Managing hypertension in primary care

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In Canada, hypertension is one of the most common reasons for patients to visit their family physicians.[1] Further, most patients with hypertension are managed in a primary care setting by family physicians rather than other specialists.[2] With cardiovascular disease being one of the leading causes of death in Canada, improved management of hypertension is key in reducing risk.[3]

To support primary care providers with the management of hypertension, as well as patients with self-measurement of blood pressure at home, we created 2 infographics (**Figures 1** and **2**), also available at **CFPlus**.* To do this, we considered evidence from landmark trials and recommendations from Canadian and American guidelines. The 2-page infographic (**Figure 1**) on hypertension management is described in the following sections.

When to start a drug?

Evidence for when to start a drug is mixed, and primary care providers should choose a threshold based on patient preference (drug or nondrug options), comorbidities, and frailty. Additionally, it is important to rule out short-term factors that could be temporarily increasing blood pressure (eg, sickness, pain, stress, trauma).

For primary prevention (no history of coronary artery disease, heart attack, stroke, heart failure, or other cardiovascular risk factors†), strong evidence supports the use of an antihypertensive drug once the blood pressure level exceeds 160/100 mm Hg.[4,5] For secondary prevention (history of heart attack or stroke) or patients with a 10-year Framingham cardiovascular risk score of 15% or higher, evidence to support the use of an antihypertensive drug once the blood pressure level exceeds 140/90 mm Hg is generally positive.[4] For patients with diabetes (type 1 or type 2), lower-quality evidence‡ suggests that a drug should be started once the blood pressure level exceeds 130/80 mm Hg.[4]

What drug to start first?

To start, prescribe the lowest available dose of a first-line antihypertensive drug and schedule a follow-up blood pressure check 4 weeks later.[6] This is the approach used in several landmark antihypertensive trials such as ALLHAT (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial) and SPRINT (Systolic Blood Pressure Intervention Trial). Recommended first-line monotherapy drugs are listed in **Figure 1**.* Of note, long-acting thiazide-like diuretics such as chlorthalidone and calcium channel blockers (CCBs) such as amlodipine are more effective and safer than angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) in black patients.[7]

When choosing a drug, consider the landmark ALLHAT study, which demonstrated that chlorthalidone lowers cardiovascular risk more than amlodipine and lisinopril do.[8] Chlorthalidone is longer acting and has more consistent evidence supporting its blood pressure–lowering and cardiovascular risk–lowering effects than hydrochlorothiazide does.[9]

What blood pressure goal to aim for?

Once drug therapy is started, consider the patient's overall health and preferences when setting a blood pressure goal. Strong evidence suggests that most patients taking an antihypertensive medication should aim for a blood pressure level below 140/90 mm Hg.[4] Grade C evidence suggests that patients who have diabetes should aim for a level below 130/80 mm Hg.[4] High-risk patients with specific cardiovascular risk factors might consent to aim for a systolic goal of 120 mm Hg.[4]

For patients whose blood pressure levels are consistently above their goals despite taking the usual dose of a first-line antihypertensive drug, expert opinion suggests adding a drug with a complementary mechanism of action.[4,10] For example, a patient taking chlorthalidone should usually have an ACEI or ARB added instead of a CCB.[4,10]

Follow-up with the patient

Measuring blood pressure in the clinic and at home. Prescribers might find it helpful to ask patients to monitor their blood pressure at home if they suspect a white-coat effect.[4,11] To ensure accurate results are obtained, patients should be taught proper technique (**Figure 2**).*

Laboratory monitoring. Before initiating or adjusting the doses of ACEIs, ARBs, or diuretics, electrolyte and serum creatinine levels should be measured at baseline. Once the drug or new dose has been started, the same laboratory parameters should be measured within 1 to 2 weeks. Patients at higher risk of hyperkalemia or acute kidney injury should get bloodwork within 7 days.[12]

*The **infographics** on **managing hypertension (Figure 1)** and on **how to take blood pressure at home (Figure 2)** are available at **www.cfp.ca**. Go to the full text of the article online and click on the **CFPlus** tab.

†Risk factors include increasing age, tobacco smoking, poor eating habits, excess weight in the abdominal area, uncontrolled diabetes, high cholesterol, male sex, and family history of cardiovascular disease.[4]

‡Grade C evidence involves the following: "Recommendations are based on trials that have lower levels of internal validity and/or precision, or trials reporting unvalidated surrogate outcomes, or results from non-randomized observational studies."[4]

Figure 1

Managing **Hypertension**

1 When to start a drug and what to aim for?

The threshold to start a drug may be different from the blood pressure goal for a patient on drug therapy

	Primary Prevention & Lower Risk	Secondary Prevention & Higher Risk	Diabetes
Who is included	◦ No history of heart disease, heart attack, heart failure, or stroke	◦ History of heart attack/stroke **OR** ◦ 10-year Framingham CV risk score >15%	◦ Type 1 ◦ Type 2
When to start a drug (threshold)	◦ >160/100 mmHg (Grade A)	◦ >140/90 mmHg (SBP Grade C; DBP Grade A)	◦ >130/80 mmHg (Grade C)
What to aim for (goal)	◦ <140/90 mmHg (Grade A)	◦ <140/90 mmHg (Grade A)	◦ <130/80 mmHg (Grade C)

Table is based on the 2018 Hypertension Canada guidelines. SBP (systolic), DBP (diastolic). Grade A evidence: strong evidence; Grade B evidence: moderate evidence; Grade C evidence: weak evidence.

Some patients with specific cardiovascular risk factors may opt for a more intensive systolic BP goal of 120 mmHg (Grade B)

Help patients choose a threshold and goal based on their preferences, medical history, and frailty

Consider waiting if there is a short-term cause of hypertension (e.g., pain, stress, trauma)

Intervention	Decrease in Systolic Blood Pressure
Antihypertensive drug	~ 10 mmHg
Modify diet (e.g., DASH diet)	~ 11 mmHg
Reduce alcohol intake (men ≤2 drinks/day; women ≤1 drinks/day)	4 mmHg
Exercise more (90-150 min/week of aerobic + resistance training)	4 - 8 mmHg
Lose weight	1 mmHg / kg lost

Table is adapted from the American College of Cardiology 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults.

2 What drug to start first?

There's no rush to lower BP. Start with a low dose.

First Line Drugs	Example
Thiazide-like diuretics	Chlorthalidone†
ACE-inhibitors	Ramipril
ARBs	Candesartan
Long-acting calcium channel blockers	Amlodipine
Beta-blockers (under age 60)	Bisoprolol

†Often used first because it lowers cardiovascular risk more than amlodipine and lisinopril (ALLHAT 2002)

Note: ACE-inhibitors are not first line for black patients because they are less effective than diuretics and CCBs and have more side effects (angioedema and cough).

3 When to add another drug?

- If BP is above goal at the maximum tolerated dose
- If BP is above goal in a series of readings at a single office visit or at home

Expert opinion suggests patients respond best when a drug is used from A and B.

A	B
ACE-inhibitors/ARBs	Thiazide/Thiazide-like diuretics
Beta-blockers	Calcium channel blockers

Table is based on the 2018 Hypertension Canada guidelines and the 2001 Canadian Hypertension Recommendations.

ACE-inhibitors = Angiotensin Converting Enzyme inhibitors
ARBs = Angiotensin Receptor Blockers
CCBs = Calcium Channel Blockers
SCr = Serum Creatinine

Figure 1 *continued on page 727*

Figure 1 *continued from page 726*

Figure 1

Managing **Hypertension**

4 Measuring Blood Pressure in Clinic

Tips for healthcare professionals:

Take ≥3 readings/visit every 4 weeks after starting or changing a drug

Once stable, recheck blood pressure every 6 months and ask about side effects

Educate patients on proper home blood pressure monitoring if:

Clinic readings are different from home readings

An antihypertensive drug has been started, changed, or stopped

Monitoring for Side Effects

Thiazide-like diuretics, ACE-inhibitors, ARBs:
Check electrolytes and serum creatinine at baseline, 1 week after starting, and 1 week after a dose increase

Drug Class	Side effects that may require a change in dose	Side effects that may require a change in drug
Thiazide-like diuretics	◦ Symptomatic hypotension	◦ Recurrent gout attacks, hyponatremia
ACE-inhibitors, ARBs	◦ Symptomatic hypotension	◦ Hyperkalemia >5.6 mmol/L or increase in SCr >30% from baseline, angioedema ◦ Dry cough (switch from ACE-inhibitor to ARB)
Calcium channel blockers	◦ Symptomatic hypotension, ankle edema, headache	◦ If side effects are not tolerated by patient
Beta-blockers	◦ Exercise intolerance, symptomatic bradycardia	◦ If side effects are not tolerated by patient, advanced heart block (i.e. 2nd degree or greater)

5 Special Situations

Resistant Hypertension

def. Patient meets the following criteria:

- Blood pressure above goal;
- Taking at least 3 antihypertensive drug classes (i.e., diuretic, CCB, ACE-inhibitor/ARB);
- Drugs are at maximally tolerated doses;
- Patient is adherent.

Preferred treatment:

More effective to add spironolactone than a beta-blocker or an alpha-blocker for patients with resistant hypertension. Monitor for hyperkalemia. (PATHWAY-2 2016)

When to Refer to Hospital

If BP is markedly elevated, refer to hospital if any of these occur:

- Nausea, vomiting, confusion
- Sudden shortness of breath, heavy chest pain
- Sharp, tearing chest and back pain

Hypertensive emergencies occur when patients have markedly elevated blood pressure that causes acute target organ damage (kidney, heart, brain).

1. The 2018 Hypertension Canada Guidelines. https://guidelines.hypertension.ca/
2. RxTx. Ottawa (ON): CPhA; c2018. CTC online: Hypertension; Available from: www.myrxtx.ca.
3. Oral Antihypertensives: Summary/Guidelines Comparison Chart. www.rxfiles.ca.
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6. ALLHAT. JAMA. 2002;288(23):2981–2997.
7. Zhang Y et al. Hypertension. 2011;58:155-160.
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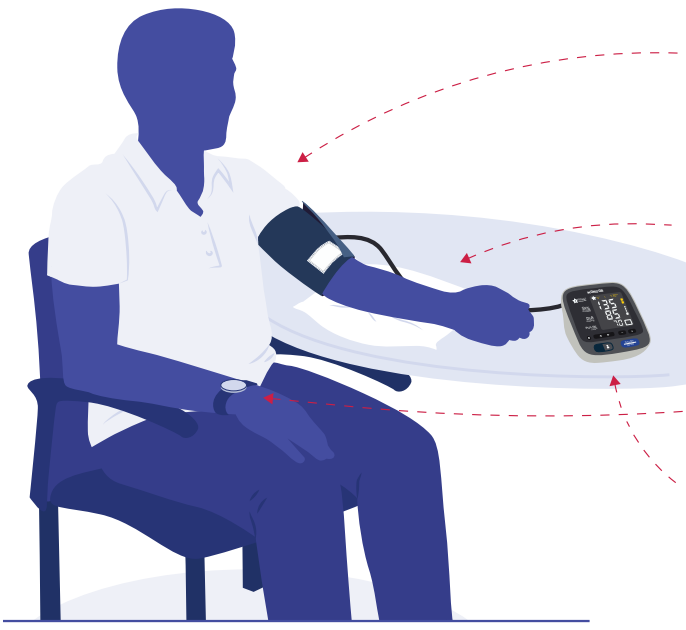
Figure 2

How to Take Blood Pressure at Home

If your blood pressure is high at the doctor's office, you may want to check your blood pressure at home.

You can also check your blood pressure before a doctor's appointment or after starting a new medication for blood pressure.



1. Check **in the morning and in the evening for one week** before visiting your healthcare professional.
2. Take 3 readings in a single sitting. You can ignore reading #1, and record reading #2 and #3.
3. Sit in a chair with your back supported, legs uncrossed and feet flat on the floor. A kitchen chair works well.
4. Put the blood pressure cuff on your bare arm. The cuff should be 2 finger widths above the bend in your arm.
5. Use a pillow or table top to raise your arm to the level of the centre of your chest.
6. When comfortable, rest for 5 minutes (no speaking and phone ringer off). Try reading a book or magazine. Have a clock nearby to help you measure 5 min.
7. After 5 minutes have passed, start the blood pressure device.

8. Face the device away from you. Watching the numbers can make your blood pressure go up.
9. 1 minute after the first reading is finished, start the machine for reading #2. Remember, you can ignore reading #1.
10. Write down reading #2. 1 minute later, start the machine again. Write down reading #3, and you're finished.

Ask your doctor, nurse, or pharmacist about what BP goal would be best for you.

When checking your blood pressure at home, use a Hypertension Canada approved device. For a list of validated devices, visit: https://hypertension.ca/hypertension-and-you/managing-hypertension/measuring-blood-pressure/devices/

Tips to measure your blood pressure accurately:

- Make sure the cuff fits you properly. Check the instructions in the box or ask your doctor, nurse, or pharmacist to help
- A cuff too small or too loose can make your blood pressure higher or lower, respectively
- The cuff should be tight around your arm (only 1 finger should fit easily under the cuff)
- Stressed? Make a note about it or delay the measurement
- Measurements should be taken before breakfast and 2 hours after dinner
- Avoid caffeine and tobacco 30 minutes before measuring your blood pressure
- Avoid exercise 60 minutes before measuring your blood pressure

The 2018 Hypertension Canada Guidelines. https://guidelines.hypertension.ca/
Muntner P et al. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. Hypertension. 2019;71:e1–e32.

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If serum creatinine levels rise higher than 30% over baseline after starting an ACEI or ARB, the drug should be stopped and serum creatinine levels rechecked in 3 days.[13] If the level increase is from a temporary cause such as dehydration, the drug can be restarted once the event is resolved.[13] If no cause is identified, consider the possibility of renal artery stenosis or a drug-induced kidney injury. With both options, the drug should be discontinued, and the primary care provider should request the appropriate laboratory workup for the patient and the patient might require referral to nephrology.[13] Angiotensin-converting enzyme inhibitors and ARBs can also increase serum potassium concentrations. A serum potassium level higher than 5.6 mmol/L generally requires a dose reduction or discontinuation of the medication.[14]

Special situations

Resistant hypertension. Patients who do not reach their blood pressure goals despite having used at least 3 different antihypertensive drugs—a diuretic, an ACEI or ARB, and a CCB—might have resistant hypertension.[15] If the patient is adherent to therapy and the drugs are at the patient's maximally tolerated doses, it is more effective to add spironolactone than a β-blocker or an α-blocker.[16] If spironolactone is added, monitor for elevated potassium levels.[16]

When to refer. If you suspect your patient is experiencing a hypertensive emergency, refer him or her to the hospital. Hypertensive emergencies are characterized by acute target organ damage (kidneys, heart, or brain) in the setting of a notably elevated blood pressure level. There is no specific blood pressure measurement that defines a hypertensive emergency, as it is dependent on the signs or symptoms of organ damage (see **Figure 1** for a list of symptoms).[17]

Conclusion

Our 2-page infographic on managing hypertension (**Figure 1**) is a great tool for primary care providers to use as an easy reference to our discussion in this article. **Figure 2** provides a stepwise approach to taking blood pressure at home and can be a resource for your patients. Each figure can be easily accessed from **CFPlus**.*

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Competing interests

None declared

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