>Statement of Objectives

After reading this lesson you will be able to:

1. Discuss the key messages related to hypertension management as documented in the 2005 Canadian Hypertension Education Program recommendations.
2. Recommend and facilitate appropriate blood pressure evaluation technique for patients.
3. Discuss the varying definitions of hypertension diagnoses as applied to different patient populations.
4. Recommend appropriate lifestyle modification for blood pressure management.
5. Empower patient adherence through appropriate strategies and education about the benefits of blood pressure reduction.
6. Recommend patient action plans for blood pressure control based on an understanding of individualized blood pressure targets and assessment of appropriate lifestyle and pharmacotherapy choices.

>Instructions

1. After carefully reading this lesson, study each question and select the one answer you believe to be correct. Circle the appropriate letter on the attached reply card.
2. Complete the card and mail, or fax to (416) 764-3937.
3. Your reply card will be marked and you will be advised of your results in a letter from Rogers Publishing.
4. To pass this lesson, a grade of 70% (14 out of 20) is required. If you pass, your CEU(s) will be recorded with the relevant provincial authority(ies).
(Note: some provinces require individual pharmacists to notify them.)

>Disclosure

The author, expert reviewers and Pharmacy Practice magazine have each declared that there is no real or perceived conflict of interest with the sponsor company.

CEP 1 CEU

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MANAGEMENT OF HYPERTENSION: A PRACTICAL APPROACH FOR PHARMACISTS

by Tom Smiley, BSc Phm, Pharm D

MANAGEMENT OF HYPERTENSION - APPRECIATING THE BIG PICTURE

HYPERTENSION IS AN IMPORTANT RISK FACTOR for cardiovascular disease, and it is important to understand how the condition should be managed according to the circumstances of each patient. This principle is expressed together with additional key messages in the "bottom line" version of the 2005 Canadian Hypertension Education Program (CHEP) recommendations, outlined below.[1] The comprehensive recommendations can be found online at www.hypertension.ca

The following principles have been maintained for the 2005 CHEP recommendations:

- The management plan for patients with hypertension must be based on their global cardiovascular risk.
- Lifestyle modifications are the cornerstone of both antihypertensive and antiatherosclerotic therapy.
- Combinations of therapies (both drug and lifestyle) are generally necessary to achieve target blood pressures.
- Focus on adherence (compliance with treatment regimens).

The following principles have been added in 2005:

- The diagnosis of hypertension should be expedited (especially in the setting of increased risk).
- Practitioners can utilize any of the three validated technologies (office, ambulatory and self/home measurements) to diagnose hypertension.
- Reducing hypertension-related complications in the "general" population of patients with hypertension depends more on the extent of blood pressure lowering achieved than on the choice of any specific "first-line" drug class.

Blood Pressure Evaluation

Case #1: *Mr. Smith, a 42-year-old gentleman, has come into the pharmacy to pick up some lozenges and has decided to use the self-serve blood pressure machine "just for fun." He has always been healthy, although he has gained a bit of weight lately. He hasn't bothered going to the doctor for the past few years because "he hasn't needed to." He comes to the pharmacy counter and says his blood pressure reading was "145 on the top and 92 on the bottom" and asks what that means.*

Mr. Smith is not alone in his lack of awareness about his blood pressure and what it means. In fact, survey data suggest that 22% of all Canadians aged 18 to 74 have hypertension, and 43% of these individuals are not aware that their blood pressure is elevated.[2] The fact that Mr. Smith came to the pharmacy counter to discuss this will be beneficial only if the pharmacist seizes the opportunity to discuss the implications of high blood pressure with the patient, and the importance

of investigating further. This notion is underlined by another survey which revealed that two-thirds of a large group of Canadians being treated for high blood pressure stated that their condition was not a serious concern.[3] However, it is also extremely important for patients to realize that in the vast majority of cases, one blood pressure reading above normal does not constitute a diagnosis of hypertension.

Many factors can influence blood pressure readings:

- Blood pressure reading technique:[4,5]
- Not relaxing long enough before the reading. The patient should relax for five minutes before taking a blood pressure reading in the seated or lying position.
- Arm or back not supported. The patient should be seated in a comfortable chair, with the patient's back supported. This is a common problem in blood pressure machines found in pharmacies.
- A cuff with inappropriate dimensions is used or poorly placed. The parameters of arm width indicated for the particular cuff should be matched with the arm circumference of the patient. If a cuff is too tight, elevated blood pressure readings are likely; if too loose, falsely lowered blood pressure readings may result.
- Patient circumstances:
  - should have no caffeine in the preceding hour
  - should have an empty bladder
  - should not smoke in the preceding 15 to 30 minutes
  - should not be wearing tight clothing on the arm or forearm
  - should not have taken substances containing adrenergic stimulants such as phenylephrine or pseudoephedrine
  - the patient should not be under any undue stress, anxiety or pain
  - the patient should remain silent prior to and during the procedure
- If self-monitoring at home, the patient must use a validated electronic device, according to British Hypertension Society, Association for the Advancement of Medical Instrumentation or International Protocol guidelines.[4] This information is available on the packaging of the device (usually a logo with an indication that the device has been validated).
- For initial blood pressure readings, the readings should be taken on both arms. Thereafter, the arm with the highest reading should be used for measurement.[4,5]
- Two or more readings should be averaged, allowing 1 to 2 minutes between BP determinations. If the first two readings differ by more than 5 mm Hg, an additional reading should be obtained and averaged.

Diagnosis of Blood Pressure

The 2005 Canadian Hypertension Education Program (CHEP) recommendations have "expedited" the diagnosis of hypertension compared with previous guidelines.

- Immediate diagnosis: If patient presents with hypertensive urgency or emergency the diagnosis is made at once. Hypertensive urgency refers to severe hypertension (210/120 mm Hg or higher) without acute end-organ damage. Hypertensive emergency refers to extremely high, uncontrolled blood pressure accompanied by target end-organ damage such as stroke, kidney failure, retinopathy, CHF or aortic dissection.
- Diagnosis at 2nd visit: If blood pressure is greater than 140-179/90-109 with target organ damage* or diabetes or chronic kidney disease at the second hypertension visit, or
- Blood pressure is measured at 180/110 mm Hg or higher at the second visit (within one month of the first visit) for hypertension, a diagnosis of hypertension is made.
- Diagnosis at 3rd visit: Where there is no target organ damage, diabetes or chronic kidney disease and blood pressure is consistently measured at ≥160 mm Hg systolic blood pressure (SBP) or ≥100 mm Hg diastolic blood pressure (DBP) (but less than 180/110 mm Hg) then a diagnosis of hypertension is made at the third visit.
- Diagnosis at 4th or 5th visit: Where there is no target organ damage, diabetes or chronic kidney disease and blood pressure is consistently measured at ≥140 mm Hg SBP or ≥90 mm Hg DBP (but less than 160/100 mm Hg) then a diagnosis of hypertension is made at the fourth or fifth visit.
- Where blood pressure is consistently above or equal to 135/85 mm Hg (e.g., morning and evening readings for seven days) with self/home blood pressure monitoring then a diagnosis of hypertension is made.
- With 24-hour ambulatory blood pressure monitoring, if awake blood pressure average is ≥135 mm Hg SBP or ≥85 mm Hg DBP or the 24-hour average is ≥130 mm Hg SBP or ≥80 mm Hg DBP then a diagnosis of hypertension is made.

* Target organ damage includes cerebrovascular disease (transient ischemic attacks, ischemic or hemorrhagic stroke), hypertensive retinopathy, coronary artery disease (myocardial infarction, angina pectoris, congestive heart failure, chronic kidney disease or peripheral artery disease (intermittent claudication).

MODIFIABLE RISK FACTOR MANAGEMENT FOR BLOOD PRESSURE CONTROL

Case #1 (continued): *Mr. Smith went to visit his doctor on your advice and had his*

FACULTY MANAGEMENT OF HYPERTENSION: A PRACTICAL APPROACH FOR PHARMACISTS

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All lessons are reviewed by pharmacists for accuracy, currency and relevance to current pharmacy practice.

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TABLE 1 Benefits of blood pressure control[4]

Treatment of hypertension in patients under age 60:
- Reduces risk of stroke by 42%
- Reduces risk of a coronary event by 14%

Treatment of hypertension in patients older than age 60:
- Reduces overall mortality by 20%
- Reduces cardiovascular mortality by 33%
- Reduces incidence of stroke by 40%
- Reduces coronary artery disease by 15%

TABLE 2 Modifiable risk factors for blood pressure management[4]

- Excess salt intake - more than 65-100 mmol per day (2.4 g sodium or 6 g sodium chloride, equivalent to 1 teaspoonful of salt) - avoid intake of processed meats, canned foods and snack foods
- Heavy alcohol use (≥14 drinks per week for men, and ≥9 drinks per week for women)
- Licorice
- Sleep apnea
- Recreational drugs (e.g., cocaine)
- Use of certain medications - e.g., non-steroidal anti-inflammatory drugs, oral contraceptives, corticosteroids, anabolic steroids, erythropoietin, calcineurin inhibitors (cyclosporine, tacrolimus), ephedrine, pseudoephedrine
- Excess weight (BMI >25 kg/m^2) and central obesity (apple shape vs. pear shape)
- Lack of regular physical activity - should be moderately active for at least 30 to 60 minutes most days of the week (e.g., brisk walking, active gardening, swimming, dancing, biking etc.,
- Lacking a diet high in fibre, fruit and vegetables. Diets too high in saturated fat

TABLE 3 Blood pressure benefits attainable through lifestyle modification[3]

Intervention	Targeted Change	SBP/DBP mm Hg
Sodium reduction	<100 mmol/day	- 5.8/2.5
Weight loss	-4.5 kg	-7.2/5.9
Alcohol reduction	-2.7 drinks/day	-4.6/-2.3
Exercise	3 times/week or more	-10.3/-7.5
Dietary patterns	DASH diet	-11.4/-5.5

blood pressure measured on the first visit at 146/94 mm Hg. He has another appointment with the doctor in two weeks. In the meantime, the doctor has recommended Mr. Smith look into an exercise and/or weight-loss program. He asks you what else he can do to help control his blood pressure without medications.

It is important to reassure Mr. Smith that weight loss and exercise may indeed get his blood pressure under control, and that he has not yet been labelled with "high blood pressure." Patients may be motivated when they understand the benefits associated with blood pressure control. Table 1 summarizes the benefits of blood pressure treatment derived from compilation of randomized controlled trials.

Table 2 summarizes modifiable risk factors for blood pressure management.

Table 3 summarizes blood pressure benefits attainable through lifestyle modification.

After discussing the blood pressure benefits of lifestyle modification with Mr. Smith, you invite him to participate in a "blood pressure risk assessment" activity on the Heart and Stroke Association website (www.heartandstroke.ca). After using this tool, Mr. Smith feels more empowered to do something about his condition, with practical tips individualized to his needs.

Weight Management

Mr. Smith tells you that his Body Mass Index (BMI = weight in kg/height in m^2) is 28 according to his doctor, and that he wants it down to 25. You explain that, in general, health risks are associated with BMI above 25 kg/m^2. Studies have shown that reducing weight by as little as 4.5 kg can reduce blood pressure.[6]

- An excellent Health Canada resource for determining BMI and assessing health risks can be found online at www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/cg_quick_reference_e.html.
- The National Institutes of Health recommend weight management regimens that set targets of initial weight loss of 10% over six months at a rate of weight loss of 0.5 to 1.0 kg per week. The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults is available online at www.nhlbi.nih.gov/guidelines/obesity/practgde.htm.[7] One kilogram of fat contains approximately 7,000 calories. Therefore, it is readily apparent that a 500 to 1,000 "calorie deficit" per day will achieve the weight loss goal. Calorie deficits are achieved through diet modification (i.e., reduced intake of calories) and increased physical activity (i.e., increased expenditure of calories).
- Medications used to aid in weight loss strategies (e.g., orlistat, sibutramine) are indicated only for those patients who have a BMI greater than 30, or a BMI greater than 27 with cardiovascular risk factors.

Dietary Management

The Dietary Approaches to Stop Hypertension (DASH) diet is rich in fruits, vegetables, dietary fibre, protein, potassium, calcium, magnesium and low-fat dairy foods, as well as being low in cholesterol, saturated and total fats. Results of a clinical trial revealed that this diet lowers blood pressure of hypertensive individuals by about 8 to 14 mm Hg on average, compared to hypertensive people not on the diet.[25]

The DASH diet is based on a 2,000-calorie daily diet, but can be adjusted according to individual needs. A full description of the DASH diet, as well as suggested daily servings, serving sizes and forms for tracking meal content (by servings of each food group) can be found on the Internet at www.nhlbi.nih.gov/health/public/heart/hbp/dash/.

Armed with practical information on weight management, diet management, physical activity, salt intake recommendations, and alcohol intake recommendations, Mr. Smith feels confident that he can make an impact on his blood pressure readings.

TREATING BLOOD PRESSURE TO INDIVIDUALIZED TARGET

Case #2: *Mrs. Jones is a 55-year-old woman who has just come to the pharmacy with a prescription for hydrochlorothiazide 25 mg once daily. She is upset because she*

has never needed to take chronic medication before and the doctor has told her she will likely have to take it "for the rest of her life." She is frustrated because she has been on the DASH diet and also joined a fitness club, yet the doctor claims she has not reduced her blood pressure sufficiently. Her blood pressure on her last four visits to the doctor was consistently between 142/92 mm Hg and 150/92 mm Hg. On top of all that, she feels fine, so she doesn't understand why she needs to take drugs. She asks if it is really necessary to take this medication.

Although lifestyle modifications are the cornerstone of antihypertensive therapy, pharmacological management is often necessary to bring blood pressure into target range. Blood pressure target depends on the cardiovascular risk profile of the patient.

Table 4 outlines target blood pressures for patients under varying circumstances. Note that isolated systolic hypertension (ISH) is the only condition where the blood pressure at which initiation of pharmacological treatment occurs differs from the target blood pressure. This is because no clinical trials have shown improved cardiovascular outcomes when ISH is treated before systolic blood pressure reaches 160 mm Hg.

The pharmacist (Carol) empathizes with Mrs. Jones about needing to take medication but assures her that it is in her best interest for the long-term. Carol shows her a document containing the facts from Table 1 and Mrs. Jones agrees to try the medication. Carol then asks Mrs. Jones if she has thought about monitoring her blood pressure. Mrs. Jones replies that she was considering purchasing a blood pressure monitor. Carol congratulates her on taking responsibility for her health and proceeds to educate Mrs. Jones about her condition, her new treatment and appropriate use of her monitor.

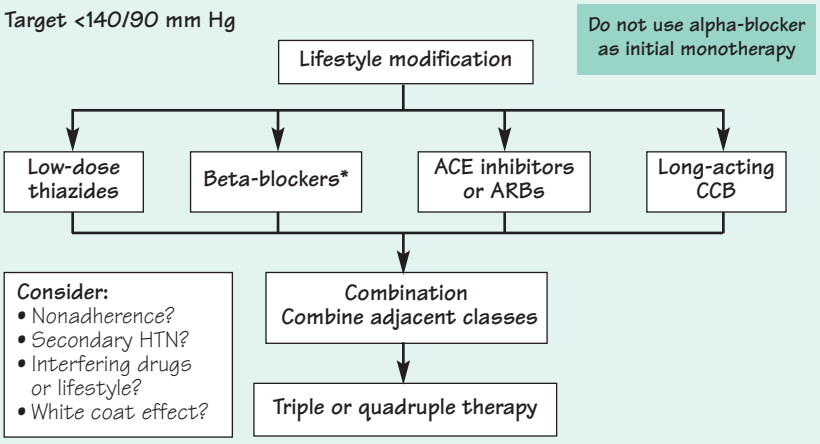
Carol has addressed Mrs. Jones' concerns and understands that she is at risk for non-adherence to her medication regimen. In this regard she has followed the 2005 CHEP recommendations that suggest the following strategies to improve adherence to antihypertensive prescriptions:

- Assess adherence at every visit.
- Encourage greater patient responsibility/autonomy in monitoring blood pressure and adjusting their prescriptions.
- Simplify medication regimens to once daily dosing and utilizing medication

TABLE 4 Target values for blood pressure and threshold for initiation of treatment[4]

Condition	Initiation SBP/DBP mm Hg	Target SBP/DBP mm Hg
Diastolic ± Systolic hypertension	≥140/90	<140/90
Isolated Systolic hypertension	SBP >160	SBP <140
Home BP measurement (no diabetes, renal disease or proteinuria)	>135/85	<135/85
Diabetes	≥130/80	<130/80
Renal Disease	≥130/80	<130/80
Proteinuria (≥1 g/day)	≥125/75	<125/75

FIGURE 1 Management of diastolic-systolic hypertension without compelling indications



*Note: Beta-blockers not recommended for persons over 60 years of age.
ACE-I = Angiotensin Converting Enzyme Inhibitors, ARBs = Angiotensin Receptor Blockers, CAD = Coronary Artery Disease

FIGURE 2 Management of isolated systolic hypertension without compelling indications

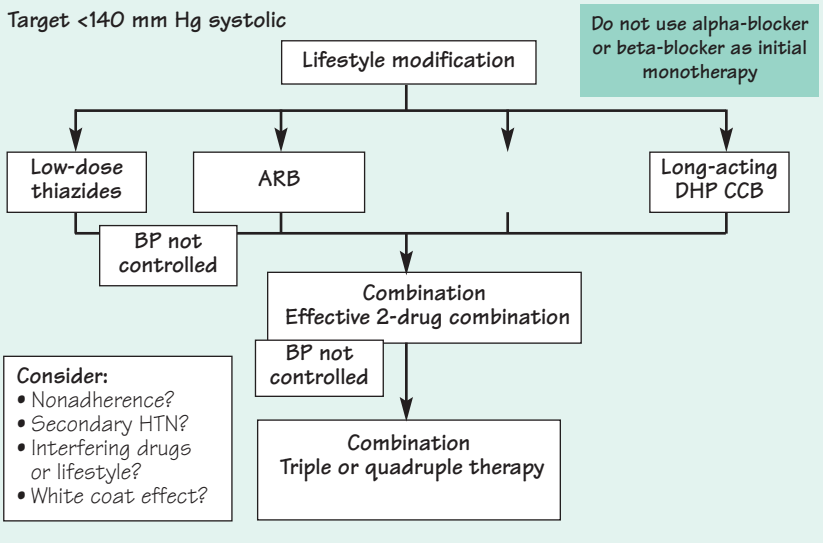


TABLE 5 Initial antihypertensive therapy for compelling indications[1]

Compelling indication	Initial therapy	Second-line therapy	Comments/ cautions
Diabetes mellitus without nephropathy	ACE Inhibitor, ARB or thiazide diuretic	Combination of first-line drugs or addition of cardioselective beta-blockers and/or long-acting calcium channel blockers.	
Diabetes mellitus with nephropathy (urinary albumin excretion rate ≥30 mg daily)	ACE inhibitors or ARB	Addition of thiazide diuretics, cardio-selective beta-blockers (e.g., bisoprolol, meto-prolol), long-acting calcium channel blockers or use an ARB/ACE-I combination.	If serum creatinine is >150 umol/L a loop diuretic should be used as a replacement for low-dose thiazide
Angina	β-blockers (ACE-I recommended in all patients with established CAD)	Long-acting calcium channel blockers.	Avoid short-acting nifedipine.
Prior myocardial infarction	β-blockers and ACE Inhibitors	Combinations of additional agents.	
Left ventricular hypertrophy	ACE-I, ARBs, long-acting calcium channel blockers, diuretics (beta-blockers for patients <55 years)		Avoid hydralazine and minoxidil
Heart failure	ACE-I (ARBs if ACE-I intolerant), β-blockers and spironolactone	ARBs or hydralazine/ isosorbide dinitrate (thiazide or loop diuretics, as additive therapy)	Avoid nondihydro-pyridine calcium channel blockers (diltiazem, verapamil)
Cerebrovascular accident or TIA (after acute phase)	ACE-I + diuretic combination preferred		Blood pressure reduction reduces recurrent cerebro-vascular events
Renal disease (non-diabetic)	ACE inhibitors (diuretics as additive therapy)	Combinations of additional agents	Do not use ACE-I or ARB if bilateral renal artery stenosis present
Atherosclerotic peripheral vas-cular diseases	Does not affect initial treatment recommendations		Avoid β-blockers with severe disease

compliance aids.
- Tailor pill-taking to fit the patients' daily habits.
- Educate patients and their families about their disease treatment regimens.
- Coordinate with work-site health-care givers to improve monitoring of adherence with pharmacological and lifestyle modification prescriptions.

RECOMMENDING PHARMACOLOGICAL TREATMENT OF HYPERTENSION

As mentioned earlier, in patients without compelling indications for particular antihypertensives (e.g., ACE inhibitors in patients with ischemic heart disease), reducing hypertension-related complications depends more on the extent of blood pressure lowering achieved than on the choice of a specific first line agent.[3] This statement reflects a consensus opinion based on the results of many clinical trials. For example, the ALLHAT study suggested that chlorthalidone was as good for decreasing blood pressure and preventing cardiovascular complications as amlodipine or lisinopril in the large population of patients studied.[8] Doxazosin (an alpha-blocker) monotherapy was stopped early due to a significant increase in patients developing congestive heart failure compared with other treatments.[8] The goal of therapy should be to achieve target blood pressure using a therapy that is convenient and associated with minimal side effects. This may be achieved by adding a second low-dose antihypertensive to monotherapy instead of increasing the dose.

Figure 1 summarizes the 2005 CHEP Recommendations with respect to antihypertensive choices in patients with diastolic/systolic hypertension and without compelling indications.[3]

It should be noted that non-dihydropyridine calcium channel blockers (i.e., diltiazem, verapamil) are now (as of 2005 CHEP recommendations) first-line monotherapy choices. This change has been recommended on the strength of results from a meta-analysis of studies that suggested use of non-dihydropyridine calcium channel blockers in hypertensive patients lowers risk of stroke more significantly than other treatments.

Figure 2 outlines 2005 CHEP Recommendations with respect to antihypertensive choices in patients with isolated systolic hypertension and without compelling indications.[3]

The reason that ACE inhibitors are not included in first-line recommendations for isolated systolic hypertension management is that good randomized controlled trials have not been performed for this population of patients. Beta-blockers are not recommended as first-line therapy when no compelling indications exist. Many patients with ISH are over 60 years of age. Beta-blockers have not been found as effective as ARBs or diuretics in initial therapy for primary prevention of cardiovascular events in this age group.

African Americans demonstrate reduced blood pressure responses to beta-blockers, ACE-Inhibitors and ARBs compared with diuretics and calcium channel blockers.[9]

Table 5 outlines recommendations for first-line agents where compelling indications exist.

In contrast to Table 5, Table 6 outlines medications that should be avoided when certain comorbid conditions exist.

Combining Antihypertensive Therapies for Blood Pressure Control

To achieve target blood pressures, nearly one-half of hypertensive patients require more than one antihypertensive agent. When faced with the issue of not reaching blood pressure targets with one medi-

TABLE 6 Medications to avoid with particular comorbid conditions[9]

Comorbid conditions	Medication to avoid
Bronchospastic disease	Beta-blockers
Smoking	Beta-blockers should be avoided unless there is a compelling indication
2nd-, 3rd-degree heart block	Beta-blockers, verapamil, diltiazem
Diabetes	Non-cardio-selective beta-blockers (e.g., propranolol, timolol), high-dose diuretics
Severe peripheral vascular disease	Beta-blockers
Systolic dysfunction heart failure	Calcium channel blockers (except amlodipine, felodipine)
Gout	Thiazide diuretics
Renal insufficiency	Potassium-sparing diuretics
Hyperkalemia (>5mEq/L)	Aldosterone antagonists and potassium sparing diuretics, caution with ACE inhibitors and ARBs
Pregnancy	ACE inhibitors and ARBs are contraindicated
History of ACE-inhibitor induced angioedema	ACE inhibitors
Renovascular disease	ACE inhibitors, ARBs
Hepatic dysfunction	Labetalol, methyldopa is contraindicated

cation (and issues such as white-coat hypertension and non-adherence have been ruled out), there are three options for pharmacological management:[10]

1. Add another antihypertensive.
2. Increase the dosage of the existing treatment.
3. Substitute another antihypertensive medication.

Under most circumstances, the current general recommendation is to add a second antihypertensive medication which is complementary in action to the first.[10]

There are two general mechanisms of action of antihypertensive medications. Beta-blockers, angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) attenuate hormonal mechanisms, while diuretics and calcium channel blockers attenuate electrolyte mechanisms associated with onset of hypertension. The 2005 CHEP recommendations suggest that initial combinations of antihypertensive medications consist of one of the members of the hormonal class with one of the members of the electrolyte class. Table 7 summarizes this approach.

The 2005 CHEP recommendations promote the use of combinations of lower-dose antihypertensives over maximal dose titration of single agents or switching medications.[1]

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends that consideration be given to initiating therapy with two agents (one of which should usually be a thiazide diuretic) if blood pressure is more than 20/10 mm Hg above target.[9] However, particular caution is advised in those at risk for orthostatic hypotension (e.g., patients with diabetes, autonomic dysfunction).[9]

THE PHARMACIST'S ROLE IN MANAGEMENT OF HYPERTENSION

PHARMACISTS ARE IN AN EXCELLENT POSITION to raise awareness around the prevalence and implications of hypertension. Initiatives in the area of primary prevention should be focused on reducing hypertension risk factors in all ages; whereas, initiatives in the area of secondary prevention should be focused on achieving optimal long-term blood pressure control and lifestyle modifications, with or without medications.

Following are areas where pharmacists can facilitate the management of hypertension. Many of these activities could be incorporated into a "clinic day" promoting awareness of the prevalence and appropriate management of hypertension:

- Post appropriate signage on and around the pharmacy's blood pressure machine, indicating how to take blood pressure appropriately and the appropriate targets. Have these figures available as handouts as well as blood pressure log books and additional educational material about appropriate lifestyle modifications and the consequences of uncontrolled hypertension.
- Assist physicians in the identification of disease and/or drug-induced causes of hypertension.
- Assist the patient in understanding, monitoring and achieving their blood pressure goals (including teaching patients about home blood pressure monitoring). If patients use your pharmacy blood pressure machine on a regular basis, offer to keep their blood pressure record on file in the computer for easy retrieval.
- Assess reasons for poor response to therapy (for example, noncompliance, obesity, excess salt intake, smoking, excess alcohol use, drug interactions).
- Develop strategies to achieve long-term compliance.
- Be sure to put potential side effects into perspective for the patient. The media and the Internet dwell far too often on only one side of the story.
- Assist patients in the development of a care plan that incorporates lifestyle modification. Collaborate with physicians on appropriate management of

TABLE 7 Recommended combinations of antihypertensive therapies

Combine a hormonal mechanism agent with an electrolyte mechanism agent[1]

Hormonal mechanism	Electrolyte mechanism
ACE inhibitors	Thiazide diuretics
ARBs	Long-acting calcium channel blockers*
Beta-blockers*	

**Caution is advised when combining a beta-blocker with a non-dihydropyridine calcium channel blocker.*

hypertension and incorporate into the care plan. Recognize compelling indications according to guidelines, as well as precautions and indications. Also recommend rational combinations of antihypertensives as outlined in the 2005 CHEP recommendations.

REFERENCES

1. The Evidence-Based Recommendations Task Force of the Canadian Hypertension Education Program. 2005 Canadian Hypertension Education Program Recommendations: The bottom line version. www.hypertension.ca; 1-11. Accessed March 10, 2005.

2. Joffres MR, Hamet P, MacLean DR, L'italien GJ, Fodor G. Distribution of blood pressure and hypertension in Canada and the United States. *Am J Hypertens* 2001; 14(11 Pt 1):1099-105.

3. 2005 Canadian Hypertension Education Program Recommendations. www.hypertension.ca. Accessed March 10, 2005.

4. Blood pressure assessment hypertension diagnosis and follow-up. 2005 Canadian Hypertension Education Program Recommendations 2005. Available online at www.hypertension.ca. Accessed March 10, 2005.

5. Langlois S., Drouin D, Vanasse A. Measuring Blood Pressure. *Hypertension Therapeutic Guide* 2002; Chapter 3:15-24.

6. Juhaeri, Stevens J, Chambless LE, Nieto FJ, Jones D, Schreiner P et al. Associations of weight loss and changes in fat distribution with the remission of hypertension in a bi-ethnic cohort: The Atherosclerosis Risk in Communities Study. *Prev Med* 2003;36(3):330-9.

7. National Heart, Lung and Blood Institute North American Association for the Study of Obesity. The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. Available online at www.nhlbi nih.gov/guidelines/obesity/practgde.htm. Accessed March 10, 2005.

8. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002; 288(23):2981-97.

9. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, Jr. et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 report. *JAMA* 2003;289(19):2560-72.

10. Milot A. Treatment of hypertension: Polypharmacy. *Hypertension Therapeutic Guide* 2002;59-76.

QUESTIONS

CASE #1: Mary is a 35-year-old woman with a family history of hypertension. She does not have any chronic medical conditions. Mary has a BMI of 31 kg/m^2 and has an office job. She does not get much exercise. Mary has not seen a doctor for two years. She has just been to a walk-in clinic and presents you with a prescription for an antibiotic. She said the doctor at the clinic took her blood pressure and it was 150/93 mm Hg. She says she is more upset about her blood pressure than her urinary tract infection.

1. Approximately what percentage of Canadians aged 18 to 74 who have hypertension are not aware that their blood pressure is elevated?
a) 13%
b) 23%
c) 33%
d) 43%

2. Mary wants to know if she should be taking blood pressure medication or see her family doctor about this.
a) Yes, because her blood pressure is above 150/90 mm Hg she should begin blood pressure medication right away.
b) Mary should be assessed by her family physician and prescribed medication if her blood pressure stays at this level through the 4th or 5th visit.
c) No, Mary doesn't need follow-up, as it is likely the stressful circumstances that have caused her blood pressure to increase.
d) Mary should be assessed by her family physician and prescribed medication if her blood pressure stays at this level for her second visit.

3. Mary wants to begin changes in her lifestyle right away. She used to be on a diet that counted calories, but stopped it about 18 months ago. She would like to know how best to lose weight. What is your recommendation?
a) Set a goal of losing 10 kg in one month and reduce food intake by 2,000 calories daily.
b) Set a goal of losing 3 kg per week and reduce food intake by 2,000 calories daily while expending another 2,000 calories through increased exercise.
c) Set a goal of losing 1 kg per week by producing a calorie deficit of 500 to 1,000 calories per day through a combination of reduced calorie intake and increased calorie expenditure.
d) Set a goal of losing 10 kg per month by producing a calorie deficit of 500 to 1,000 calories per week through a combination of reduced calorie intake and increased calorie expenditure.

4. Mary asks how the DASH diet could help with her blood pressure if she "stuck to it." In clinical trial, patients' blood pressure:
a) reduced by 2-5 mm Hg on average.
b) reduced by 8-14 mm Hg on average.
c) reduced by 15-20 mm Hg on average.
d) did not reduce significantly from placebo, but weight loss was significant.

5. Mary wants to know what she should be aiming for with respect to reducing her blood pressure (according to CHEP recommendations).
a) She should try and get it below 135/85 mm Hg as measured on a home blood pressure monitor.
b) She should try and get it below 140/90 mm Hg as measured on a home blood pressure monitor.
c) She should try and get it below 130/80 mm Hg as measured in the doctor's office.
d) She should try and get it below 130/80 mm Hg as measured on a home blood pressure monitor.

6. Mary asks you about recommendations for physical activity that might help reduce her blood pressure. Which activity is NOT likely to improve blood pressure compared with the rest of the answers?
a) Easy walking for 30-60 minutes most days of the week.
b) Biking for 30-60 minutes most days of the week.
c) Swimming for 30-60 minutes most days of the week.
d) Active gardening for 30-60 minutes most days of the week.

7. Mary says she often goes out for a drink with the other ladies in the office after work. She usually has 2-3 alcoholic drinks daily. Is this a problem?
a) Mary should keep her alcohol consumption to 3 or fewer drinks per day and 21 drinks weekly.
b) Mary should keep her alcohol consumption to less than 14 drinks per week.
c) Mary should keep her alcohol consumption to less than 9 drinks per week.
d)Alcohol actually reduces risk for heart disease so her consumption is fine.

8. What benefit can Mary expect by reducing her blood pressure to target levels?
a) Reduce her risk of stroke by 60%.
b) Reduce her risk of a coronary event by 60%.
c) Reduce her risk of stroke by 25%.
d) Reduce her risk of a coronary event by 14%.

CASE #2: Carl is a 45-year-old male teacher who has Type 2 diabetes diagnosed 3 years ago. He currently takes coated ASA 81 mg, metformin 500 mg tid, and atorvastatin 20 mg daily. Carl does not have nephropathy. Carl's doctor (in the clinic next door) calls to say that Carl has been diagnosed with hypertension and asks for your advice on pharmacological treatment.

9. Which option would be appropriate for recommendation according to the 2005 CHEP recommendations?
a. Hydrochlorothiazide, ACE inhibitor or angiotensin receptor blocker.
b) ACE inhibitor or angiotensin receptor blocker only.
c) ACE inhibitor only.
d) Angiotensin receptor blocker only.

10. If Carl's blood pressure does not reach blood pressure target with the first medication, what is the best strategy for further pharmacological management?
a) Add another antihypertensive.
b) Increase dosage of the existing treatment.
c) Substitute another antihypertensive.
d) Switch current therapy to doxazosin.

11. If Carl's blood pressure at presentation to the doctor's office 152/94 mm Hg at first visit and is 153/93 mm Hg at the second visit, which would be the most appropriate strategy?
a) Use a combination of ACE Inhibitor and Angiotensin receptor blocker to start - monitor for orthostatic hypotension.
b) Use a high-dose calcium channel blocker to start - monitor for orthostatic hypotension.
c) Lower the blood pressure quickly with furosemide at a strength of at least 60 mg daily - monitor for orthostatic hypotension.
d) Use a combination of an ACE Inhibitor or an Angiotensin Receptor blocker and a thiazide diuretic to start - monitor for orthostatic hypotension.

CASE #3: Mildred is a 57-year-old female who has been taking hydrochlorothiazide 25 mg once daily for 10 years to control blood pressure. She does not have any other chronic conditions. She smokes approximately 10 cigarettes daily. Her last 4 readings at the doctor's office have averaged 148/93 mm Hg.

12. Which medication would be most likely to have an additive or synergistic effect with Mildred's antihypertensive regimen?
a) Amlodipine
b) Diltiazem long-acting
c) Irbesartan
d) Long-acting verapamil

13. Which medication would NOT have been an appropriate INITIAL antihypertensive choice for use by Mildred?
a) Amlodipine
b) Metoprolol
c) Losartan
d) Ramipril

14. If Mildred had presented with a TIA when originally diagnosed with hypertension which combination would have been most appropriate?
a) Ramipril plus hydrochlorothiazide
b) Losartan plus hydrochlorothiazide
c) Diltiazem long-acting plus hydrochlorothiazide
d) Acebutolol plus hydrochlorothiazide

15. Mildred wants to use your pharmacy's blood pressure machine. Which factor is NOT likely to influence blood pressure reading?
a) Having smoked in the previous 15-30 minutes
b) Feeling the urge to urinate while getting blood pressure checked
c) Having taken chronic blood pressure medication less than 1 hour previously.
d) Having had a cup of coffee 30 minutes earlier.

16. Mildred wants to self-monitor her blood pressure. Which is INCORRECT advice?
a) Average 2 or more readings, allowing 1-2 minutes between readings.
b) Always take the blood pressure in the left arm.
c) If the first 2 blood pressure readings differ by more than 5 mm Hg, an additional reading should be obtained and averaged.
d) She should use a validated electronic device.

CASE #4: John is a 72-year-old man with a blood pressure of 161/82 mm Hg. This is the highest reading he has ever had. John has never taken blood pressure medication, and has come for your advice. He has been healthy most of his life and only takes the occasional acetaminophen tablet for a headache.

17. Which statement is TRUE according to 2005 CHEP recommendations?
a) If John's blood pressure stays at this level for 3 more doctor's visits he should be treated with an ACE inhibitor, an angiotensin receptor blocker, a calcium channel blocker or a thiazide diuretic.
b) If John's blood pressure stays at this level for 3 more doctor's visits he should be treated with an ACE inhibitor, a long-acting calcium channel blocker or a thiazide diuretic.
c) If John's blood pressure stays at this level for 3 more doctor's visits he should be treated with an ACE inhibitor, an angiotensin receptor blocker, or a thiazide diuretic.
d) If John's blood pressure stays at this level for 3 more doctor's visits he should be treated with an angiotensin receptor blocker, a long-acting calcium channel blocker or a thiazide diuretic.

18. If John's blood pressure had initially been steady at 156/81 mm Hg (i.e., not 161/82 mm Hg) for 4 office visits, which strategy would be most appropriate?
a) Do not treat with medication, but monitor blood pressure closely.
b) Treat as per answer in previous question.
c) Start hydrochlorothiazide 12.5 mg.
d) Ensure that his blood pressure gets checked again within the next two years.

19. Which medication is LEAST likely to cause an increase in blood pressure in hypertensive patients?
a) Ibuprofen
b) Acetaminophen
c) Oral contraceptives
d) Prednisone

20. If a blood pressure is consistently at 182/112 mm Hg and there are no signs of end-organ damage, when should a diagnosis of hypertension be made?
a) Immediately.
b) At the second visit to the doctor's office for blood pressure reading.
c) At the third visit to the doctor's office for blood pressure reading.
d) At the fourth or fifth visit to the doctor's office for blood pressure reading.

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1 CEU
1 UNIT IN QUEBEC
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1. a b c d	**6.** a b c d	**11.** a b c d	**16.** a b c d
2. a b c d	**7.** a b c d	**12.** a b c d	**17.** a b c d
3. a b c d	**8.** a b c d	**13.** a b c d	**18.** a b c d
4. a b c d	**9.** a b c d	**14.** a b c d	**19.** a b c d
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Feedback on this CE lesson

1. Do you now better understand how to care for patients with hypertension? ❑ Yes ❑ No
2. Was the information in this lesson relevant to your practice? ❑ Yes ❑ No
3. Will you be able to incorporate the information from this lesson into your practice? ❑ Yes ❑ No
4. Was the information in this lesson... ❑ Too basic ❑ Appropriate ❑ Too Difficult
5. Do you feel this lesson met its stated learning objectives? ❑ Yes ❑ No
6. What topic would you like to see covered in a future issue? _____

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