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Stroke and hypertension

by Ann Thompson, BScPharm, PharmD, ACPR

Learning objectives

Upon completion of this lesson, the pharmacy technician will be able to do the following:

1. Describe how hypertension influences stroke prevalence
2. Define hypertension and stroke, and identify other risk factors for stroke
3. Outline the importance of treating hypertension to prevent stroke, and preferred medication options for managing hypertension in those who have had a stroke or a transient ischemic attack
4. Describe important steps for patients who are taking their own blood pressure
5. Educate patients and their families who are affected by hypertension and stroke
6. Describe the role of the pharmacy technician in hypertension and stroke management, focusing on the assessment of medication adherence

Hypertension, defined as having a systolic blood pressure (BP) of ≥ 140 mmHg and/or a diastolic BP of ≥ 90 mmHg in those without diabetes, is the most important risk factor for all types of stroke.[1] Systolic BP represents the pressure in the artery when the heart is contracting whereas diastolic BP represents pressure when the heart is relaxing. The prevalence of hypertension in Canada is rising; 19.6% of the population had this condition in 2007/08 compared with 12.5% in 1998/99.[2] Population studies have shown

that as both systolic and diastolic BP rise, so does the risk of stroke; controlling BP reduces stroke incidence. In 2012, stroke was the third leading cause of death in Canada at approximately 6% (or 14,000 Canadians) annually. It is estimated that 50,000 strokes occur in Canada each year and approximately 31,000 Canadians are living with the effects of stroke.[3]

Fortunately, the incidence of mortality and hospitalizations related to stroke in Canada is decreasing because of the increased use of medications to lower BP.[4] Technicians can play an important role in screening patients for hypertension and engaging these patients to ensure their hypertension is properly controlled and well-managed over the long term in order to prevent a first or recurrent stroke. This lesson will discuss what a stroke is; the importance of controlling BP; proper BP measurement; the preferred pharmacologic agents for stroke reduction; the importance of adherence; and the role of the pharmacy technician in working with the pharmacist to improve patient care.

What is a stroke?

A stroke is defined as a sudden loss in brain function. This can be caused by either an interruption in the blood flow to the brain (ischemic stroke) or by the rupture of a blood vessel (hemorrhagic stroke). Ischemic stroke, which is the focus of this lesson, is the most common; there are two ways in which it can occur. The first is a thrombotic stroke, which is caused by the formation of a blood clot in the brain, which blocks blood flow to the affected area. The second is an embolic stroke, which involves the formation of a clot somewhere else in the body, with movement to the brain. Both can cause the death of brain tissue that affects body functioning. The term transient ischemic attack (TIA), or mini-stroke, is often used to describe temporary interruptions or reductions in blood flow to the brain that lead to transient and reversible stroke symptoms, which resolve within minutes or hours. A TIA is important to identify as it is the precursor to a stroke. It acts as a warning signal and provides the opportunity to mitigate a person's risk for stroke.

Symptoms of a stroke, as defined by the Heart and Stroke Foundation of Canada, include the following[3]:

- *Weakness*—sudden loss of strength or sudden numbness in the face, arms or legs, even if temporary
- *Trouble speaking*—sudden difficulty speaking or understanding or sudden confusion, even if temporary
- *Vision problems*—sudden trouble with vision, even if temporary
- *Headache*—sudden severe and unusual headache
- *Dizziness*—sudden loss of balance, especially with any of the symptoms mentioned above

Although hypertension is the leading risk factor for stroke, it is not the only one. Other modifiable risk factors include high cholesterol, smoking, diabetes, physical inactivity, obesity and stress. Optimizing control of all of these risk factors will play a combined role in decreasing the risk of a first or recurrent stroke.

Hypertension treatment and stroke prevention

Hypertension increases the risk of all cardiovascular diseases, including stroke, as it damages the arterial blood vessels, thereby accelerating the development of atherosclerosis, which is the narrowing of blood vessels due to cholesterol deposits in the vessel walls. The BP target for patients younger than age 80 years without diabetes is < 140/90 mmHg in the office or pharmacy practice setting, or < 135/85 mmHg in the home setting using a home BP machine. In people with diabetes, this changes to a lower threshold of < 130/80 mmHg, and in those over the age of 80, achieving a systolic BP target of < 150 mmHg is acceptable based on clinical trial evidence.[5] Achieving BP targets involves two approaches: lifestyle modification and use of pharmacologic agents. For patients who have not had a stroke, lifestyle modification alone may be used to treat hypertension. Individuals who have had a stroke or TIA are already considered at high risk for a second stroke and, if hypertensive, BP-lowering medications (i.e., antihypertensives) should be used in conjunction with lifestyle modifications to achieve BP targets.[5]

Lifestyle modifications that are recommended as a cornerstone of preventing and treating hypertension include the following[5]:

- Moderate-intensity physical activity (examples: walking, jogging, cycling, swimming) 4–7 days a week for 30–60 minutes
- Weight reduction to achieve a healthy body weight as measured by a body mass index (BMI) of 18.5–24.9 kg/m^2
- Alcohol consumption should be ≤ 2 drinks/day
- Diet should be high in fruits, vegetables, low-fat dairy, whole grains, lean protein (fish, poultry), nuts/seeds and low amounts of saturated fats (example: butter) and sodium (2000 mg, or lower; 2000 mg is approximately 1 teaspoon of salt)

Lowering BP is important to prevent a first stroke or TIA (primary prevention) and any subsequent strokes (secondary prevention). For primary prevention of stroke, many medication options are available to lower BP; importantly, antihypertensives should be combined, if needed, until BP targets are achieved. According to the Canadian Hypertension Education Program (CHEP), four medication classes can be used as initial antihypertensive therapy for primary prevention of stroke in those older than 60 years. These are outlined in Table 1.[5] Although beta-blockers (such as metoprolol, bisoprolol, atenolol and labetalol) lower blood pressure, they are not recommended as initial monotherapy for patients older than 60 years with no other medical conditions because they increase the risk of stroke compared with other drug therapies outlined in Table 1.[6] For patients who have other medical conditions (comorbidities) like diabetes, there are preferred antihypertensives for reducing the complications of hypertension and the comorbid condition. Technicians should work with pharmacists to ensure that medication choices are optimal given patient-specific medical conditions.

For secondary prevention of stroke, CHEP recommends treatment with an ACE inhibitor and a diuretic (a thiazide is recommended if kidney function is normal) based on evidence that this combination reduces the incidence of a second stroke compared with other combinations. If a third antihypertensive agent is required, a long-acting dihydropyridine calcium channel blocker (CCB) is a good choice. Importantly, an ACE inhibitor should not be combined with an angiotensin receptor blocker (ARB).[5] Should additional agents be required to lower BP to the recommended target, patient-specific factors need to be considered when selecting additional antihypertensive agents.

Lowering blood pressure by 10–12 mmHg systolic and 5–6 mmHg diastolic, even if not at target, can reduce stroke rates by 35%–40%.[1] Antihypertensive medications should be combined in order to achieve BP targets; if targets cannot be achieved, BP should be reduced as much as possible from the baseline or initial readings. Low doses of two or more antihypertensive agents lead to a greater reduction in BP than using the maximum dose of a single antihypertensive. Moreover, using low-dose combinations of antihypertensive agents reduces the rate of adverse effects.[7]

BP targets can be achieved in the majority of the population. Empowering patients to monitor their own BP and notify their healthcare team when their BP exceeds target levels is an important strategy to use. Monthly to bimonthly

TABLE 1 - Antihypertensive medications indicated for primary prevention of stroke

Drug class	Examples
Thiazide diuretics	Hydrochlorothiazide Indapamide Chlorthalidone
Angiotensin-converting enzyme inhibitors (ACE inhibitors)	Ramipril Perindopril Lisinopril Enalapril Trandolapril
Angiotensin receptor blockers (ARBs)	Losartan Candesartan Valsartan Irbesartan Olmesartan
Long-acting calcium channel blockers (CCBs)	*Dihydropyridine* Amlodipine Nifedipine XL (long-acting formulation) Felodipine *Non-Dihydropyridine* Diltiazem (long-acting formulations) Verapamil (long-acting formulations)

follow-up is important for those with uncontrolled hypertension, while those who are controlled can be followed at 3–6 month intervals.[5]

Assessing adherence

Helping patients adhere to their medication is an important aspect of treating hypertension. Evidence has shown that 30%–70% of patients do not take their antihypertensive medications as prescribed for a variety of reasons (e.g., experiencing side effects, not understanding purpose of medication).[8] Often, healthcare providers do not ask about medication-taking behaviour, including adherence, and when they do, effective communication strategies are not always used. Engaging patients in a collaborative discussion about behaviours surrounding medication-taking using open-ended questions is important to identify any medication issues, including nonadherence. Examples of open-ended questions include "Which medications are you taking for your blood pressure?" or "How often are you taking X medication?" as these, unlike yes and no answers, facilitate discussion. The first example question also allows the provider to assess the patient's knowledge of their antihypertensive medications. It is important to determine why patients do not take their medications before effective strategies can be implemented to improve adherence.

A multidisciplinary approach has been shown to be effective in improving adherence. Strategies that work to improve adherence are diverse and the success of any intervention depends on the initial reasons for nonadherence. Reminder packaging has been shown to be useful when forgetfulness is the reason for nonadherence. Additionally, simplifying the treatment regimen through the use of once-daily products or combination products has been shown to increase adherence. Given that many patients take more than one drug for the treatment of hypertension, it is useful to see if combinations can be used to minimize pill burden.[9]

Measuring BP properly

Proper BP measurement is so important, as patient treatment decisions are made based on the accuracy of BP readings. Evidence has shown that 24-hour ambulatory blood pressure monitoring (ABPM) is the gold standard for diagnosing hypertension. The 24-hour ABPM test is described in the sidebar. If a 24-hour ABPM is not available or feasible for the patient, home BP monitoring is the next best option. A home BP monitor is easy and feasible for most patients and provides valuable information for the healthcare provider. It is important that home BP readings are obtained using the proper technique. Table 2 outlines important instructions that should be given to patients if they are going to measure their BP at home.[5]

Patient resources

Many patient resources are available on the Internet; two that are important to mention are Hypertension Canada (www.hypertension.ca) and the Heart and Stroke Foundation of Canada (www.heartandstroke.ca). Both of these websites have credible patient information and provide healthcare professionals with patient education materials that can either be ordered or downloaded and printed for patients. Additionally, sections on both websites are directed toward the public to

AMBULATORY BLOOD PRESSURE MONITORING

Ambulatory blood pressure monitoring (ABPM) consists of a blood pressure (BP) cuff attached to a portable device that measures and stores BP measurements over 24–48 hours (24 hours is most common). BP is usually measured every 30 minutes during the daytime and every 60 minutes during sleep. At the end of the test, the portable device produces a report (through a computer program) outlining the BP readings over the time frame measured. Various statistics, such as overall BP average, as well as daytime BP and nighttime BP averages, are calculated for the clinician. The clinician can then use this information for either diagnosing hypertension or determining the effectiveness of a particular treatment regimen. ABPM is usually performed at a physician's office, or a specialty hypertension clinic, and some pharmacies are now offering this service. The cost is variable and can range from $40–$100.

If ABPM is not available, then automated office-based BP measurements (which can be done in a pharmacy practice setting) or home BP readings are reasonable alternatives.

TABLE 2 - Important Instructions for patients who want to use home BP monitors[10]

Parameter	Instructions
Selecting a home BP monitor	• Obtain one that is endorsed by Hypertension Canada to ensure that it has been tested for accuracy; it is recommended that pharmacies carry these. These monitors will contain the following symbol on their packaging:  • Select an upper-arm based monitor, as these are more accurate than wrist-based monitors. • Ensure the cuff is the correct size based on the circumference of the upper arm midway between the elbow and the shoulder. The size of the cuff should be stated on the box.
Proper set-up for measuring blood pressure	• Be comfortable, with no distractions; rest for 5 minutes before taking any readings. • Be seated with back support. • Arm should be supported at heart level (this is easiest at a table. • Feet should be uncrossed on the floor. • Only measure BP if you have time to do it correctly.
How often to measure blood pressure	• Twice daily is recommended: in the morning before taking medications and in the evening before taking medications. • Take at least two readings, waiting 1–2 minutes between readings and record the average of the readings along with the date and time.
Other considerations before measuring blood pressure	• Wait for at least two hours after a big meal or heavy physical activity. • Wait at least 30 minutes after drinking caffeine or smoking. • Empty bladder and bowels.

TABLE 3 - Education topics covered by Hypertension Canada and the Heart and Stroke Foundation of Canada

Hypertension Canada www.hypertension.ca ("Public" section of website, with information categorized as "What Do I Need to Know" and "What Can I Do?")	Heart and Stroke Foundation of Canada www.heartandstroke.ca
• Know my number • What is high blood pressure? • How to measure my blood pressure (including a blood pressure tracker tool) • What are the causes? • Health risks associated with high blood pressure • How to prevent and treat high blood pressure • Limit salt and sodium intake • Lifestyle information on smoking cessation, physical activity, stress-free living, maintaining healthy weight, limiting alcohol and taking medication as prescribed	• Health information on heart disease, stroke, and healthy living (this includes video stories) • Healthy recipes for all meals/snacks • Nutrition facts table • Healthy kids section • My Heart and Stroke Risk Assessment • Health eTools include - My Healthy Weight Action Plan (sign-up required) - My Healthy Blood Pressure Action Plan (sign-up required)

educate about hypertension, heart disease and stroke. Education topics include those outlined in Table 3.

Role of the technician

Pharmacy technicians can support pharmacists in providing care to patients with hypertension in a number of ways. First, patients' hypertension should be noted on their patient profiles. This will allow the technician to inquire about BP control when affected patients pick up their prescriptions. If patients do not know their BP, technicians can use an automated device to obtain an accurate BP reading, following the appropriate methods outlined in Table 2. Technicians can also educate patients on how to measure their BP properly and determine if home BP measurement is possible for a patient.

Importantly, technicians can be aware of the signs and symptoms of stroke and, after consultation with a pharmacist, ensure that patients who are experiencing these symptoms are immediately referred to the emergency room. Technicians can also determine if patients with hypertension have had a stroke or TIA, and note this on the patient's profile. These notes act as a red flag in ensuring these patients have their hypertension optimally controlled and are achieving the best possible BP levels. Additionally, if over-the-counter medication(s) are being purchased by, or for, a person with hypertension, the pharmacist should be consulted to ensure it is safe. Lastly, medication adherence assessments are also an important technician function. Nonadherence to antihypertensive medication is common and assessing adherence regularly can promote awareness of its importance. A conversation allows for exploration of medication-taking habits, including what is working well, what is not and whether the patient is experiencing any side effects that might lead to nonadherence. Technicians can review medication profiles to see if two or more of the medications that patients are taking are available as a combination tablet. They can also speak with patients to gauge interest in reminder packaging or dosettes. Having technicians assist with information-gathering supports the pharmacist's role, which is to determine if a patient's treatment plan is working optimally.

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QUESTIONS

Please select the best answer for each question or answer online at www.CanadianHealthcareNetwork.ca for instant results.

1. The blood pressure target in the home setting for adults younger than age 80 years without diabetes is
a) <140/90 mmHg
b) <135/85 mmHg
c) <130/80 mmHg
d) <120/80 mmHg

2. Which of the following is not a symptom of stroke or transient ischemic attack?
a) Weakness
b) Trouble speaking
c) Chest pain
d) Dizziness

3. Besides treating hypertension, another strategy for reducing the risk of stroke is
a) Taking a multivitamin
b) Reducing cholesterol levels
c) Increasing fat intake
d) Minimizing daily exercise

4. It is recommended that those with hypertension get regular physical exercise. This is defined by Hypertension Canada as
a) 10 minutes of mild activity 3x/week
b) 90 minutes of vigorous activity 4x/week
c) 60 minutes of jogging or running 2x/week
d) 30-60 minutes of moderate activity 4–7x/week

5. Beta-blockers are not recommended as initial monotherapy to treat hypertension in those older than age 60 years because
a) They increase the risk of heart attack compared with other antihypertensives
b) They are associated with increased adverse effects in this age group
c) They increase the risk of stroke compared to other antihypertensives
d) They do not lower blood pressure

6. According to the Canadian Hypertension Education Program, if someone has had a stroke and is trying to prevent a second one, the recommended combination drug therapy for lowering blood pressure, assuming kidney function is normal, is
a) An ACE inhibitor and a thiazide diuretic
b) An ARB and a long-acting CCB
c) An ACE inhibitor and an ARB
d) A long-acting CCB and a thiazide diuretic

7. Which of the following steps is not necessary to properly measure BP at home?
a) Resting for one minute before taking any BP readings
b) Providing support to the back
c) Having the arm at heart level
d) Feet are uncrossed and flat on floor

8. Selecting a home blood pressure monitor should include the following steps:
a) Purchasing one endorsed by Hypertension Canada
b) Use of an upper-arm cuff that is the correct size
c) Use of a wrist cuff that is the correct size
d) a and b only

9. Factors that increase blood pressure include
a) Caffeine
b) Crossing legs
c) Exercise
d) All of the above

10. A patient assessment for adherence should include which of the following?
a) Speaking with each patient about their medication-taking behaviour
b) Reviewing the medication profile to see if any medications can be combined
c) Asking patients if they are experiencing any side effects that may be caused by their medication(s)
d) All of the above

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First Name _____ Last Name _____

Pharmacy Name _____

Primary Licensing Province _____ Licence # _____ Secondary Licensing Province _____ Licence # _____

Home Address _____ City _____ Province _____

Postal Code _____ Telephone _____ Fax _____

Email _____ Year Graduated _____

Type of practice
❑ Drug chain or franchise
❑ Banner
❑ Independent
❑ Mass merchandiser
❑ Grocery store pharmacy
❑ Hospital pharmacy
❑ Other (specify): _____

❑ Full-time technician
❑ Part-time technician

Are you a certified technician?
❑ Yes ❑ No

Please help ensure this program continues to be useful to you by answering these questions.

1. Do you now feel more informed about "Stroke and hypertension"? ❑ Yes ❑ No
2. Was the information in this lesson relevant to you as a technician? ❑ Yes ❑ No
3. Will you be able to incorporate the information from this lesson into your job as a technician? ❑ Yes ❑ No ❑ N/A
4. Was the information in this lesson... ❑ Too basic ❑ Appropriate ❑ Too difficult
5. How satisfied overall are you with this lesson? ❑ Very ❑ Somewhat ❑ Not at all
6. What topic would you like to see covered in a future issue?_____

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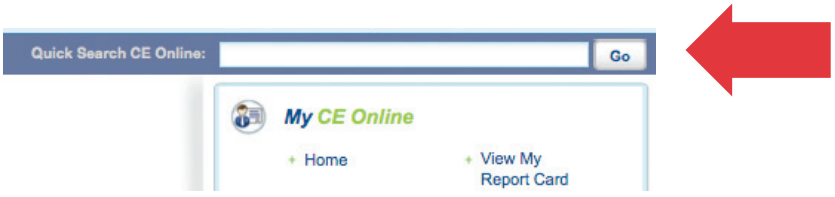

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