Vollmer WM, Sacks FM, Ard J, Appel LJ, Bray GA, Simons-Morton DG, et al. Effects of diet and sodium intake on blood pressure. *Ann Intern Med* 2001;135:1019-28
27. Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure. *Ann Intern Med* 2002;136:838-43.
28. Xin X, He J, Frontini MG, Ogden LG, Motsamai OI, Whelton PK. Effects of alcohol reduction on blood pressure. *Hypertension* 2001;38:1112-7.
29. Cushman WC, Ford CE, Cutler JA, Margolis KL, Davis BR, Grimm RH, et al. Success and predictors of blood pressure control in diverse North American settings: the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *J Clin Hypertens* 2002;4:393-404.

30. Black HR, Elliott WJ, Neaton JD, Grandits G, Grambsch P, Grimm RH Jr, et al. Baseline characteristics and elderly blood pressure control in the CONVINCE trial. *Hypertension* 2001;37:12-8.
31. Balas EA, Weingarten S, Garb CT, Blumenthal D, Boren SA, Brown GD. Improving preventive care by prompting physicians. *Arch Intern Med* 2000;160:301-8.
32. Mendis S. Challenges for the management of hypertension in low-resource settings. *Ethn Dis* 2003;13(2 Suppl):s67-70.