HYPERTENSION: AN OVERVIEW

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ABSTRACT

Primary hypertension, sometimes called essential hypertension, is far more common than secondary hypertension. There are many distinct and separate causes of secondary hypertension, which requires a more thorough discussion than would be possible in a short study. Primary hypertension is primarily discussed, as well as the topics of hypertensive emergencies, isolated diastolic hypertension, and isolated systolic hypertension is briefly highlighted.
Accreditation Statement

This activity has been planned and implemented in accordance with the policies of NurseCe4Less.com and the continuing nursing education requirements of the American Nurses Credentialing Center’s Commission on Accreditation for registered nurses.

Credit Designation

This educational activity is credited for 3 hours. Nurses may only claim credit commensurate with the credit awarded for completion of this course activity.

Pharmacology content is 0.5 hours (30 minutes).

Course Author & Planner Disclosure Policy Statements

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Statement of Learning Need

Nurses in various practice settings need to know the definitions and statistics of hypertension, including the etiologies of primary and secondary hypertension, risk factors of primary hypertension, as well as the complications and treatments used for primary hypertension in order to properly educate patients to prevent and to recognize hypertension.
Course Purpose

The provide nurses with knowledge about primary hypertension and secondary hypertension, including the risk, prevention and treatment of primary hypertension.

Target Audience

Advanced Practice Registered Nurses, Registered Nurses, Licensed Practical Nurses and Nursing Associates

Course Author & Director Disclosures

Dana Bartlett, BSN, MA, MSN, CSPI, William S. Cook, PhD, Douglas Lawrence, MA, Susan DePasquale, MSN, FPMHNP-BC -all have no disclosures.

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1. Elevated blood pressure that does not have an identifiable cause is known as
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. systolic hypertension.

2. Elevated blood pressure that is caused by heart and lung disease, or other illness, is known as
   a. primary hypertension.
   b. chronic hypertension.
   c. secondary hypertension.
   d. acute hypertension.

3. If only the diastolic blood pressure is elevated when measured, then the patient is understood to have
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. systolic hypertension.

4. The majority of people who have hypertension have:
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. acute hypertension.

5. Primary hypertension is defined as:
   a. SBP > 110 mm Hg or DBP > 70 mm Hg.
   b. SBP ≥ 160 mm Hg or DBP ≥ 110 mm Hg.
   c. SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.
   d. SBP 120-139 mm Hg, DBP 80-89 mm Hg.
Introduction

Hypertension, often referred to as high blood pressure, is one of the most common chronic diseases. Approximately one in three adult Americans has hypertension. This means that 66 to 78 million Americans have the disease. Hypertension is typically and most usefully classified as primary or secondary. Primary hypertension accounts for the great majority of the cases of hypertension. The terms primary hypertension and hypertension refer to the same disease and they will be used interchangeably throughout this study.

Etiology Of Hypertension

The etiology of primary hypertension is not known. There is a genetic component to the development of the disease, but age and lifestyle factors contribute significantly to its development and progression. Secondary hypertension is much less common than primary hypertension, and in secondary hypertension there are identifiable causes. The causes of secondary hypertension include, but are not limited to:

- endocrine, neurologic, renal, and vascular diseases
- medical conditions, such as obstructive sleep apnea, rare cancers, and rare genetic diseases
- pregnancy
- drugs such as alcohol, cocaine, non-steroidal anti-inflammatory, and oral contraceptives

The majority of people who have hypertension (aside from secondary hypertension) have no characteristic signs or symptoms except for an elevated blood pressure, and this is one of the most harmful features
of the disease. Untreated, unrecognized hypertension slowly causes progressive damage to the heart, the eyes, the kidneys, the neurological system, and the vascular system and by the time the patient is symptomatic, the damage is extensive and often irreversible.

The presence of hypertension significantly increases the risk for developing cardiovascular diseases such as atrial fibrillation, coronary artery disease, congestive heart failure, myocardial infarction, stroke, renal disease, and retinopathy. Morbidity and mortality are directly related to the duration and severity of hypertension.

Hypertension cannot be cured but it can be controlled with lifestyle modifications and antihypertensive drug therapy; however, initiating and maintaining these lifestyle modifications are very difficult and patient compliance with antihypertensive drug therapy is often poor, as well. The problem is worsened because a large number of people who are at risk for developing hypertension are not screened for the disease, and many people who have been diagnosed with hypertension are not being adequately treated. As the population ages and as obesity becomes more common, the incidence of hypertension will grow.
Definitions of Hypertension

The term hypertension refers to chronic increases in blood pressure. These measured increases can be of both the systolic and diastolic blood pressure, which is called primary hypertension. If only the diastolic blood pressure is elevated when measured, then the patient is understood to have isolated diastolic hypertension. If only the systolic blood pressure is elevated when measured, then the patient is understood to have isolated systolic hypertension.

Whether a patient has primary diastolic or systolic hypertension depends on the particular level of blood pressure. Pre-hypertension is present when the systolic blood pressure and/or diastolic blood pressure are elevated, but not to a degree that is considered to fit the criteria for primary hypertension. Primary Hypertension is also divided into Stage I and Stage II, as seen below.\textsuperscript{1,2,5}

### Definitions of Hypertension

<table>
<thead>
<tr>
<th>Pre-hypertension: SBP 120-139 mm Hg, DBP 80-89 mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I hypertension: SBP $\geq$ 140-159 mm Hg or DBP $\geq$ 90-99 mm Hg</td>
</tr>
<tr>
<td>Stage II hypertension: SBP $\geq$ 160 mm Hg or DBP $\geq$ 100 mm Hg</td>
</tr>
<tr>
<td>Isolated diastolic hypertension: DBP $\geq$ 90 mm Hg and SBP $&lt; 160$ mm Hg</td>
</tr>
<tr>
<td>Isolated systolic hypertension: SBP $\geq$ 140 mm Hg and DBP $&lt; 90$ mm Hg</td>
</tr>
</tbody>
</table>

Hypertensive Emergencies

Blood pressure measurements that require immediate medical care and/or are causing significant signs and symptoms or organ damage are considered to be diagnostic of hypertensive emergencies.
Hypertensive emergencies are a spectrum of clinical presentations that are usually characterized by a systolic blood pressure > 220 mm Hg or a diastolic blood pressure > 120 mm Hg.\textsuperscript{4} The situation is considered \textit{urgent} (not necessarily an emergency) if the patient has no significant signs and symptoms and no evidence of end-organ damage.

Patients in whom the blood pressure elevation is considered to be urgent may be managed with initiation of antihypertensive therapy or a change to the existing antihypertensive therapy and outpatient follow up. Rapid control of blood pressure is typically not needed.\textsuperscript{6} If the patient has significant signs and symptoms such as chest pain, headache, or shortness of breath, or evidence of end-organ damage such as aortic dissection, hypertensive encephalopathy, intracranial hemorrhage, myocardial infarction, papilledema, or retinal hemorrhages, hospitalization and rapid control of blood pressure would be required.\textsuperscript{6,7}

\textbf{Scope of the Problem}

One in three American adults or approximately 66-78 million Americans have hypertension.\textsuperscript{1,2} It is one of the most common and well-known public health problems in the U.S., but many people who have hypertension are either unaware that they have hypertension, are not receiving treatment, or are inadequately treated.\textsuperscript{1,2,4}

The incidence of hypertension increases with age. Until age 45 men are more likely than women to have hypertension.\textsuperscript{1} As discussed in the next section, race is an important factor with hypertension. For example, hypertension is much more common in African Americans.
This population also suffers disproportionately from the complications of hypertension.

**Risk Factors And Pathogenesis Of Primary Hypertension**

Primary hypertension accounts for approximately 80%-95% of all cases of hypertension. It is a disease that is multifactorial in origin, and it is caused by genetic and environmental factors. Many of the risk factors that contribute to the development and progression of primary hypertension are closely related and cannot be easily separated.

**Genetics**

The genetic contribution to the development of hypertension is unclear. Studies that have controlled environmental factors have estimated the heritability of blood pressure to be 15%-35%, and it may be that susceptibility to end-organ damage from hypertension is also influenced by genetics. But heritability measures phenotype variability that is attributed to genetic variability; it does not mean that a specific percentage of an individual’s phenotype is caused by genetics.

Genetic abnormalities have been identified in people who have hypertension but these have not been shown to be a primary cause of the disease and because environmental factors clearly contribute to the development of primary hypertension, genetic identification of those at risk is not feasible at this time and may not be.
**Age**

Hypertension should not be considered to be an inevitable part of getting older, but the statistics of aging and hypertension are not comforting. The likelihood of developing hypertension increases as an individual ages and it has been estimated that the probability is 90% of a middle-aged or elderly person developing hypertension in his or her lifetime.¹

The high prevalence of hypertension in the elderly can be explained by a diet high in sodium, obesity, and a sedentary lifestyle.⁹ Hypertension in this age group can also be explained by physiological factors that occur during aging such as increased arterial stiffness, decreased baroreceptor sensitivity, increased activity of the sympathetic nervous system, and a decreased ability of the kidneys to excrete sodium.¹⁰

**Race**

The incidence and severity of hypertension is higher in African Americans than in other ethnic groups in the U.S.¹¹ African Americans develop hypertension at an earlier age and the rate of progression from pre-hypertension to hypertension is increased.¹¹ In addition, African Americans suffer disproportionately from the cardiovascular and renal complications of hypertension¹¹ and optimal control of blood pressure is more difficult for African Americans, even when awareness of the problem and the level of treatment are equivalent to other ethnic groups.¹²

These disparities can be partially explained by socio-economic status, suboptimal maternal nutrition that causes low birth weight, the increased incidence of obesity in the African American community,
diet, and differences in salt sensitivity. However, even when income, body mass, and diet are considered, hypertension is a particular problem for African Americans and the reasons for this are not clear.

**Obesity**

Obesity increases the risk of developing hypertension\(^{13,14}\) and weight reduction can help reduce blood pressure, but the mechanisms by which obesity contributes to the development of hypertension are not clearly understood.\(^{14}\) Insulin resistance and obstructive sleep apnea (OSA) are common in people who are obese, and there is some evidence that these are contributory causes of hypertension.\(^{15}\) However, there appears to be significant inter-individual variation in the degree to which insulin resistance, OSA, and obesity itself contribute to the risk of developing hypertension.\(^{15}\) For example, not all people who are obese develop high blood pressure. It may be the *distribution* of body fat, not body weight per se, which is the factor that determines who will or will not become hypertensive.\(^{13}\)

**Smoking**

The relationship between cigarette smoking and hypertension is complex. Cigarette smoking increases arterial stiffness,\(^{16}\) and the incidence of hypertension is increased in people who smoke more than 15 cigarettes a day.\(^{17}\) Smoking increases the risk of developing atherosclerosis and atherosclerosis and contributes to the development of hypertension.
Alcohol

Alcohol appears to be an independent risk factor for hypertension. Moderate alcohol intake may have a protective effect;\textsuperscript{18} excessive alcohol intake increases the risk of developing hypertension.\textsuperscript{18-20}

Physical Inactivity

Physical inactivity and a sedentary lifestyle increase the risk for developing hypertension,\textsuperscript{1,21,22} and a high level of fitness and physical activity are inversely associated with the development of hypertension.\textsuperscript{22}

Sodium Intake

Dietary sodium intake is closely associated with hypertension. Excess dietary sodium increases the risk of developing hypertension\textsuperscript{23} and reducing salt intake will lower blood pressure.\textsuperscript{24}

Other factors that may be risk factors for the development of primary hypertension are Vitamin D deficiency,\textsuperscript{25-27} dyslipidemia,\textsuperscript{28} low dietary intake of calcium and magnesium\textsuperscript{4} and fruits and vegetables,\textsuperscript{29} and psycho-social variables such as depression, occupational stress, personality type, sleep quality, and the individual’s level of isolation and social support.\textsuperscript{30-33}

All of the risk factors that were discussed are or may be contributing causes to the development of hypertension. How much each one influences the risk for hypertension and how they interact is not known. It is clear however that many of these risk factors such as obesity, smoking, and a sedentary lifestyle, regardless of their effect on hypertension, are very unhealthy and they are primary causes of
many other serious chronic diseases. Losing weight, smoking cessation, physical exercise, and a healthy diet improve health, lower blood pressure and may prevent hypertension, as well.

**Screening And Initial Evaluation Of Hypertensive Patients**

Screening for hypertension significantly reduces the incidence of cardiovascular events and poses very little harm. Blood pressure can be measured in a physician’s office, at home by the patient, or by using ambulatory blood pressure monitoring (ABPM). The U.S. Preventive Services Task Force (USPSTF) recommendations for blood pressure screening are outlined below.

1. Annual screening for everyone ≥ 40 years of age and for people who have risk factors for the development of hypertension.
2. The USPSTF considers a high-normal blood pressure (130-139/85-89 mm Hg), African American ethnicity, and obesity and being overweight as risk factors.
3. Adults aged 18 to 39 years with normal blood pressure (<130/85 mm Hg) who do not have other risk factors should be rescreened every 3 to 5 years.
4. The USPSTF recommends rescreening with properly measured office blood pressure and, if blood pressure is elevated, confirming the diagnosis of hypertension with ABPM.

**Ambulatory Blood Pressure Monitoring**

Ambulatory blood pressure monitoring is considered to be the most accurate method for diagnosing hypertension, it is the preferred technique for diagnosing hypertension, and it is especially helpful
at detecting masked hypertension.\textsuperscript{37} A portable blood pressure monitor device is worn by the patient and the measurements are recorded at fixed intervals for 24-48 hours, sometimes less.

**Home Measurement**

Home measurement of blood pressure with an automated device is an acceptable method for detecting hypertension. The technique is the same as off-based measurement (discussed below). It is recommended that at least 12-14 measurements should be taken during the day and the evening\textsuperscript{35} but there is no consensus about the optimal schedule.\textsuperscript{38}

**Office-based Measurement**

Office-based measurement of blood pressure for hypertension screening requires proper technique to obtain accurate results. Close attention must be paid to the following details when performing office-based blood pressure measures.\textsuperscript{35}

**Cuff Size**

Incorrect cuff size can result in an inaccurate reading. The American Heart Association (AHA) recommendations for cuff size are: 1) Upper arm circumference 22-26 cm, small adult cuff/12 x 22 cm, 2) Upper arm circumference 27-34 cm, adult cuff/16 x 30 cm, 3) Upper arm circumference 35-44 cm, large adult cuff/16 x 36 cm, and 4) Upper arm circumference 45-52 cm, adult thigh cuff/16 x 42 cm.\textsuperscript{39}
**Cuff Placement and Inflation/Deflation**

The cuff bladder should be midline over the brachial artery and it should not be placed over clothing. Place the cuff so that the stethoscope does not touch the bladder; this will prevent noise from cuff deflation from interfering with an accurate measurement.

When inflating and deflating the cuff, inflate the cuff 20 mmHg above the systolic pressure; and, deflate the cuff 3 mmHg per second. Use the disappearance of sound - the Korotkoff V phase - as the diastolic pressure.

**Device**

The same device should be used for each measurement; different devices will give different results.

**Number of Measurements**

At least three measurements should be taken. It is very important that multiple readings should be taken and these readings must be separated by the appropriate length of time. This will avoid *white coat hypertension*, which is when a person experiences high blood pressure only when he or she visits their medical provider’s office, or *masked hypertension*, which is when a person’s blood pressure is normal when being measured by a medical professional but otherwise abnormally high.

**Patient Position**

The patient should be seated with the back supported, and the legs should not be crossed. If the back is unsupported or the legs are
crossed the measurement will be falsely elevated. The patient’s arm should be at the level of the heart; if the arm is below heart level the reading will be elevated.

_Time_

Each measurement in the office should be done at the same time.

_Other Variables_

The patient should be sitting for at least five minutes before a measurement is taken. There should be no smoking or ingestion of caffeine prior to the measurement. Also, the room where the patient is sitting should not be too cool, and the patient should not be talking while blood pressure is being measured. If the above variables are not observed, an elevated blood pressure could result.

When it has been confirmed that the patient has hypertension, the patient should be assessed for secondary hypertension and he or she should be evaluated for end-organ damage. Renal function should be assessed, neurologic and ophthalmologic exams should be performed, and an evaluation of the patient’s cardiovascular status should be done.

**Complications Of Hypertension**

Primary hypertension is a progressive disease and the first stage in its development is pre-hypertension. Pre-hypertension is a condition in which the blood pressure is elevated above normal levels but not to the measurements that define hypertension. In addition, the patient is asymptomatic and he or she has not yet developed organ damage.
Pre-hypertension greatly increases the risk of developing hypertension\textsuperscript{40} and by itself it is a significant risk factor for the development of cardiovascular disease and stroke.\textsuperscript{41,42} Pre-hypertension is followed by early hypertension, and by 30-50 years of age, primary hypertension is well established.

If the patient who has primary hypertension is not diagnosed and treated, he or she will eventually develop complicated hypertension and, potentially, damage to the eyes, heart, kidneys, nervous system, and central and peripheral vasculature.\textsuperscript{4} The chance of developing complications increases as the level of blood pressure elevation increases;\textsuperscript{4,43} the risk of developing heart disease doubles for every 20 mmHg increase in systolic pressure and every 10 mmHg increase in diastolic pressure.\textsuperscript{4} Complications of primary hypertension include those highlighted below.

**Atherosclerosis**

Hypertension greatly increases the risk for developing atherosclerosis,\textsuperscript{44-47} and in younger adults, hypertension contributes more to the development of atherosclerosis and cardiovascular disease than diabetes, dyslipidemia, or smoking.\textsuperscript{48}
**Stroke**

Hypertension and pre-hypertension are associated with a significant increase in the risk for stroke.\(^4\)\(^3\),\(^4\)\(^9\) The incidence of stroke increases in direct proportion to increases in blood pressure.\(^4\)

**Kidney Disease**

Hypertension is a major risk factor for the development of chronic kidney disease, and the risk of chronic kidney disease increases in direct proportion to elevations in blood pressure.\(^4\)

**Heart Disease**

Hypertension increases the risk of developing atrial fibrillation, congestive heart failure, myocardial infarction, and other cardiovascular and heart pathologies.\(^4\),\(^10\),\(^45\) Heart disease is the most common cause of death in people who have hypertension.

**Retinal Damage**

The incidence of retinopathy in patients who have hypertension has been reported to be as high as 66.3% to 80.3%,\(^50\),\(^51\) and the level of systolic blood pressure and the duration of hypertension are significant risk factors for developing retinal damage. The presence of diabetes in many hypertensive patients and the particular methods used to detect retinal damage may skew these figures but, even when these factors are considered, hypertensive retinopathy is still a problem of considerable magnitude.
Isolated Diastolic And Isolated Systolic Hypertension

Hypertension refers to elevations of both systolic and diastolic blood pressure, but elevations of diastolic pressure or systolic pressure alone are well described and isolated systolic blood pressure is relatively common.

Isolated diastolic blood pressure primarily affects adults and young men who are obese, and it is the most common form of hypertension in adults less than age 40.\textsuperscript{52,53} Isolated diastolic hypertension is strongly related to increases in cardiovascular morbidity and mortality\textsuperscript{52} and most people who have isolated diastolic hypertension will develop hypertension.\textsuperscript{54} However, the importance of isolated diastolic hypertension as a cause of hypertensive complications is not completely understood\textsuperscript{52} nor are the best treatment options.\textsuperscript{53} Patients who have isolated diastolic hypertension should be treated with lifestyle modifications, and if they are considered to be at risk for hypertensive complications and/or there is evidence of organ damage they should be treated with antihypertensive medication.\textsuperscript{53}

Isolated systolic hypertension is caused by reduced compliance and elasticity of large arteries, and it is quite common in the elderly.\textsuperscript{52} Isolated systolic hypertension is considered to be a significant cause of cardiovascular disease\textsuperscript{52} and patients who have isolated systolic hypertension should be closely monitored and treated.

Treatment Of Primary Hypertension

The benefits of treating primary hypertension are clear and significant. It has been estimated that lowering systolic blood pressure 10 mmHg and diastolic blood pressure 5 mmHg will reduce the risk of congestive
heart failure by 50%, the risk of coronary heart disease and myocardial infarction by 20%-25%, the risk of stroke by 35%-40%, and overall mortality rate by 10%-20%.45

Recommendations for the treatment of patients who have hypertension have changed and evolved. Given the complexity and multifactorial nature of the disease it is not surprising that there is some disagreement in the medical community as to who should be treated, when treatment should be started, the best therapies and medications, and what level of benefits treatment can provide. However, the basic approach to treating hypertension is essentially the same, regardless of the source of the recommendations.

This section will discuss the treatment recommendations published in 2014 by the Eighth National Joint Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, an expert panel appointed by the National Heart, Lung, and Blood Institute.55 Additionally, articles from the medical literature will be used that will provide background information on these recommendations.

Once the diagnosis of hypertension has been confirmed and goal blood pressure has been determined, treatment can begin and as with most medical conditions, it is prudent to start with simple measures first.

The first step in treating hypertension is to establish a goal blood pressure. The table below lists the goal blood pressures recommended by the 2014 Eighth National Joint Committee.55
Setting Goals for Blood Pressure

<table>
<thead>
<tr>
<th>General population: Age ≥ 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓</td>
</tr>
<tr>
<td>Systolic pressure &lt; 150 mm Hg; diastolic pressure &lt; 90 mm Hg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General population, age &lt; 60, and patients of any age who have chronic kidney disease (CKD) and/or diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓</td>
</tr>
<tr>
<td>Systolic pressure &lt; 140 mm Hg, diastolic pressure &lt; 90 mm Hg</td>
</tr>
</tbody>
</table>

### Lifestyle Modifications

Lifestyle modifications are the first intervention when treating and controlling hypertension.\(^56\) These changes must be considered to be life-long commitments. The use of antihypertensives can at times be decreased but adherence to an exercise program, moderate use of alcohol, salt restriction, smoking cessation, and maintaining optimal body weight are essential for the successful treatment of hypertension. If the risk factors are not eliminated or modified, then treating hypertension will be an uphill battle.

### Exercise

Aerobic exercise has been shown to reduce blood pressure for 24 hours post-exercise and to reduce resting blood pressure, as well.\(^57\) Patients who have hypertension should perform 30-40 minutes of moderate to vigorous aerobic exercise four to seven days a week.\(^58,59\) Resistance exercise, *i.e.*, weight lifting, is also recommended for
patients who have hypertension. However, the blood pressure lowering effects of resistance training appear to be much less than for aerobic exercise and the level of proof of its usefulness for lowering blood pressure is not as robust as for aerobic exercise.\textsuperscript{58,60}

Resistance training is still recommended for patients who have hypertension and if it is determined that resistance training can be done safely, it will not be harmful and patients should be encouraged to start a weight lifting program. Before starting an exercise program, patients should consult with a physician, especially if he or she is greater than 40 years of age, has chest pain at rest or during activity, bone or joint pain, a balance disorder, or is taking medications for hypertension or a cardiac disorder. The American College of Sports Medicine has published exercise program recommendations for people who have hypertension.

\textit{Diet}

Patients who have hypertension should be instructed to follow the Dietary Approaches to Stop Hypertension (DASH) eating pattern.\textsuperscript{4} The DASH program is a diet that stresses consumption of fruits, vegetables, whole grains, and low-fat dairy products while reducing intake of saturated fats and total fats and restricting sodium intake.

The DASH program has been shown to significantly reduce systolic and diastolic blood pressure. The guidelines of the DASH diet 2000 calorie and varied nutritional intake are outlined below.\textsuperscript{61}
DASH Diet Guidelines, 2000 Calorie Daily Diet

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>1250 mg</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>55% of daily calories</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>150 mg</td>
</tr>
<tr>
<td>Fiber</td>
<td>30 grams</td>
</tr>
<tr>
<td>Magnesium</td>
<td>500 mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>4700 mg</td>
</tr>
<tr>
<td>Protein</td>
<td>18% of daily calories</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>6% of daily calories</td>
</tr>
<tr>
<td>Sodium</td>
<td>2300 mg, 1500 mg in African American and older adults</td>
</tr>
<tr>
<td>Total fats</td>
<td>27% of daily calories</td>
</tr>
</tbody>
</table>

Weight Loss

Obesity is strongly associated with hypertension, and weight loss has been shown to produce significant reductions in blood pressure.\(^{62,63}\)

Smoking Cessation

Smoking cessation has been shown to decrease blood pressure and arterial stiffness.\(^{64-66}\)

Decreased Alcohol Consumption

The association between alcohol consumption and hypertension is strong and well established,\(^{67,68}\) and an alcohol consumption of more than 30 grams a day (a drink of alcohol is 14 grams - this is the amount of alcohol in 6 ounces of wine) is associated with an increased risk for hypertension.\(^{67}\) The mechanism by which alcohol causes
hypertension is not known, but stopping or cutting down drinking has been shown to be effective at lowering blood pressure.

**Antihypertensive Therapy**

The following recommendations are from the 2014 report by the Eighth National Joint Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. The mechanism of action of each class of drug will be discussed in the next section. Most patients who have hypertension will eventually require more than one type of drug in order to reach the blood pressure goal.

Non-black patients, no diabetes or diabetes present, no CKD:

Start therapy with a thiazide diuretic, angiotensin converting enzyme inhibitor (ACEI), angiotensin II receptor blocker (ARB), or a calcium channel blocker (CCB), alone or in combination. The ACEIs and ARBs should not be used together.

Black patients, no diabetes or diabetes present, no CKD:

Start therapy with a thiazide diuretic or a CCB.

All races, CKD present:

Start therapy with an ACEI or an ARB, alone or with another antihypertensive. The ACEIs and ARBs should not be used together.

After the patient has been started on an antihypertensive, the medications can be adjusted using one of the following strategies:

1. maximize the first medication dose before adding a second
2. add a second medication before reaching the maximum dose of the first medication
3. start with two medication classes separately or as fixed-dose combination

If the blood pressure goal is not attained using this first approach, the following extension to the above treatment recommendations should be applied.

*Reinforce Medication and Lifestyle Adherence*

For strategies 1 and 2, add and titrate thiazide-type diuretic or ACEI or ARB or CCB; use a medication not previously selected, and avoid the combined use of an ACEI and an ARB. For strategy 3, titrate doses of initial medications to the maximum. If the blood pressure goal is not attained using this approach, the following medication changes may be instituted:

- Add and titrate thiazide-type diuretic or ACEI or ARB or CCB (use a medication class previously selected, avoid combined use of an ACEI and an ARB).
- If the blood pressure goal is not attained using the above approach, a medication from another class (*i.e.*, β-blocker, aldosterone antagonist, or others) and/or refer to medical provider with expertise in hypertension management.

The drugs that are most commonly used to treat primary hypertension are the ACEIs, ARBs, beta-blockers, CCBs, and the thiazide diuretics. These medications are available as single drugs or in combination (*i.e.*, Enalapril Maleate-Hydrochlorothiazide, which is a combination of enalapril and hydrochlorothiazide). They are typically given orally but
intravenous preparations of some of them are available. Although primarily used to treat hypertension, some of them have other labeled uses, as well.

**Angiotensin Converting Enzyme Inhibitors**

The Angiotensin Converting Enzyme Inhibitors (ACEIs) currently available in the U.S. are benazepril, captopril, enalapril, lisinopril, moexipril, perindopril, quinapril, ramipril, and trandolapril. The ACEIs lower blood pressure by their effect on the renin-angiotensin system, one of the primary mechanisms of blood pressure homeostasis. These drugs inhibit the activity of the angiotensin-converting enzyme (ACE). Angiotensin converting enzyme inhibits the conversion of angiotensin I to angiotensin II, and angiotensin II is a potent vasoconstrictor.

Common side effects of the ACEIs include cough, hyperkalemia, hypersensitivity reactions, and skin rash. Angioedema is an uncommon but potentially life-threatening side effect of these drugs that can occur even after months and years of use of an ACEI. African Americans do not generally respond well to monotherapy with an ACEI.55

**Angiotensin II Receptor Blockers**

The Angiotensin II Receptor Blockers (ARBS) currently available in the U.S. are azilsartan, candesartan, irbesartan, losartan, olmesartan, telmisartan, and valsartan. The ARBs lower blood pressure by their effect on the renin-angiotensin system, and they do so by antagonizing the effect of angiotensin II at receptor sites on the blood vessels resulting in vasodilation of the peripheral vasculature. Common side effects of these drugs include dizziness, headache,
lightheadedness, and nasal congestion. Cough and angioedema are uncommon, unlike the ACEIs.

**Beta-blockers**

The beta-blockers currently available in the U.S. are acebutolol, atenolol, betaxolol, bisoprolol, carvedilol, esmolol, labetalol, metoprolol, nadolol, propranolol, nebivolol, and sotalol. The beta-blockers can be beta-selective, non-selective, some have intrinsic sympathomimetic properties, and others have alpha blocking effects, as well. The beta-blockers lower blood pressure by antagonizing the effects of catecholamines at beta-receptors in the heart and the peripheral vasculature, decreasing the force of myocardial contraction and causing vasodilation.

Beta-blocker side effects include bradycardia, bronchospasm, depression, dizziness, exercise intolerance, fatigue, hypotension, and sexual dysfunction. These drugs must be used very cautiously in patients who have asthma, diabetes, or peripheral vascular disease as they can cause bronchospasm, blunt the signs and symptoms of hypoglycemia, and aggravate and/or cause arterial insufficiency.

**Calcium Channel Blockers**

The calcium channel blockers currently available in the U.S. are amlodipine, clevidipine, diltiazem, felodipine, nicardipine, nifedipine, nisoldipine, and verapamil. Similar to the beta-blockers, the CCBs are a diverse group of medications and there are slight differences in their respective mechanisms of action. However, all of the CCBs lower blood pressure by antagonizing the movement of calcium through calcium ion channels in the conducting tissues and pathways of the heart, the
myocardium, and the peripheral vasculature, thus lowering the heart rate, decreasing the force of myocardial contraction, and causing vasodilation.

The common side effects include bradycardia, constipation, dizziness headache, hypotension, edema, fatigue, and rash.

Diuretics

There are several classes of diuretics: aldosterone receptor antagonists, carbonic anhydrase inhibitors, loop diuretics, osmotic diuretics, potassium-sparing diuretics, and thiazide diuretics. Each of these has a specific and distinct mechanism of action. The thiazide diuretics are the first choice for the treatment of primary hypertension, and those currently available in the U.S. include chlorothiazide, hydrochlorothiazide, and methylchlothiazide.

The thiazide diuretics lower blood pressure by inhibiting sodium re-absorption in the distal tubules, causing increased sodium excretion and diuresis. Common side effects of the thiazide diuretics include blurred vision, dehydration, dizziness, hypokalemia, hyponatremia, hypomagnesemia, hypotension, and orthostatic hypotension.

Other Antihypertensive Medication

There are a variety of other medications that may be used to treat hypertension when other drugs have not worked or multi-drug therapy is indicated. Alpha-1 blockers such as doxazosin and prazosin are peripheral alpha-blockers that lower blood pressure by causing dilatation of the peripheral blood vessels.
The alpha-2 agonists clonidine, guanfacine, and methyldopa reduce blood pressure by stimulating central alpha-2 receptors and decreasing sympathetic outflow from the brain. Hydralazine and minoxidil lower blood pressure by dilating arterioles. Aliskiren is a renin inhibitor that lowers blood pressure by preventing the conversion of angiotensinogen to angiotensin I.

**Alternative Therapies**

A wide variety of alternative and complementary therapies have been used to treat primary hypertension including, but not limited to, acupuncture, biofeedback, meditation, and yoga. Evidence for the effectiveness of these therapies is weak and/or conflicting, but as they are generally safe when done correctly and they may have other health benefits aside from lowering blood pressure, their use can be recommended.

**Nursing Considerations**

Approximately 52% of people who have hypertension have the condition under control and one in five adults who have hypertension are undiagnosed. There is a multitude of reasons why treatment of hypertension is suboptimal; such as, inadequate screening, poor patient compliance, incomplete patient education, unpleasant side effects of the antihypertensive medication, lack of medical and patient resources, lack of patient knowledge, and, the well documented
difficulty many people have in losing weight, stopping smoking, using alcohol in moderation and adhering to an exercise regimen.

Nurses can and should have an active role in the identification, prevention and treatment of hypertension. Patients who are at risk for developing hypertension should be encouraged to have their blood pressure checked. The nurse should assess these patients to determine if there is a family history of hypertension and if the patient has lifestyle issues such as poor diet, obesity, sedentary lifestyle, or smoking that increase the risk for developing hypertension. If these or other risk factors are present, the nurse should provide the patient with information about such deleterious lifestyle choices and with the education, referrals, resources, and support needed to make needed changes, such as setting up an exercise program, making proper dietary changes, losing weight, and smoking cessation.

If the patient has hypertension, he or she should be carefully assessed for signs and symptoms of end-organ damage, i.e., blurred vision or other ocular abnormalities, chest pain, dizziness, hematuria, numbness or tingling in the extremities, or palpitations. These patients should also be assessed for the presence of risk factors, for their level of
knowledge about how lifestyle factors can influence hypertension, and how well they understand their role in self-care.

Nursing considerations appropriate for the patient with hypertension address the following concerns: 1) deficient knowledge regarding the relationship between the treatment regimen and control of the disease process, 2) ineffective therapeutic regimen management related to medication adverse effects and difficult lifestyle adjustments, 3) ineffective coping, and 4) noncompliance with the therapeutic regimen. The following table addresses key points for patient education.

**Key Points for Patient Teaching**

- Know the blood pressure goal – ideally less than 120/80 mmHg.
- Understand which lifestyle changes are helpful in treating and preventing hypertension.
- Hypertension cannot be cured but it can be managed and patient involvement and self-care are absolutely critical.
- Know how often to follow up with the health care provider; typically, monthly until blood pressure is well controlled and every three to six months thereafter.
- Know which blood tests are important to monitor based on the medications taken.
- Maintain a record of blood pressure readings.
- Contact the healthcare provider for signs/symptoms of end-organ damage.
- To change or stop medications, or for side effects difficult to tolerate, contact the primary health care provider.
- Understand common side effects and report them to the health care provider.
- For a missed dose of medication, contact the primary health care provider, or pharmacist. Do not take an extra dose to “catch up” as this could be dangerous.
Summary

Hypertension significantly increases the risk for developing cardiovascular diseases, which include atherosclerosis, cardiac arrhythmias, congestive heart failure, myocardial infarction, stroke and organ disease. Morbidity and mortality are directly related to the duration and severity of hypertension. Hypertension is typically classified as primary or secondary. Primary hypertension accounts for the great majority of the cases of hypertension. Whereas, secondary hypertension is much less common than primary hypertension, and identifiable causes of secondary hypertension are multifactorial, such as endocrine, neurologic, renal, and vascular diseases, medical conditions (i.e., obstructive sleep apnea), pregnancy, and drug-induced.

While there is no cure for hypertension, certain lifestyle modifications and antihypertensive drug therapy can help to control it. Screening for hypertension is key to identifying those individuals at risk for having hypertension. Additionally, patient knowledge of and compliance with hypertension drug therapy and the needed lifestyle changes are important to successful treatment. Nurses have a fundamental role in educating patients on the prevention and treatment of hypertension, and in closing gaps in patient knowledge to obtain appropriate care.

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Completing the study questions is optional and is NOT a course requirement.
1. Elevated blood pressure that does not have an identifiable cause is known as
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. systolic hypertension.

2. Elevated blood pressure that is caused by heart and lung disease, or other illness, is known as
   a. primary hypertension.
   b. chronic hypertension.
   c. secondary hypertension.
   d. acute hypertension.

3. If only the diastolic blood pressure is elevated when measured, then the patient is understood to have
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. systolic hypertension.

4. The majority of people who have hypertension have:
   a. primary hypertension.
   b. isolated diastolic hypertension.
   c. secondary hypertension.
   d. acute hypertension.

5. Primary hypertension is defined as:
   a. SBP > 110 mm Hg or DBP > 70 mm Hg.
   b. SBP ≥ 160 mm Hg or DBP ≥ 110 mm Hg.
   c. SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.
   d. SBP 120-139 mm Hg, DBP 80-89 mm Hg.

6. In the beginning stages of hypertension
   a. most people experience chest pain and shortness of breath.
   b. most people are asymptomatic.
   c. most people have blurred vision and dizziness.
   d. most have mild and non-specific symptoms.
7. True or False: African Americans suffer disproportionately from hypertension.
   a. True
   b. False

8. Which of the following answers lists correctly the risk factors for hypertension?
   a. Age < 20 years, obesity, and diet high in fiber.
   b. Heavy drinking, high level of physical activity, and age.
   c. Family history, sedentary lifestyle, and abstinence from tobacco.
   d. Obesity, smoking, and excessive sodium intake.

9. Complications of primary hypertension include:
   a. Hepatic and pulmonary damage.
   b. Stroke and kidney damage.
   c. Atherosclerosis and hypokalemia.
   d. Thyroid disorders and retinopathy.

10. A diagnosis of hypertension is confirmed if the patient’s blood pressure is elevated
    a. and orthostatic changes are present.
    b. and risk factors for hypertension are present.
    c. on at least 3 separate occasions, separated by the appropriate length of time.
    d. with readings of SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.

11. Isolated systolic hypertension is very common in
    a. the elderly.
    b. African Americans
    c. people < 40 years of age.
    d. men.
12. The first intervention when treating and controlling hypertension is
   a. aggressive diuresis with a thiazide diuretic.
   b. starting therapy with an ACEI and a CCB.
   c. starting therapy with low-dose aspirin and a beta-blocker.
   d. lifestyle modifications.

13. The *first-line* drug(s) of choice for treating patients who have hypertension is/are:
   a. ACEIs and ARBs.
   b. Thiazide diuretics.
   c. Beta-blockers and loop diuretics.
   d. Vasodilators and alpha₁ blockers.

14. Hypertension can be ________ with lifestyle modifications and anti-hypertensive drug therapy.
   a. cured
   b. controlled
   c. diagnosed
   d. eliminated

15. Which of the following defines pre-hypertension?
   a. SBP ≥ 160 mm Hg or DBP ≥ 100 mm Hg
   b. SBP ≥ 140 mm Hg and DBP < 90 mm Hg
   c. SBP 120-139 mm Hg, DBP 80-89 mm Hg
   d. SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg

16. True or False: A patient who has elevated blood pressure is considered to be in a hypertension emergency.
   a. True
   b. False

17. Patients in whom the blood pressure elevation is considered to be *urgent* may be managed with
   a. hospitalization and rapid control of blood pressure.
   b. rapid control of blood pressure.
   c. maintaining the same anti-hypertensive therapy.
   d. initiation of anti-hypertensive therapy.
18. Hospitalization and rapid control of blood pressure would be required in cases where a patient has significant signs and symptoms such as

a. chest pain.
b. evidence of end-organ damage such as aortic dissection.
c. hypertensive encephalopathy.
d. All of the above

19. The most important factor related to obesity, which contributes to an increased risk of developing hypertension, appears to be

a. body weight.
b. distribution of body fat.
c. insulin resistance.
d. obstructive sleep apnea.

20. The incidence of hypertension is increased in people who smoke because smoking increases the risk of developing

a. atherosclerosis.
b. obesity.
c. encephalopathy.
d. decreased activity of the sympathetic nervous system.

21. The incidence of retinopathy in hypertension patients may be skewed by the presence of

a. metabolic syndrome.
b. sympathetic nervous system abnormalities.
c. diabetes.
d. physical inactivity.

22. The high prevalence of hypertension in the elderly can be explained physiological factors that occur during aging such as

a. increased arterial stiffness.
b. decreased activity of the sympathetic nervous system.
c. a diet high in sodium.
d. obesity.
23. Studies show that with the development of hypertension in an individual, genetic

a. factors are primary causes of the disease.
b. factors play no role.
c. factors will predict hypertension in over half the cases.
d. identification of those at risk is not feasible at this time.

24. Hypertensive emergencies are a spectrum of clinical presentations that are usually characterized by

a. SBP ≥ 160 mm Hg or DBP ≥ 100 mm Hg
b. SBP ≥ 140 mm HG and DBP < 90 mm Hg
b. SBP > 220 mm Hg or a DBP > 120 mm Hg
d. SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg

25. True or False: Until age 45 men are more likely than women to have hypertension.

a. True
b. False

26. Other factors that have been identified as possible independent contributors to the development of primary hypertension include(s)

a. high-fiber diet.
b. Vitamin D deficiency.
c. decreased activity of the sympathetic nervous system.
d. All of the above

27. The incidence of retinopathy in patients who have hypertension has been reported to be

a. due to Vitamin D deficiency.
b. statistically insignificant because retinopathy is usually caused by diabetes.
c. below 20%.
d. as high as 66.3% to 80.3%.
28. __________________ is the most common form of hypertension in adults less than age 40.

a. Isolated diastolic blood pressure  
b. Isolated systolic blood pressure  
c. Acute hypertension  
d. Genetic hypertension  

29. Isolated systolic hypertension is caused by

a. Vitamin D deficiency. 
b. decreased sympathetic neural activity. 
c. reduced compliance and elasticity of large arteries. 
d. conforming nephron mass.  

30. True or False: An alcohol consumption of more than 30 grams a day is associated with an increased risk for hypertension.

a. True  
b. False  

31. Common side effects of Angiotensin Converting Enzyme Inhibitors (ACEIs) include

a. cough.  
b. hyperkalemia. 
c. hypersensitivity reactions, and skin rash. 
d. All of the above  

32. The Angiotensin II Receptor Blockers (ARBs) lower blood pressure by their effect on

a. the renin-angiotensin system.  
b. sympathetic neural activity.  
c. hypertensive encephalopathy  
d. retinal hemorrhages.
33. **Common side effects of Angiotensin II Receptor Blockers (ARBs) include**

   a. cough.
   b. angioedema.
   c. dizziness.
   d. All of the above

34. **The nurse should assess these patients to determine if there is/are __________________________ that increase(s) the risk for developing hypertension.**

   a. a family history of hypertension
   b. lifestyle issues such as obesity
   c. lifestyle issues such as smoking
   d. All of the above

35. **True or False: Beta-blockers must be used very cautiously in patients who have asthma, diabetes, or peripheral vascular disease.**

   a. True
   b. False

**CORRECT ANSWERS:**

1. **Elevated blood pressure that does not have an identifiable cause is known as**

   a. primary hypertension.

   p. 5: “The etiology of primary hypertension is not known. There is a genetic component to the development of the disease, but age and lifestyle factors contribute significantly to its development and progression. Secondary hypertension is much less common than primary hypertension, and in secondary hypertension there are identifiable causes.”
2. Elevated blood pressure that is caused by heart and lung disease, or other illness, is known as

c. secondary hypertension.

p. 5: “The etiology of primary hypertension is not known. There is a genetic component to the development of the disease, but age and lifestyle factors contribute significantly to its development and progression. Secondary hypertension is much less common than primary hypertension, and in secondary hypertension there are identifiable causes.”

3. If only the diastolic blood pressure is elevated when measured, then the patient is understood to have

b. isolated diastolic hypertension.

p. 6: “If only the diastolic blood pressure is elevated when measured, then the patient is understood to have isolated diastolic hypertension.”

4. The majority of people who have hypertension have:

a. primary hypertension.

p. 5: “Primary hypertension accounts for the great majority of the cases of hypertension.”

5. Primary hypertension is defined as:

c. SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.

p. 7: “Stage I Hypertension: SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.”

6. In the beginning stages of hypertension

b. most people are asymptomatic.

pp. 5-6: “The majority of people who have hypertension (aside from secondary hypertension) have no characteristic signs or symptoms except for an elevated blood pressure, and this is one of the most harmful features of the disease.”
p. 16: “Pre-hypertension is a condition in which the blood pressure is elevated above normal levels but not to the measurements that define hypertension. In addition, the patient is asymptomatic and he or she has not yet developed organ damage.”

7. True or False: African Americans suffer disproportionately from hypertension.

a. True

p. 10: “The incidence and severity of hypertension is higher in African Americans than in other ethnic groups in the U.S.”

8. Which of the following answers correctly lists risk factors for hypertension?

d. Obesity, smoking, and excessive sodium intake.

See discussion at pages 9-12.

9. Complications of primary hypertension include:

b. Stroke and kidney damage.

pp. 16-17: “Complications of primary hypertension include ... Kidney disease. Hypertension is a major risk factor for the development of chronic kidney disease, and the risk of chronic kidney disease increases in direct proportion to elevations in blood pressure. Hypertension is the second leading cause of kidney failure in the U.S.”

10. A diagnosis of hypertension is confirmed if the patient’s blood pressure is elevated

c. on at least 3 separate occasions, separated by an appropriate length of time.

p. 15: “At least three measurements should be taken. It is very important that multiple readings should be taken and these readings must be separated by the appropriate length of time.”
11. Isolated systolic hypertension is very common:
   a. in the elderly.
   
   p. 18: “Isolated systolic hypertension is caused by reduced compliance and elasticity of large arteries, and it is quite common in the elderly.”

12. The first intervention when treating and controlling hypertension is
   d. lifestyle modifications.
   
   p. 20: “Lifestyle modifications are the first intervention when treating and controlling hypertension.”

13. The first-line drugs of choice for treating patients who have hypertension are:
   b. Thiazide diuretics.
   
   p. 27: “The thiazide diuretics are the first choice for the treatment of primary hypertension, and those currently available in the U.S., include chlorothiazide, hydrochlorothiazide, and methylchlothiazide.”

14. Hypertension can be _________ with lifestyle modifications and anti-hypertensive drug therapy.
   b. controlled
   
   p. 6: “Hypertension cannot be cured but it can be controlled with lifestyle modifications and anti-hypertensive drug therapy.”

15. Which of the following defines pre-hypertension?
   c. SBP 120-139 mm Hg, DBP 80-89 mm Hg
   
   p. 7: “Pre-hypertension: SBP 120-139 mm Hg, DBP 80-89 mm Hg.”
16. **True or False: A patient who has elevated blood pressure is considered to be in a hypertension emergency.**

b. False

p. 7: “Hypertensive emergencies are a spectrum of clinical presentations that are usually characterized by a systolic blood pressure > 220 mm Hg or a diastolic blood pressure > 120 mm Hg. The situation is considered urgent (not necessarily an emergency) if the patient has no significant signs and symptoms and no evidence of end-organ damage.”

17. **Patients in whom the blood pressure elevation is considered to be urgent may be managed with**

d. initiation of anti-hypertensive therapy.

pp. 7-8: “Patients in whom the blood pressure elevation is considered to be urgent may be managed with initiation of anti-hypertensive therapy or a change to the existing anti-hypertensive therapy and outpatient follow up.”

18. **Hospitalization and rapid control of blood pressure would be required in cases where a patient has significant signs and symptoms such as**

a. chest pain.
b. evidence of end-organ damage such as aortic dissection.
c. hypertensive encephalopathy.
d. **All of the above**

p. 8: “If the patient has significant signs and symptoms such as chest pain, headache, or shortness of breath, or evidence of end-organ damage such as aortic dissection, hypertensive encephalopathy, intracranial hemorrhage, myocardial infarction, papilledema, or retinal hemorrhages, hospitalization and rapid control of blood pressure would be required.”
19. The most important factor related to obesity, which contributes to an increased risk of developing hypertension, appears to be

b. distribution of body fat.

p. 11: “It may be the distribution of body fat, not body weight, which is the factor that determines who will or will not become hypertensive.”

20. The incidence of hypertension is increased in people who smoke because smoking increases the risk of developing

a. atherosclerosis.

p. 11: “Smoking increases the risk of developing atherosclerosis and atherosclerosis contributes to the development of hypertension.”

21. The incidence of retinopathy in hypertension patients may be skewed by the presence of

c. diabetes.

pp. 17-18: “The incidence of retinopathy in patients who have hypertension has been reported to be as high as 66.3% to 80.3%, and the level of systolic blood pressure and the duration of hypertension are significant risk factors for developing retinal damage. The presence of diabetes in many hypertensive patients and the particular methods used to detect retinal damage may skew these figures but, even when these factors are considered, hypertensive retinopathy is still a problem of considerable magnitude.”
22. The high prevalence of hypertension in the elderly can be explained physiological factors that occur during aging such as

a. increased arterial stiffness.

pp. 9-10: “The high prevalence of hypertension in the elderly can be explained by a diet high in sodium, obesity, and a sedentary lifestyle. Hypertension in this age group can also be explained by physiological factors that occur during aging such as increased arterial stiffness, decreased baroreceptor sensitivity, increased activity of the sympathetic nervous system, and a decreased ability of the kidneys to excrete sodium.”

23. Studies show that with the development of hypertension in an individual, genetic

d. identification of those at risk is not feasible at this time.

p. 9: “Genetic abnormalities have been identified in people who have hypertension but these have not been shown to be a primary cause of the disease and because environmental factors clearly contribute to the development of primary hypertension, genetic identification of those at risk is not feasible at this time and may not be.”

24. Hypertensive emergencies are a spectrum of clinical presentations that are usually characterized by

c. SBP > 220 mm Hg or a DBP > 120 mm Hg

p. 7: “Hypertensive emergencies are a spectrum of clinical presentations that are usually characterized by a systolic blood pressure > 220 mm Hg or a diastolic blood pressure > 120 mm Hg.”

25. True or False: Until age 45 men are more likely than women to have hypertension.

a. True

p. 8: "Until age 45 men are more likely than women to have hypertension.”
26. Other factors that have been identified as possible independent contributors to the development of primary hypertension include(s)

   b. Vitamin D deficiency.

   p. 12: “Other factors that may be risk factors for the development of primary hypertension are Vitamin D deficiency, dyslipidemia, low dietary intake of calcium and magnesium and fruits and vegetables, and psycho-social variables such as depression, occupational stress, personality type, sleep quality, and the individual’s level of isolation and social support.”

27. The incidence of retinopathy in patients who have hypertension has been reported to be

   d. as high as 66.3% to 80.3%.

   pp. 17-18: “The incidence of retinopathy in patients who have hypertension has been reported to be as high as 66.3% to 80.3%, and the level of systolic blood pressure and the duration of hypertension are significant risk factors for developing retinal damage. The presence of diabetes in many hypertensive patients and the particular methods used to detect retinal damage may skew these figures but, even when these factors are considered, hypertensive retinopathy is still a problem of considerable magnitude.”

28. ____________________________ is the most common form of hypertension in adults less than age 40.

   a. Isolated diastolic blood pressure

   p. 18: “Isolated diastolic blood pressure primarily affects adults and young men who are obese, and it is the most common form of hypertension in adults less than age 40.”
29. **Isolated systolic hypertension is caused by**

   c. reduced compliance and elasticity of large arteries.

   p. 18: “Isolated systolic hypertension is caused by reduced compliance and elasticity of large arteries, and it is quite common in the elderly.”

30. **True or False: An alcohol consumption of more than 30 grams a day is associated with an increased risk for hypertension.**

   a. True

   p. 22: “The association between alcohol consumption and hypertension is strong and well established, and an alcohol consumption of more than 30 grams a day (a drink of alcohol is 14 grams - this is the amount of alcohol in 6 ounces of wine) is associated with an increased risk for hypertension.”

31. **Common side effects of Angiotensin Converting Enzyme Inhibitors (ACEIs) include**

   d. All of the above

   p. 25: “Common side effects of the ACEIs include cough, hyperkalemia, hypersensitivity reactions, and skin rash.”

32. **The Angiotensin II Receptor Blockers (ARBs) lower blood pressure by their effect on**

   a. the renin-angiotensin system.

   p. 25: “The ARBs lower blood pressure by their effect on the renin-angiotensin system.”
33. Common side effects of Angiotensin II Receptor Blockers (ARBs) include

c. dizziness.

pp. 25-26: "The ARBs lower blood pressure by their effect on the renin-angiotensin system, .... Common side effects of these drugs include dizziness, headache, lightheadedness, and nasal congestion. Cough and angioedema are uncommon, unlike the ACEIs."

34. The nurse should assess these patients to determine if there is/are ___________________________________ that increase(s) the risk for developing hypertension.

d. All of the above

p. 29: “The nurse should assess these patients to determine if there is a family history of hypertension and if the patient has lifestyle issues such as poor diet, obesity, sedentary lifestyle, or smoking that increase the risk for developing hypertension. If these or other risk factors are present, the nurse should provide the patient with information about such deleterious lifestyle choices and with the education, referrals, resources, and support needed to make needed changes, such as setting up an exercise program, making proper dietary changes, losing weight, and for smoking cessation.”

35. True or False: Beta-blockers must be used very cautiously in patients who have asthma, diabetes, or peripheral vascular disease.

a. True

p. 26: “Beta-blocker side effects include bradycardia, bronchospasm, depression, dizziness, exercise intolerance, fatigue, hypotension, and sexual dysfunction. These drugs must be used very cautiously in patients who have asthma, diabetes, or peripheral vascular disease as they can cause bronchospasm, blunt the signs and symptoms of hypoglycemia, and aggravate and/or cause arterial insufficiency.”
References Section

The reference section of in-text citations includes published works intended as helpful material for further reading. Unpublished works and personal communications are not included in this section, although may appear within the study text.


61. Chiu S, Bergeron N, Williams PT, Bray GA, Sutherland B, Krauss RM. Comparison of the DASH (Dietary Approaches to Stop


74. Li DZ, Zhou Y, Yang YN, Ma YT, Li XM, Yu J, et al. Acupuncture for essential hypertension: a meta-analysis of randomized sham-


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