Medication Therapy Management: Optimizing Hypertension Control
By Karissa Kim, PharmD; and Stacey Frede, PharmD

Upon successful completion of this article, the pharmacist should be able to:
1. Describe the five core elements of medication therapy management.
2. Discuss the non-pharmacological options for treating hypertension and its affect on blood pressure.
3. Discuss the pharmacological options for treating hypertension.
4. Given a patient scenario, identify any medication-related problems.
5. Given a patient scenario, suggest a plan to resolve any medication-related problem.

Medication therapy management (MTM) has been broadly defined as "a distinct service or group of services that optimize therapeutic outcomes for individual patients." The rationale for implementing MTM is to promote safe and effective medication use, improve quality of care, optimize patient outcomes, and possibly reduce drug costs. National pharmacy organizations have agreed that MTM services may include any of the following, depending on patient needs:
1. Assessing patient’s health status
2. Developing a medication treatment plan
3. Selecting, initiating, modifying, or administering medication
4. Monitoring and evaluating the safety and efficacy of an individual’s drug therapy
5. Conducting a complete medication review to identify, resolve, and prevent medication-related problems, including adverse drug events
6. Documenting care and communicating important information to appropriate health care providers
7. Providing patient education to patients on their medications
8. Increasing patient adherence
9. Coordinating and integrating MTM services within the broader health care-management services being provided to the patient.

In March 2008, "Medication Therapy Management in Pharmacy Practice: Core Elements of an MTM Service Model Version 2.0" was published as an updated version to the original core elements for MTM developed in 2004. The purpose of this update is to provide a framework or model that pharmacists can follow when implementing and delivering MTM services; the intent is to promote effective and efficient delivery of MTM across pharmacy practice settings. The five core elements of MTM are shown and summarized in Table 1.

Traditionally, community pharmacists have been paid for drug dispensing services. The Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 required, for the first time, that insurers provide MTM to a subset of beneficiaries. Its implementation in January 2006, as
Medicare Part D, aided in broadening the scope of pharmacy practice. Community pharmacists have risen to the challenge and have embraced MTM services as an opportunity to provide services beyond dispensing medications. A 2008 survey showed that most pharmacists are aware of MTM and are beginning to implement MTM services as part of their practice. Of the 544 respondents in the survey, 356 (68 percent) reported offering MTM services, an increase from 63 percent in 2007. Additionally, services were more clearly defined by a greater number of respondents. Independent community and national chain pharmacies were the most common patient care settings for delivering MTM services.

When providing MTM consultations, pharmacists have the opportunity to positively impact patient outcomes associated with hypertension. By providing patient education and ensuring optimal pharmacotherapy, pharmacists can help patients reach optimal blood pressure control. The purpose of this article is to provide an overview of hypertension and illustrate the skills necessary for performing MTM services for a patient with hypertension.

**HYPERTENSION: A QUICK REVIEW**

Blood pressure is the force that is created when the heart pumps blood into the blood vessels. In patients with uncontrolled hypertension, the pressure increases the workload of the heart and adds stress to blood vessels and organs. The risks of high blood pressure are well known; it increases the risk for total mortality as well as death due to heart disease, stroke, heart failure and kidney disease. Moreover, hypertension increases morbidity associated with nonfatal cardiovascular events. Of the more than 2.4 million deaths in 2005, hypertension was listed as the primary reason for death of approximately 57,000 Americans and the primary or contributing cause of death in 319,000. The direct and indirect cost of hypertension for 2009 is estimated at $73.4 billion. It is important to implement strategies to improve hypertension control because the mortality, morbidity, and cost associated with poorly controlled blood pressure are significant. MTM services can help meet this goal.

Many patients who see the pharmacist for MTM services will have hypertension, as it is a common problem. Approximately one in three American adults, or about 74 million people in the United States age 20 and older, are hypertensive. Unfortunately, 21 percent of people with hypertension are undiagnosed because it is generally an asymptomatic condition. Roughly 79 percent of people with known hypertension are receiving treatment, but only 45 percent of patients are well controlled. Among people 80 years or older, only 38 percent of men and 23 percent of women have their blood pressure at goal. Control rates in men 60 or younger, and 60 to 79 years of age are 38 percent and 36 percent respectively. For women in the same age groups, they are 38 percent and 28 percent, respectively. Although blood pressure control rates have improved, they are still below

<table>
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<tr>
<th>Element</th>
<th>Description</th>
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<tr>
<td><strong>Medication Therapy Review (MTR)</strong></td>
<td>Interaction between a patient and pharmacist to: • Collect patient-specific information • Assess drug therapy to identify drug-related problems • Develop a list of drug-related problems and prioritize them • Create a pharmacotherapy plan to resolve drug-related problems</td>
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<tr>
<td><strong>Personal medication record (PMR)</strong></td>
<td>• Create a comprehensive record of the patient’s prescription and nonprescription medications, herbal products, and other dietary supplements. • The PMR is intended to be used by the patient.</td>
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<td><strong>Medication-related action plan (MAP)</strong></td>
<td>• A patient-specific document with a list of actions for the patient • A simple guide to track progress</td>
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<td><strong>Intervention and/or referral</strong></td>
<td>• Intervention and/or referral to resolve actual drug-related problems or prevent potential drug-related problems</td>
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<tr>
<td><strong>Documentation and follow-up</strong></td>
<td>• Document services (including interventions) in a consistent manner • Schedule follow-up based on the patient’s medication-related needs</td>
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the Healthy People 2010 goal of 50 percent especially in people over 60.

To effectively provide MTM services, pharmacists must first possess appropriate knowledge. The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC) evaluates available literature and provides guidelines on treating hypertension. The seventh edition (JNC 7), the most recent guideline, was published in 2003. JNC 8 will be available for public review and comment by December 2009, and the expected release date is spring 2010. A brief summary of the JNC 7 report is provided below.

The JNC 7 guideline delineates the classification of high blood pressure for adults. To diagnose and classify high blood pressure, the average of two or more blood pressure readings at two or more separate visits should be used. Normal blood pressure is a systolic blood pressure (SBP) less than 120 mmHg and a diastolic blood pressure (DBP) less than 80 mmHg. Patients with SBP between 120–139 mm Hg or DBP between 80–89 mm Hg are classified as having pre-hypertension; these individuals are at increased risk for developing hypertension. High blood pressure is defined as SBP >140 mmHg or DBP >90 mmHg, or taking antihypertensive medication. The degree of BP elevation determines whether a patient has stage 1 or 2 hypertension. SBP between 140–159 mmHg or DBP between 90–99 mmHg is classified as stage 1 hypertension. Stage 2 hypertension is defined as SBP of 160 mmHg or higher or DBP of 100 mmHg or higher. Regardless of the severity, elevated blood pressure can lead to significant complications if not optimally treated.

Hypertension is often clinically silent and is therefore termed a "silent killer." Some symptoms that may occur in patients with high blood pressure are flushing, sweating, and blurred vision. However, hypertension is generally asymptomatic. A majority of patients (approximately 90 percent) with hypertension have essential or primary hypertension where the exact etiology is unknown. Secondary hypertension is where a definitive cause for elevated blood pressure can be identified such as pheochromocytoma, Cushing’s disease, sleep apnea or renovascular disease. Only a minority of patients have secondary hypertension.

MANAGING HYPERTENSION (NON-PHARMACOLOGIC APPROACH)

Lifestyle Modifications

Lifestyle modifications are helpful in reducing blood pressure as well as other cardiovascular risk factors. Although lifestyle modifications alone may not control hypertension, they may enhance blood pressure control and may reduce the number and dosage of antihypertensive medications. All patients, regardless of risk status, should be encouraged to modify their lifestyle.

<table>
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<th>Table 2: Management of Blood Pressure for Adults</th>
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<tr>
<td><strong>Initial Drug Therapy</strong></td>
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<td><strong>Lifestyle Modification</strong></td>
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<td>Prehypertension</td>
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<td>Stage 1</td>
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<td>Stage 2</td>
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**Sodium Reduction**

Sodium intake is positively correlated with the level of blood pressure, and excessive sodium intake plays a part in the development of hypertension. Sodium reduction can lower blood pressure by 2–8 mmHg. To help lower blood pressure, JNC 7 recommends moderate sodium reduction to no more than 2.4 g of sodium or 6 g of sodium chloride.

**Weight Reduction**

Obesity is strongly associated with increased blood pressure. Upper body obesity, for example, is commonly linked with hypertension. A 10 kg weight loss can lower systolic blood pressure by 5–20 mm Hg. Moreover, weight reduction may augment the efficacy of antihypertensive drugs and decrease cardiovascular risk factors, such as diabetes and hyperlipidemia. All patients with hypertension should be encouraged to maintain normal body weight.

**Regular Physical Activity**

Increased physical activity should be strongly encouraged in patients with hypertension. Regular aerobic physical activity helps with weight loss and improves the overall cardiovascular status. Regular aerobic exercises, such as 30 to 45 minutes of brisk walking most days of the week, is recommended and has been shown to lower systolic blood pressure by 4-9 mmHg.

**Smoking Cessation**

Smoking cigarettes and cigars can raise blood pressure. For those who smoke, quitting can reduce overall cardiovascular risk. People who continue smoking may not obtain complete protection against cardiovascular disease from antihypertensive agents. Reducing overall nicotine consumption in general (such as chewing tobacco) is also helpful.

**Moderation of Alcohol Consumption**

Excessive alcohol intake can be a risk factor for hypertension and stroke. It can also decrease responsiveness to antihypertensive therapy. Moderate daily consumption of any type of alcohol has clearly been associated with lower mortality and morbidity from coronary disease. For most men, JNC 7 recommends consuming no more than 24 ounces of beer, eight ounces of wine, or two ounces of 100-proof whiskey. For women or lighter weight persons, no more than one drink per day is recommended (no more than 12 ounces of beer, four ounces of wine, and one ounce of whiskey). These amounts can lower systolic blood pressure by 2–4 mmHg.

**Dietary Approaches to Stop Hypertension (DASH) Diet.**

The DASH eating plan consists of limiting saturated fat and cholesterol, along with even further sodium restriction to no more than 1,600 mg. This diet recommends eating foods rich in nutrients that are expected to lower blood pressure, mainly minerals (such as potassium, calcium, and magnesmum), protein, and fiber. Patients should also consume a diet rich in fruits and vegetables. The DASH eating plan can reduce SBP by 8–14 mmHg.

**PHARMACOTHERAPEUTIC APPROACH HYPERTENSION MANAGEMENT**

Lifestyle modifications should be implemented first and are recommended for both treatment and prevention of hypertension. If lifestyle modifications alone do not achieve goal blood pressure, medication therapy should be started. Numerous, effective antihypertensive agents are available from which practitioners can choose. Table 2 shows the recommendations for initiating drug therapy and which drug to choose. When considering which drug to use initially, each class of agents has advantages and disadvantages. (See Table 3.) Antihypertensive agents may have pharmacologic effects that are favorable or unfavorable for certain comorbid disease states. For example, thiazide diuretics can cause hypercalcemia and may be beneficial in patients with osteoporosis. In contrast, diuretics can cause hyperuricemia and may be unfavorable in patients with gout. Selection of drug therapy should therefore be individualized, taking into consideration the patient’s medical history.

For certain co-existing diseases, clinical data supports the use of a specific antihypertensive drug for treating hypertension and the co-existing disease. The JNC 7 report refers to these situations as compelling indications. For example, angiotensin converting enzyme inhibitors (ACE-I) have been shown to sig-
significantly reduce morbidity and mortality in patients with systolic heart failure. Therefore, patients with co-existing heart failure and hypertension should be placed on an ACE-I, as long as there are no contraindications. Without a compelling indication and stage 1 hypertension, a thiazide-type diuretic is recommended initially. The clinician may consider an ACE-I, angiotensin receptor blocker (ARB), beta-blocker (BB), calcium channel blocker (CCB), or a combination product as an alternative. Without a compelling indication and stage 2 hypertension, a two-drug combination regimen may be necessary for most patients. The combination of a thiazide diuretic and an ACEI, ARB, BB, or CCB is usually recommended. With a compelling indication, antihypertensive drugs for the compelling

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<tr>
<th>Compelling Indications</th>
<th>Effect on comorbid condition</th>
<th>Common or severe adverse effects</th>
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<td><strong>Diuretics</strong></td>
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<td>Thiazide diuretics</td>
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<td>chlorothalidone (generic)</td>
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<td>hydrochlorothiazide indapamide (Lozol)</td>
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<td>metolazone (Mykrox, Zaroxolyn)</td>
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<td>Loop diuretics</td>
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<td>bumetanide (Bumex)</td>
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<td>furosemide (Lasix)</td>
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<td>torsemide (Demadex)</td>
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<td><strong>Beta-blockers</strong></td>
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<td>atenolol (Tenormin)</td>
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<td>betaxolol (Kerlone)</td>
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<td>bisoprolol (Zebeta)</td>
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<td>metoprolol (Lopressor)</td>
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<td>metoprolol extended release (Toprol XL)</td>
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<td>nadolol (Corgard)</td>
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<td>propranolol long-acting (Inderal LA)</td>
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<td>timolol (Blocadren)</td>
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<td><strong>Angiotensin-converting enzyme inhibitors</strong></td>
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<td>quinapril (Accupril)</td>
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<td>ramipril (Altace)</td>
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<td>trandolapril (Mavik)</td>
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<td><strong>Angiotensin II receptor antagonists</strong></td>
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<td>candesartan (Atacand)</td>
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<td>valsartan ( Diovan)</td>
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Table 3: Compelling Indications, Effect on Comorbid Conditions and Adverse Effect Profiles of Commonly Used Antihypertensive Agents

- Hypercalcemia
- Hypokalemia
- Hypomagnesemia
- Hyperuricemia
- Hyperlipidemia
- Increased urination
- Photosensitivity
- Sexual dysfunction
- Gout flare
- Bradycardia
- Decreased exercise tolerance
- Fatigue
- Depression
- Sexual dysfunction
- Bronchospasm
- Cough
- Angioedema
- Hyperkalemia
- Taste disturbance
- Renal failure
- Hyperkalemia
- Taste disturbance
- Renal failure
indication should be used. For example, a compelling indication for using an ACE-I or ARBs is diabetes. Table 3 lists the compelling indications for various antihypertensive agents.

Patients with hypertension often need two or more medications to reach their blood pressure goals. If the blood pressure is not controlled with adequate doses of a single drug, another antihypertensive agent from a different class should be added. If the blood pressure is more than 20/10 mmHg above goal, a 2-drug regimen should be considered at the outset. A reasonable timeframe for follow-up and adjustment of medications is monthly, although shorter intervals for follow-up may be appropriate in patients with stage 2 hypertension. Clinicians should modify drug therapy by adjusting dosages or adding additional drugs until goal blood pressure is reached. Patients with difficult to control hypertension can be referred to a specialist.

### Table 3: Compelling Indications, Effect on Comorbid Conditions and Adverse Effect Profiles of Commonly Used Antihypertensive Agents — Continued

<table>
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<tr>
<th>Compelling Indications</th>
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<tbody>
<tr>
<td><strong>Non-dihydropyridine Calcium channel antagonists</strong></td>
<td>Diabetes High coronary disease risk</td>
<td>• Bradycardia • Constipation (verapamil) • Headache • Nausea</td>
</tr>
<tr>
<td>Diltiazem extended release (Cardizem CD, Dilacor XR, Tiazact†)</td>
<td>FAVORABLE: angina, atrial fibrillation/tachycardia, diastolic heart failure, migraine headache</td>
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<tr>
<td>Verapamil immediate release (Calan, Isoptin†)</td>
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<td>Verapamil long acting (Calan SR, Isoptin SR†)</td>
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<td>Verapamil (Coer, Covera HS, Verelan PM)</td>
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| **Dihydropyridine Calcium Channel Blockers** | FAVORABLE: angina, isolated systolic hypertension, Raynaud’s syndrome | Reflex tachycardia • Peripheral edema • Headache • Flushing • Proteinuria • Gingival hyperplasia |
| Amlodipine (Norvasc) | |
| Felodipine (Plendil) | |
| Isradipine (Dynacirc CR) | |
| Nicardipine sustained release (Cardene SR) | |
| Nifedipine long-acting (Adalat CC, Procardia XL) | |
| Nisoldipine (Sular) | |

| **Alpha-antagonists** | FAVORABLE: benign prostatic hyperplasia, dyslipidemia | Postural hypotension • Headache • Weakness |
| Doxazosin (Cardura) | |
| Prazosin (Minipress) | |
| Terazosin (Hytrin) | |

### ANTIHYPERTENSIVE AGENTS

#### Diuretics

Diuretics decrease blood pressure by reducing peripheral vascular resistance. Thiazide diuretics are preferred for treating hypertension and are very cost effective. Along with the compelling indications for diuretics, patients with isolated systolic hypertension and African-Americans respond particularly well to diuretics. Thiazide diuretics can cause hypercalcemia and may be beneficial in osteoporosis by slowing down bone demineralization. Low doses of thiazide diuretics (hydrochlorothiazide ≤ 25 md/day) do not cause significant metabolic disturbances such as hyperlipidemia, hyperglycemia, and hyperuricemia, although higher doses may affect these parameters. For patients with poor renal function (estimated creatinine clearance ≤ 30
ml/min), a loop diuretic is preferred because thiazides may not be effective.

**Beta-Blockers**

Beta-blockers reduce blood pressure by decreasing heart rate and cardiac output and inhibiting renin release. In addition to the compelling indications, beta-blockers can also be beneficial in patients with atrial tachycardia or fibrillation, essential tremor, hyperthyroidism, migraine headaches, and preoperative hypertension. On the other hand, beta-blockers may aggravate asthma, reactive airway disease, heart block, and peripheral arterial disease, and these agents should be used cautiously in these patients. African-Americans tend to respond less to beta-blockers as monotherapy; thus, beta-blockers may not be the best initial agent to use in this population.

**Angiotensin Converting Enzyme (ACE) Inhibitors**

ACE inhibitors work by decreasing angiotensin II levels, a potent vasoconstrictor, and increasing bradykinin levels, a potent vasodilator. Caucasians respond exceptionally well to ACE inhibition because they tend to have high renin levels. On the other hand, African-Americans tend to have low renin levels and respond less to ACE inhibition. Because ACE inhibitors have been shown to cause fetal death, they are absolutely contraindicated during pregnancy. These agents should be used cautiously in women of childbearing age, and adequate birth control methods must be stressed if used. Furthermore, ACE inhibition may aggravate renovascular disease and should be avoided in this population.

**Angiotensin II Receptor Blockers**

ARBs work by blocking angiotensin II at the receptor site. They have similar benefits and contraindications as with ACE inhibitors. These agents have a lower incidence of cough, and they are an option in those who develop ACE induced cough.

**Calcium Channel Blockers (CCB)**

CCBs reduce the influx of calcium responsible for cardiac and vascular smooth muscle contraction. Verapamil works mainly on the myocardium, dihydropyridine CCBs work on the vasculature, and diltiazem affects both cardiac and vascular smooth muscles. African-Americans respond particularly well to CCBs. Long-acting dihydropyridine CCBs are a good option in those with isolated systolic hypertension. CCBs may also be beneficial in patients with angina, diastolic heart failure, migraine, atrial tachycardia and atrial fibrillation. There is limited data that non-dihydropyridine CCBs are also renal protective. On the other hand, diltiazem and verapamil should be avoided in those with congestive heart failure.

**Alpha1-Blockers**

Peripheraly acting, selective alpha1-blockers such as doxazosin, prazosin, and terazosin reduce blood pressure by inducing vasodilation. In addition to lowering blood pressure, alpha1-blockers are highly effective in treating the symptoms of benign prostatic hyperplasia. Data indicate, however, that alpha1-blockers are less effective than traditional agents like diuretics in treating hypertension. The Antihypertensive and Lipid Lowering treatment to Prevent Heart Attack Trial (ALLHAT) was stopped early because the study drug, doxazosin, was found to be less effective in reducing some forms of cardiovascular disease. Doxazosin users had 25 percent more cardiovascular events and were twice as likely to be hospitalized for congestive heart failure. Alpha1-blockers should not be used as an initial agent or monotherapy in treating hypertension as better alternatives are available. They should only be used in combination with other primary antihypertensive agents.

**Direct Renin Inhibitors**

Aliskiren, a direct renin inhibitor, is the newest class of antihypertensive agent. The extent of blood pressure lowering with aliskiren is similar to ACE-I, ARBs and CCBs. The adverse effects and cautions with aliskiren are similar to ACE-I and ARBs; it is contraindicated during pregnancy.

**Others**

Centrally acting 2-agonists such as clonidine and methyldopa and direct vasodilators such as hydralazine and minoxidil are other options available in the treatment of hypertension. These agents are reserved for resistant cases due to their adverse effect profile.
TREATMENT GOALS
Ultimately, the goal of treating hypertension is to reduce morbidity and mortality. Extensive clinical data support the fact that lowering blood pressure reduces total mortality, stroke, myocardial infarction, heart failure, and chronic kidney disease. The JNC 7 guidelines recommend that the target blood pressure for most patients is less than 140/90 mmHg. In patients with diabetes or kidney disease, the target blood pressure goal is 130/80 mmHg. Despite extensive emphasis on treating hypertension, hypertension control rates are still suboptimal. Health care providers, including pharmacists, should ensure that patients are reaching their blood pressure goals.

PATIENT COUNSELING GUIDE
To optimize hypertension control, patient education and counseling can be an important component to MTM services. The patient education session can include the following:
• Explain to patients what high blood pressure is and what the complications are.
• Emphasize optimal control to prevent complications and define the individual’s goal blood pressure.
• Counsel patients on lifestyle modifications to enhance blood pressure control.

HOME BLOOD PRESSURE MONITORING
An important part of MTM is monitoring and evaluating the patient’s response to therapy, including efficacy. Home blood pressure monitoring (HBPM) can be useful in assessing blood pressure control, and is recommended by several national organizations. Recently, a joint scientific statement from the American Heart Association, American Society of Hypertension, and Preventive Cardiovascular Nurses Association was released to endorse and call to action on use and reimbursement for home blood pressure monitoring because there is evidence to support the value of HBPM. HBPM is particularly useful in distinguishing sustained high blood pressure from “white-coat hypertension,” evaluating response to therapy, possibly improving treatment adherence, and potentially reducing cost.

In choosing a BP monitor, an accurate and properly validated automatic digital monitor is recommended. A current list of validated monitors is available on the Dabl Educational Web site (www.dableducational.org). A fully automated device with an upper arm cuff is recommended. Wrist and finger monitors are generally not recommended because they are less reliable and may be inaccurate. In an obese patient where a cuff large enough to fit around the upper arm is difficult to find, the wrist monitor provides an advantage and can be used. Automated devices in malls and supermarkets may be inaccurate, and their use is not encouraged. With home blood pressure monitoring, readings higher than 130/80 mmHg should be considered elevated in patients with diabetes, coronary heart disease, or chronic kidney disease. Readings higher than 135/85 mmHg should be considered elevated for all other patients.

As part of the MTM consultation, the pharmacist can have a critical role in helping patients select monitors and educating them on proper use. Pharmacists can discuss with patients the proper method for measuring blood pressure.
1. The size of the cuff should be appropriate (the bladder within the cuff should encircle at least 80 percent arm).
2. Patients should be seated in a chair with their backs supported and both feet should be flat on the floor. Their arms should be bared and supported at heart level.
3. Patients should not have smoked, ingested caffeine, or exercised within 30 minutes.
4. Measure blood pressure after resting for a minimum of five minutes.
5. If a repeat measurement is to be taken, wait at least one minute. BP goal is <135/85 mmHg, or <130/80 mmHg in patients with diabetes, coronary heart disease or chronic renal disease.

It is also important that the accuracy of the monitor be periodically checked by comparing simultaneous blood pressure measurements on the home device to the mercury sphygmomanometer. The average of blood pressures after two to four weeks of therapy should be used to assess the effect of treatment.

APPLYING THE KNOWLEDGE
It is important to remember to use good interviewing skills throughout the consultation.
Introduce yourself and greet the patient. Establishing a good patient-pharmacist relationship is critical; patients will be more responsive to your recommendations if you show empathy and if they notice that you are a sincere and caring professional. Prior to beginning the consultation, ask the patient if he or she has specific concerns that need to be addressed. Make sure you hear and respond to the patient’s concerns. Active listening skills should be used throughout the interaction, and your body language should also show your attentiveness. Finally, engage the patient in the consultation by using mostly open-ended questions. At times, closed-ended questions may be appropriate.

Medication Therapy Review (MTR)
Begin the MtM session by obtaining a thorough history. Initially, the pharmacist may have to gather information such as demographics, general health and activities, medical history, medication history, immunization history, and patients’ thoughts or feelings about their conditions and medication use. Based on information available to the pharmacist, the pharmacist assesses the patient’s physical and overall health status. The pharmacist may also assess the patient’s values, preferences, quality of life, and goals of therapy. The interview should include an evaluation to detect for signs or symptoms of adverse drug events. If available, the pharmacist may also interpret, monitor, and assess the patient’s laboratory values. Once an adequate history has been obtained and a thorough assessment has been performed, the pharmacist can assess if there are any drug-related problems. Medication-related problems can include the following: 1) appropriateness of each medication; 2) appropriateness of the dose and dosing regimen of each medication, including consideration of indications, contraindications, potential adverse effects, and potential problems with concomitant medications; 3) therapeutic duplication or other unnecessary medications; 4) adherence to the therapy; 5) untreated diseases or conditions; 6) medication cost considerations; and 7) health care/medication access considerations. After identifying medication-related problems, these problems should be prioritized.

It is very unlikely that all medication-related problems can be addressed at one time. More critical problems should be addressed first, and the pharmacist should develop a plan to resolve each problem. As part of MTR, pharmacists can provide education and training on the appropriate use of medications and monitoring devices and the importance of medication adherence and understanding treatment goals.

Relative to hypertension, the pharmacist should remember a few key points when conducting the MTR. During the initial interview, the pharmacist should obtain a complete medication history, evaluate the patient’s understanding of hypertension, and assess adherence to lifestyle modifications. The medication history should include a history of previously used antihypertensive agents. Next, the pharmacist should evaluate the appropriateness of drug therapy. If a compelling indication is present, the patient should be on a guideline-recommended medication unless there is a contraindication for that drug. The pharmacist should further ensure that the choice of antihypertensive is appropriate for the patient’s co-morbid conditions. Another key point to address is efficacy of antihypertensive therapy. As mentioned previously, there is room for improvement in blood pressure control rates. The pharmacist should make sure that the target blood pressure is reached; drug therapy should be adjusted if the blood pressure is not under optimal control. Another important issue is adherence to drug therapy and adverse effects of pharmacotherapy. Because hypertension is generally asymptomatic, patients may not be adherent to drug therapy if the medication causes more problems than the disease. Tolerability of antihypertensive agents should be thoroughly assessed. Finally, patient counseling and education is a critical element to the MtM session; the points previously mentioned will provide guidance on appropriate counseling.

Personal Medication Record (PMR)
Once the MTR is completed, the pharmacist should make a patient specific medication record for the patient. It can be written manually or electronically. For each medication, the name of the medication, indication, instructions for use, the ordering prescriber and contact information, and
special instructions should be included. A sample PMR can be found in the “Medication Therapy Management in Pharmacy Practice: Core Elements of an MTM Service Model Version 2.0” document.

The pharmacist can decide when to create and provide the final PMR to the patient. For example, it may not be possible to provide a complete and accurate PMR to the patient at the end of the initial appointment. Medication-related problems are often identified during the MTR and necessitate consultation with the prescribing doctor. Rather than create a PMR that is likely to change, the pharmacist may choose to contact the provider and resolve any medication-related problems. An accurate PMR can then be created after all issues are resolved. The PMR can be given to the patient during the follow-up appointment.

Medication-Related Action Plan (MAP)
The medication-related action plan is a document that contains a list of actions for the patient to use in self-management. For patients with hypertension, education about blood pressure monitoring and how to handle common side effects are an important part of MAP. A sample MAP can be found in the “Medication Therapy Management in Pharmacy Practice: Core Elements of an MTM Service Model Version 2.0” document. The pharmacist may also wish to document on the MAP the actions that will be taken on the patient’s behalf. For example, if the pharmacist will be contacting the physician, this information may be included as an action for the pharmacist to assume. Once an issue has been clarified with the physician, an updated MAP can be given to the patient during the follow-up visit showing only patient actions.

Intervention and/or Referral
If a medication-related problem is identified, the pharmacist should intervene as necessary to resolve the problem. Common interventions for patients with hypertension may include recommendations regarding OTC products or herbal medication issues, basic diet suggestions (including sodium restriction and/or the DASH diet), physical activity plans, home monitoring recommendations, proper medication administration, and adherence. The intervention may also include communicating with the patient’s prescriber to make recommendations to help get the patient to goal or choose more cost effective therapy.

Documentation and Follow-Up
Typically, documentation consists of writing a pharmacists progress note. Most clinicians use the SOAP format where the note is organized into four sections: subjective, objective, assessment, and plan.

CONCLUSION
There are numerous goals for implementing medication therapy management services. It is anticipated that MTM services will increase patient medication adherence, enhance patient understanding of medication therapy, and prevent medication-related problems. Ultimately, MTM services may help improve health outcomes. Community pharmacists have risen to the challenge and have embraced MTM services as an opportunity to provide care beyond the traditional medication dispensing functions. Many patients who visit the pharmacist for MTM services will have hypertension, and pharmacists have the opportunity to improve patient outcomes associated with this disease state.

Karissa Kim, PharmD, is an associate professor of clinical pharmacy at the University of Cincinnati College of Pharmacy. She is also a clinical ambulatory care pharmacist.

Stacey Frede, PharmD, is the residency coordinator for Kroger Pharmacy in Cincinnati and an adjunct assistant professor of Pharmacy Practice at the University of Cincinnati.

Editor’s Note: To obtain the complete list of references used in the article, contact Chris Linville at NCPA (703-838-2680) or at chris.linville@ncpanet.org.
CONTINUING EDUCATION QUIZ

Select the correct answer.

1. Which of the following is NOT a core element of MTM?
   a. Medication therapy review
   b. Medication-related action plan
   c. Personal medication record
   d. Medication-related problem

2. Which of the following statements regarding MTR is FALSE?
   a. The pharmacist should assess drug therapy to identify medication-related problems.
   b. The pharmacist should schedule follow-up based on the patient’s medication-related needs.
   c. The pharmacist should collect patient-specific information.
   d. The pharmacist should develop a prioritized list of medication-related problems

3. Which of the following does not need to be included in the PMR?
   a. Name of the medication
   b. Indication
   c. Instructions for use
   d. Cost of drug

4. What is the goal blood pressure for most patients with hypertension?
   a. < 160/90 mmHg
   b. < 140/90 mmHg
   c. < 130/80 mmHg
   d. < 120/80 mmHg

5. In treating hypertension, lifestyle modification is also necessary. Which of the following is NOT a component of lifestyle modification?
   a. Reduce sodium intake
   b. No more than two ounces of 100-proof whiskey daily
   c. Increase potassium intake
   d. Regular exercise

6. Which of the following lifestyle modifications has the potential to lower blood pressure the most?
   a. Weight reduction
   b. Adopting the DASH diet
   c. Physical activity
   d. Sodium restriction

7. Which of the following statements about the DASH diet is FALSE?
   a. The DASH plan consists of limiting saturated fat and cholesterol.
   b. The DASH plan consists of restricting sodium to no more than 1,600 mg/day.
   c. The DASH plan consists of avoiding nutrients such as potassium and calcium.
   d. The DASH plan consists of consuming a diet rich in fruits and vegetables.

8. In treating stage 2 hypertension, which of the following statements is TRUE?
   a. Without a compelling indication and stage 2 hypertension, a three-drug combination regimen, including a thiazide diuretic, is the most appropriate initial therapy.
   b. Without a compelling indication and stage 1 hypertension, a two-drug combination regimen is the most appropriate initial therapy.
   c. Without a compelling indication and stage 2 hypertension, monotherapy is the most appropriate initial therapy.
   d. Without a compelling indication and stage 2 hypertension, a two-drug combination regimen, including a thiazide diuretic, is the most appropriate initial therapy.

9. In the treatment of hypertension, there are compelling indications to use a certain drug in patients with certain comorbid diseases. Which of the following disease-drug combinations used to treat hypertension is correctly paired between a compelling indication and medication therapy?
   a. Heart failure/metoprolol
   b. Type 2 diabetes/aliskiren
   c. Chronic kidney disease/felodipine
   d. Post-myocardial infarction/verapamil
10. In the treatment of hypertension, there are compelling indications to use a certain drug in patients with certain comorbid diseases. Which of the following disease-drug combinations used to treat hypertension is a compelling indication?
   a. Heart failure/verapamil
   b. Type 2 diabetes/lisinopril
   c. Chronic kidney disease/amiloride
   d. Benign prostatic hyperplasia/doxazosin

Use the following case to answer questions 11-17.

J.S. is a 68-year-old African-American man with a history of hypertension, type 2 diabetes, arthritis, and hypercholesterolemia. He comes to your pharmacy today for an initial medication therapy management consultation. He brings in all of his prescription and nonprescription medications, herbal products, and home remedies. You begin the consultation and obtain a thorough history. These are your findings.

Subjective: He has difficulty managing all of his medications and wants to review with the pharmacist. He denies any chest pain, shortness of breath, headaches, and dizziness. He complains of erectile dysfunction that started about two months ago when his metoprolol dose was increased from 100 mg to 200 mg per day; he does not take his metoprolol regularly as a result. He does not follow a low salt diet, and eats whatever his wife prepares. He does not exercise regularly and is 40 pounds overweight. He does check his blood sugars at home (morning range 100-130 mg/dL; A1c 6.9 percent); he does not monitor blood pressure at home.

Social History: Does not smoke or drink
Allergies: Penicillin-rash; lisinopril-cough
Current Medications: rosuvastatin 20 mg at bedtime
                        metoprolol XL 200 mg daily
                        hydrochlorothiazide
                        25 mg daily
                        metformin 1,000 mg twice daily
                        pioglitazone 30 mg daily
                        acetaminophen 500 mg 2 tablets 2-3 times daily
                        aspirin 81 mg daily
                        multivitamin one daily
Past Medical History: Hypertension x 20 years
                        Type 2 Diabetes x 4 years
                        Osteoarthritis
                        Hypercholesterolemia
Past Surgical History: None

Objective:
Vitals: Blood pressure today 182/82 repeat 184/80 heart rate 68
Laboratory values: Not available; patients denies any kidney or liver disease

11. What is the goal blood pressure for JS?
   a. < 160/90 mmHg
   b. < 140/90 mmHg
   c. < 130/85 mmHg
   d. < 130/80 mmHg

12. What drug therapy recommendation is important for JS?
   a. Decrease metoprolol to 100 mg daily
   b. Stop metoprolol
   c. Switch hydrochlorothiazide to furosemide
   d. Switch to atenolol 100 mg daily
13. What is another important drug therapy recommendation for JS?
   a. Add an angiotensin-converting enzyme inhibitor
   b. Add an angiotensin II receptor blocker
   c. Add an alpha blocker
   d. Add a loop diuretic

14. What lifestyle modification(s) is/are important for JS?
   a. Stop smoking
   b. Exercise regularly
   c. Sodium reduction
   d. Both B and C

15. In counseling JS about home blood pressure monitoring, which statement is false?
   a. For JS, the target home blood pressure should be less than 135/85 mmHg.
   b. JS should rest five minutes and should not have smoked or ingested caffeine for 30 minutes before measurement.
   c. JS should use a validated, fully automated device with upper arm cuff.
   d. JS should rest the arm at heart level with back supported and feet flat on the ground.

16. Which of the following is NOT a reasonable approach to the MTM consultation?
   a. Use good interviewing technique and introduce yourself.
   b. Elicit an appropriate medication history.
   c. Use closed-ended questions to expedite the consultation.
   d. Elicit the patient’s concerns at the beginning of the consultation.

17. During the initial interview, which of the following assessment(s) should be performed by the pharmacist?
   a. The pharmacist should assess the patient’s understanding of hypertension.
   b. The pharmacist should assess adherence to drug therapy and lifestyle modifications.
   c. The pharmacist should assess tolerability of drug therapy.
   d. All of the above

After the initial interview, these are your findings.

Subjective: She denies any chest pain, shortness of breath, headaches, and dizziness. She has difficulty managing her medications and forgets to take them daily. The cost of aliskiren has been burdensome, especially when she runs out of samples. She doesn’t know what all her medications are for. She lives alone and gets “Meals on Wheels.” She is unable to exercise. She has a wrist blood pressure monitor at home but does not check it regularly.

Social History: Does not smoke or drink
Allergies: No known drug allergy
Current Medications: Pravastatin 40 mg at bedtime
                Aliskiren 150 mg daily
                Atenolol 100 mg daily
                Amiodarone 200 mg daily
                Warfarin 2 mg daily
                Levothyroxine 100 mcg daily
                Alendronate 70 mg daily
                Omeprazole 20 mg daily
                as needed

Use the following case to answer questions 16-20.

PP is an 80-year-old woman with a history of hypertension, atrial fibrillation, osteoporosis, hypercholesterolemia, gastroesophageal reflux disease, and hypothyroidism. She comes to your pharmacy today for an initial medication therapy management consultation. She brings in all of her prescription and nonprescription medications, herbal products, and home remedies.

Continue on page 57
Multivitamin one daily
Calcium carbonate 650 mg 2 times daily

Objective:
Vitals: Blood pressure today 152/82 repeat 156/78 heart rate 88

18. What is the goal blood pressure for PP?
a. < 160/90 mmHg
b. < 140/90 mmHg
c. < 130/85 mmHg
d. < 130/80 mmHg

19. Which of the following statement is true?
a. PP’s blood pressure is optimally controlled.
b. PP has a compelling indication for a specific antihypertensive agent but is not taking that agent.
c. PP is taking a suboptimal combination of antihypertensive agent.
d. PP should be on a calcium channel blocker.

20. What drug therapy recommendation is important for PP?
a. Suggest switching from aliskiren to a thiazide diuretic.
b. Suggest switching from aliskiren to lisinopril.
c. Suggest switching from atenolol to a thiazide diuretic.
d. Suggest switching from atenolol to lisinopril.

Medication Therapy Management:
Optimizing Hypertension Control

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Store a mail (if avail.)

Quiz: Shade in your choice

1.  a b c d e
2.  a b c d e
3.  a b c d e
4.  a b c d e
5.  a b c d e
6.  a b c d e
7.  a b c d e
8.  a b c d e
9.  a b c d e
10.  a b c d e

Quiz: Circle your choice

21. Is this program used to meet your mandatory C.E. requirements?
a. yes  b. no
22. Type of pharmacist:  a. owner  b. manager  c. employee
23. Age group:  a. 21–30  b. 31–40  c. 41–50  d. 51–60  e. Over 60
24. Did this article achieve its stated objectives?  a. yes  b. no
25. How much of this program can you apply in practice?
   a. all  b. some  c. very little  d. none

How long did it take you to complete both the reading and the quiz? ______ minutes