


Strategies for Managing Hypertension

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Learning Objectives

Pharmacists:

After completing this lesson, pharmacists should be able to:

- Describe the prevalence of hypertension in the US.
- Understand the clinical guidelines for hypertension treatment.
- Describe approaches to medication therapy for managing hypertension.
- List a variety of hypertension measurement devices.
- Describe patient counseling tips to help with medication compliance and adherence.

Pharmacy Technicians:

After completing this lesson, pharmacy technicians should be able to:

- Describe the prevalence of hypertension in the US.
- Understand the clinical guidelines for hypertension treatment.
- Describe why many medications may be needed to manage hypertension.
- List a variety of hypertension measurement devices.
- Describe patient medication compliance tools and devices that are available.

Hypertension remains a “silent” killer contributing to cardiovascular disease and its associated deaths among American men and women. Clinical guidelines for hypertension management, known as JNC VII, were published in 2003. The guidelines created a new class of hypertension — “prehypertension,” recognizing the importance of early control of the disease. It also introduced the concept of having patients “know their number” to provide a tool for patient self-monitoring of their condition. In this CE lesson, clinical guidelines for treating hypertension will be reviewed and patient counseling tips provided.

Nearly one in three adults has elevated blood pressure (approximately 72 million people in the United States) and up to 1 billion people worldwide. Hypertension accounts for more than 30 million physician office visits per year. While hypertension is among the most frequent diagnoses made, it is still one of the most poorly controlled conditions in the United States. Without appropriate preventive strategies, almost all American adults will ultimately develop the disease. The direct and indirect costs of CVD in the US are estimated to be \$431 billion annually, with hypertension contributing about \$67 billion.

A higher percentage of men than women have high blood pressure (HBP) until age 45. From ages 45-54, the percentage in men and women is similar. After that, a much higher number of women than men have HBP. HBP is two to three times more common in women taking oral contraceptives.

The prevalence of hypertension is higher among black people and it is increasing. From 1988–94 to 1999–2002, the prevalence of HBP in adults increased from 35.8% to 41.4% among blacks, and it was particularly high among black women, at 44.0%. Prevalence among whites also increased, from 24.3% to 28.1%.

Compared with whites, blacks develop HBP earlier in life and their average blood pressures are much higher. As a result, compared with whites, blacks have a 1.3-times greater rate of nonfatal stroke, a 1.8-times greater rate of fatal stroke, a 1.5-times greater rate of heart disease death, and a 4.2-times greater rate of end-stage kidney disease.

HBP mortality in 2004 was 54,186 (22,795 males, 31,392 females). From 1994–2004, the age-adjusted death rate from HBP increased 25.2% and the actual number of deaths rose 54.6%. The 2004 overall death rate from HBP was 17.9. Death rates were 15.6 for white males, 49.9 for black males, 14.3 for white females, and 40.6 for black females.

What is Blood Pressure?

Blood pressure (BP) allows blood to circulate through the body, providing vital organs with the oxygen and food that they need to work. When the heart beats, it pumps blood to the arteries and creates pressure in them. This pressure results from two forces. The first force is created as blood pumps into the arteries and through the circulatory system. The second is created as the arteries resist the blood flow.

Blood pressure is the pressure of the blood exerted against the walls of the arteries. The higher (systolic) number

represents the pressure when the heart is beating. The lower (diastolic) number represents the pressure when the heart is resting between beats. Optimal blood pressure is less than 120 mm Hg systolic and 80 mm Hg diastolic. High blood pressure, or hypertension, is a condition in which blood pressure levels are above the normal range. Blood pressures of 120-139 mm Hg and/or 80-89 mm Hg are considered prehypertension. It is estimated that 37.4 percent of the U.S. population age 20 and older has pre-hypertension, including 41,900,000 million men and 27,800,000 women. Blood pressure is considered high if it is 140 mm Hg and/or 90 mm Hg or higher. (See Table 1.)

HBP increases the risk for heart attack, angina, stroke, kidney failure, and peripheral artery disease (PAD). HBP may also increase the risk of developing fatty deposit in arteries (atherosclerosis). The risk of heart failure also increases due to the increased workload that HBP places on the heart.

About 69% of people who have a first heart attack, 77% who have a first stroke, and 74% with heart failure have blood pressure higher than 140/90 mm Hg. People with systolic BP of 160 mm Hg or higher and/or diastolic BP of 95 mm Hg or higher have a relative risk for stroke about four times greater than for those with normal BP. Hypertension precedes the development of heart failure in 91% of cases, and is associated with a two to three times higher risk for developing heart failure. Data from the Framingham Heart Study indicate that hypertension is associated with shorter overall life expectancy as well as shorter life expectancy free of cardiovascular disease (CVD) and more years lived with CVD.

Clearly, controlling HBP can lead to reduction in far more serious consequences and costs to both patients and society. Pharmacists have an important role to play in helping screen patients for HBP, refer them to their physicians for treatment, monitor treatment, and assist patients in getting the best use of their hypertension medications.

Awareness and Control

Data from NHANES 1999–2004 showed that of those with hypertension age 18 and older, 71.8% were aware of their condition, 61.4% were under current treatment, 35.1% had it under control and 64.9% did not have it controlled. Seventy-five percent of people who were unaware that they had HBP averaged at least three clinic visits to a doctor’s office in a year. Better identification of HBP is needed and pharmacists can help by offering HBP screenings.

JNC 7 Treatment Guidelines

In May 2003, the National High Blood Pressure Education Program Coordinating Committee of the National Heart, Lung, and Blood Institute released new guidelines for the detection, prevention, and management of hypertension. These guidelines are for adult patients 18 and older and are based on the average of two or more properly measured, seated blood pressure readings during two or more office visits.

There are a number of ways HBP is measured. At a health professional’s office, through blood pressure

monitoring in ambulatory settings, including the pharmacy, and through patient self-measurement. A brief description on each method is in Table 2.

Evaluation of patients with documented HBP has three objectives:

1. Assess lifestyle and identify other CV risk factors or concomitant disorders that affects prognosis and guides treatment.
2. Reveal identifiable causes of high BP.
3. Assess the presence or absence of target organ damage and CVD.

The JNC 7 guidelines recommend a treatment goal of less than 140/90 mmHg for people with a diagnosis of HBP. Lower blood pressure goals of less than 130/80 mmHg are set for patients with hypertension and comorbid diabetes or chronic kidney disease. Patients who have these comorbid diseases have an inflated risk for cardiovascular disease and must be treated more aggressively. Hypertension treatment goals aim to reduce CVD and renal morbidity and mortality, reduce blood pressure to under 140/90 mmHg or under 130/80 mmHg in patients with diabetes or chronic kidney disease and achieve systolic blood pressure (SBP) goals, especially in persons 50 years and older. The last treatment goal has been created because SBP is more important than diastolic blood pressure (DBP) as a CVD risk factor in this age group. A 10 mmHg reduction in systolic blood pressure can delay the need for dialysis in a 50-year old by 8 years.

Treatment Strategies

JNC 7 outlines specific components of both lifestyle modification and drug therapy treatment. The management of HBP involves the combination of nonpharmacologic treatments, such as modifications in diet, exercise, and alcohol consumption, as well as the use of individualized pharmacotherapy outlined in Table 3.

Lifestyle Modification

Lifestyle modifications play an important role in HPB treatment. The American Heart Association's recommendations for diet-related lifestyle modifications are in Table 4.

JNC-7 outlines an exercise goal of 30 minutes, three or more times per week which can lead to a BP reduction of -10.3/7.5 mmHg.

Pharmacists can serve as "coaches" to monitor patients with HBP by setting up an appointment-based medication therapy management service that includes setting and monitoring lifestyle modifications. The author notes from numerous conversations with pharmacists who have established such programs that providing information on healthier eating and "getting active" have had very positive impact on their patients. These practitioners recommend avoiding the terms "diet" and "exercise" because they may create barriers in the mind of some patients. Terms such as "healthy eating" and "getting more active" are preferable.

Pharmacologic Treatment Strategies

Pharmacotherapy for HPB involves agents from several classes of medications: diuretics, aldosterone receptor blockers, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs),

calcium channel blockers (CCBs), alpha-1 blockers, alpha-2 agonists, central alpha-2 agonists and other centrally-acting drugs, and direct vasodilators.

JNC 7 recommends thiazide-type diuretics as initial drug therapy for most, either alone or combined with other drug classes. Certain high-risk conditions are compelling indications for other drug classes. (See Table 3) Most patients will require two or more antihypertensive drugs to achieve their blood pressure goals. Combination therapy should be embraced. If blood pressure is greater than 20/10 mmHg above goal, initiation of therapy with two agents should be considered. Usually one of the agents can be a thiazide-type diuretic.

American Heart Association guidelines stress that the most benefit of antihypertensive therapy is from the lowering of BP rather than the specific drug chosen. There are differences in therapeutic approaches, however, based upon compelling indications. These are outlined in Table 5.

In spite of the availability of a wide number of brand-name and generic medications in a variety of drug classes, many patients do not have their BP under control, creating the need for new agents that are safe and effective.

In 2007 and 2008, two new blood pressure medications were approved. Tekturna® (aliskiren) from Novartis Pharmaceuticals and Bystolic™ (nebivolol, Forest Laboratories.) Tekturna is the first orally-active, direct renin inhibitor to be shown to be clinically effective for persons with hypertension. Renin, also known as angiotensinogenase, is a circulating enzyme released mainly by juxtaglomerular cells of the kidneys in response to low blood volume or low body sodium chloride content, mediated through the rapid release of prostaglandins. Renin's primary function is to cause an increase in blood pressure, leading to restoration of perfusion pressure in the kidneys and throughout the body. Tekturna is available as a 150-mg oral tablet. The recommended dosage in adults is 150 mg once daily which may be increased to a maximum of 300 mg.

Bystolic is a novel β-adrenergic receptor-blocking agent that provides significant blood pressure reductions with a favorable tolerability profile. Bystolic has a unique mechanism of action. It is a selective β-1 blocker at doses less than or equal to 10 mg per day and has the added pharmacological properties of producing vasodilation and reducing total peripheral resistance. Bystolic dosage should be individualized to the needs of the patient. Bystolic is a once-daily antihypertensive with efficacy maintained over 24 hours. For most patients, the starting dose is 5 mg once daily, with or without food, as monotherapy or in combination with other agents. For patients requiring further blood pressure reductions, the Bystolic dose can be increased in 2-week intervals up to 40 mg daily. The product is available in 2.5-mg, 5-mg, and 10-mg tablets in bottles of 30 and 100 tablets.

Pharmacists Role

Pharmacists have a number of opportunities for helping implement JNC 7 recommendations, including:

- Ø Educating those over 50 years of age on the importance identifying and managing SBP;

- Ø Identifying at-risk individuals with pre-hypertension and talking with them about lifestyle modifications to lower BP;
- Ø Recommending appropriate drug therapies to practitioners and ensuring patients are titrated to dose;
- Ø Educating patients on why multiple medications may be needed, how they work together and why adherence to their therapies is so important; and,
- Ø Providing self monitoring equipment to patients with hypertension and teaching them how to use them properly.

Patient non-compliance with hypertension medications is very common. High medication adherence with a single-tablet regimen has been linked to greater BP control. The number of unique nonantihypertensive drugs taken per patient was inversely and strongly related to a lower BP control rate. Compliance and adherence are affected by many factors, however, pharmacists can assist patients by:

- Ø Telling patients that each drug lowers blood pressure in a unique and individual manner to help achieve their blood pressure goals.
- Ø Offering patients compliance aids to assist them in adhering to their therapy or simplify dosage schedules.
- Ø Talking with patients about using automated refills if your pharmacy offers the service.
- Ø Advising patients to carry a personal medication record and develop a relationship with their pharmacist to help with medication therapy adherence.
- Ø Working closely with patients and their physicians when patients require medication therapy changes.
- Ø Reminding patients to take their medication everyday as prescribed.
- Ø Cautioning patients to see how they react to therapy before they drive, use machinery or engage in other tasks requiring alertness.
- Ø Advising patients to talk to their physician if they experience any difficulty breathing, or if any congestive heart failure symptoms get worse.

Blood Pressure Monitoring

A key message from JNC-7 is to advise patients to “know their number” and ask them their BP when they pick up their refills. Providing blood pressure monitoring in the pharmacy and helping patients self-monitor their blood pressure is an important aspect of managing HBP. An HBP monitor provides a visual reminder and a positive reinforcement tool for drug adherence. Many recent studies have shown benefits of using ambulatory blood pressure monitoring, compared with traditional clinical blood pressure monitoring.

There are different types of blood pressure monitors, all with different levels of user friendliness and accuracy. The most optimal recommendation for a home blood pressure monitoring kit would be automatic devices. Automatic devices usually come with a cuff attached to a unit that reads the patient’s blood pressure results. Three different categories of

cuff-oscillometric devices exist: the upper-arm cuff, the wrist cuff, and the finger cuff. The finger-cuff device is not recommended due to measurement inaccuracies related to vasoconstriction, alteration in BP the more distal the site of the recording, and limb positioning. Traditional wrist-cuff devices are subject to the same problems as the finger cuff in addition to problems with changing the position of the wrist. However, certain wrist BP monitors with positioning technology that only allow them to inflate when they are at heart level have been proven accurate in recently published clinical studies among adults, obese adults, and the elderly. Currently, the upper-arm cuff device has been shown to be most reliable.

When recommending a blood pressure monitoring kit, the pharmacist should consider its affordability as well as its accuracy. An up-to-date list of validated monitors is available at www.dableducational.com/accuracy_criteria.html or www.bhsoc.org/blood_pressure_list.st.

Important guidelines should be communicated to patients about self-monitoring. These include: emptying their bladder, staying quiet, being seated and resting two minutes prior to reading, taking blood pressure on both arms, taking two readings and averaging them together, being sure the cuff is placed properly on the arm, and taking the reading the same time each day. Patient should not have caffeine within 60 minutes of reading, or smoke within 30 minutes of reading. Attention to these guidelines will less common errors that are made using home blood pressure monitoring devices.

Summary

Pharmacists can play important roles in helping their patients with high blood pressure manage their condition. Serving as a partner and coach, pharmacists can provide medication therapy management services, educate patients about HBP, offer compliance tools to improve medication adherence and provide education to patients about self-monitoring their BP. Other professional and patient-related resources may be found by visiting: <http://www.nhlbi.nih.gov/guidelines/hypertension/index.htm>. Additional materials are available at www.nhlbi.nih.gov/, including brochures on the DASH eating plan and a guide to lowering BP for patients.

References available on request.

Table One
Blood Pressure Classification in Adults

Classification	Systolic Blood Pressure (mmHg)		Diastolic Blood Pressure (mmHg)
Normal	<120	and	<80
Prehypertension	120 – 139	or	80 – 89
Stage I hypertension	140 – 159	or	90 – 99
Stage II hypertension	160	or	100

Table Two
Blood Pressure Measurement

Method	Brief Description
In-office	Two readings, 5 minutes apart, sitting in chair. Confirm elevated reading in contralateral arm.
Ambulatory BP monitoring	Indicated for evaluation of “white-coat” HBP. Absence of 10–20% BP decrease during sleep may indicate increased CVD risk.
Self-measurement	Provides information on response to therapy. May help improve adherence to therapy and evaluate “white-coat” HBP.

Table 3
JNC 7: Blood Pressure Classification and Management

BP classification	SBP* mmHg	DBP* mmHg	Lifestyle modification	Initial drug therapy	
				Without compelling indication	With compelling indications
Normal	<120	and <80	Encourage		
Prehypertension	120–139	or 80–89	Yes	No antihypertensive drug indicated.	Drug(s) for compelling indications. ‡
Stage 1 Hypertension	140–159	or 90–99	Yes	Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.	Drug(s) for the compelling indications. ‡ Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.
Stage 2 Hypertension	≥160	or ≥100	Yes	Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).	Drug(s) for the compelling indications. ‡ Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.

*Treatment determined by highest BP category.

†Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

‡Treat patients with chronic kidney disease or diabetes to BP goal of < 130/80 mmHg.

Table 4
Diet-Related Lifestyle Modifications That Effectively Lower BP

Lifestyle Modification	Recommendation	BP Reduction (mmHg)
Weight loss	For overweight or obese persons, lose weight, ideally attaining a BMI <25 kg/m ² ; for nonoverweight persons, maintain desirable BMI <25 kg/m ²	-7.2/5.9
Reduced salt intake	Lower salt (sodium chloride) intake as much as possible, ideally to ≈65 mmol/d sodium (corresponding to 1.5 g/d of sodium or 3.8 g/d sodium chloride)	-5.8/2.5
DASH-type dietary patterns	Consume a diet rich in fruits and vegetables (8–10 servings/d), rich in low-fat dairy products (2–3 servings/d), and reduced in saturated fat and cholesterol	-11.4/5.5
Increased potassium intake	Increase potassium intake to 120 mmol/d (4.7 g/d), which is also the level provided in DASH-type diets	-11.4/5.5
Moderation of alcohol intake	For those who drink alcohol, consume ≤2 alcoholic drinks/d (men) and ≤1 alcoholic drink/d (women)	-4.6/2.3

Table 5
JNC Compelling Indications for Individual Drug Classes

Compelling Indication	Initial Therapy Options	Clinical Trial Basis
Heart Failure	THIAZ, BB, ACEI, ARB, ALDO ANT	ACC/AHA Heart Failure Guideline, MERIT-HF, COPERNICUS, CIBIS, SOLVD, AIRE, TRACE, ValHEFT, RALES
Post Myocardial Infarction	BB, ACEI, ALDO ANT	ACC/AHA Post-MI Guideline, BHAT, SAVE, Capricorn, EPHEBUS
High CAD Risk	THIAZ, BB, ACE, CCB	ALLHAT, HOPE, ANBP2, LIFE, CONVINCENCE
Diabetes	THIAZ, BB, ACE, ARB, CCB	NKF-ADA Guideline, UKPDS, ALLHAT
Chronic Kidney Disease	ACEI, ARB	NKF Guideline, Captopril Trial, RENAAL, IDNT, REIN, AASK
Recurrent Stroke Prevention	THIAZ, ACEI	PROGRESS