



Hypertension – Diagnosis and Management

Effective Date: April 15, 2020

Scope

This guideline provides recommendations on how to diagnose and manage hypertension (HTN) in adults. Management of secondary causes of HTN,* accelerated HTN, acute HTN in emergency settings, and HTN in pregnancy are out of scope.

For an algorithm of this guideline, refer to [Appendix A: Diagnosis and Management of Hypertension Algorithm](#).

Key Recommendations[†]

► Hypertension is a modifiable risk factor for cardiovascular disease (CVD) and an important public health issue.

► Detection and Diagnosis

1. When measuring blood pressure in the office, the use of an automated office blood pressure (AOBP) electronic device is recommended in patients with regular heart rate.¹⁻³ [Strong Recommendation, Strong Evidence]
2. Hypertension is diagnosed in adults when automated office blood pressure reading is $\geq 135/85$ in the higher BP arm. [Strong Recommendation, Strong Evidence]
When a manual office blood pressure device (MOBP) is used hypertension is diagnosed at $\geq 140/90$.⁴⁻⁶ [Strong Recommendation, Strong Evidence]
3. Consider 24-hour ambulatory blood pressure monitoring, or standardized home blood pressure monitoring, to confirm a hypertension diagnosis in all patients⁷. [Strong Recommendation, Strong Evidence]

► Management

1. A desired blood pressure level should be determined with each adult patient. Achieving an automated blood pressure reading of $\leq 135/85$ is associated with the greatest reduction of risk for adults with no co-morbid conditions.⁸⁻¹⁰ [Strong Recommendation, Strong Evidence]
2. Health behaviour change is recommended as a first step for those with average blood pressure 135-154/85-94 (AOBP), low-risk for cardiovascular disease and no co-morbidities.¹¹ [Strong Recommendation, Strong Evidence]
3. Initiate pharmaceutical management in context of the patient's overall cardiovascular risk and not solely on their blood pressure.^{12,13} [Strong Recommendation, Strong Evidence]

* For examples of secondary causes of HTN, refer to [Appendix C: Examples of Secondary Causes of Hypertension](#).

† Strength of recommendation came from guidelines that used a GRADE approach, where available. If not present, the strength was based on consensus of the GPAC Guideline committee.

Quality Indicator – For a list of Quality Indicators refer to [Appendix E: Hypertension Quality Indicators](#).

Definition

An elevated automated office blood pressure (AOBP) is defined as an average systolic blood pressure (SBP) of > 135 mm Hg or an average diastolic blood pressure (DBP) of > 85 mm Hg or both with best available technique.

White-coat hypertension refers to the untreated condition in which BP is elevated in the office but is normal when measured by ambulatory blood pressure monitoring (ABPM), home blood pressure measurement (HBPM), or both.

Masked hypertension refers to untreated patients in whom the BP is normal in the office but is elevated when measured by HBPM or ABPM.

Classification

Based on the average BP recorded, hypertension is classified as High-Normal, Stage 1, Stage 2, and Stage 3 (Figure 1. Note: Figure 1 lists MOBP values only for Stage 2 and 3 since validated AOBP levels are currently unavailable). Management of hypertension based on the classification should be further informed and guided by the patient's CVD risk, organ damage, and presence of co-morbidities.

Figure 1: Hypertension Classification

AOBP		135-154* 85-94		Systolic (mm Hg) Diastolic (mm Hg)	
Low Normal		Normal		High Normal	
MOBP		120-129 80-84		130-139 85-89	
<120 <80		140-159 90-99		160-179 100-109	
		Stage 1		Stage 2	
				Stage 3	
				≥180 ≥110	
				Systolic (mm Hg) Diastolic (mm Hg)	

*Validated AOBP levels for the other classifications are currently unavailable and hence only previously published MOBP levels are listed.

Epidemiology

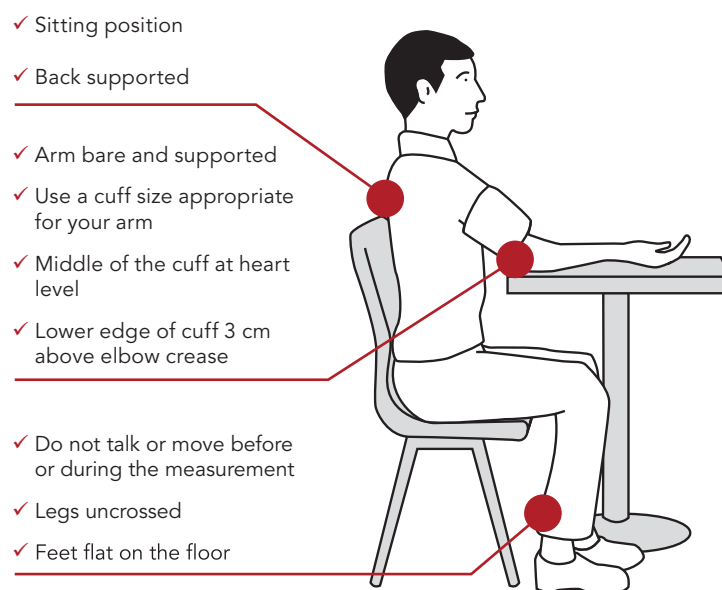
In BC, the age standardized prevalence rate for hypertension is 22.5 (per 100) and the age standardized annual incidence rate is 20.2 (per 1000 people over the age of 20) for 2017/18.¹⁴

Detection

Screening blood pressure should be recorded as accurately as possible in all adults at every appropriate visit. At appropriate visits, ask permission to check BP on all adults (trauma-informed practice). Inform patients that they may be sensitive to the tightening of the cuff on their arm.

Ensure standardized technique for measurement of BP (see Figure 2) and equipment are being used (see Table 1 in [Appendix B: Recommended Methods and Techniques for Measuring Blood Pressure](#)).^{3,15}

Figure 2: Standardized Technique for Hypertension Measurement (Image reproduced from Hypertension Canada Guideline⁶)



Diagnosis

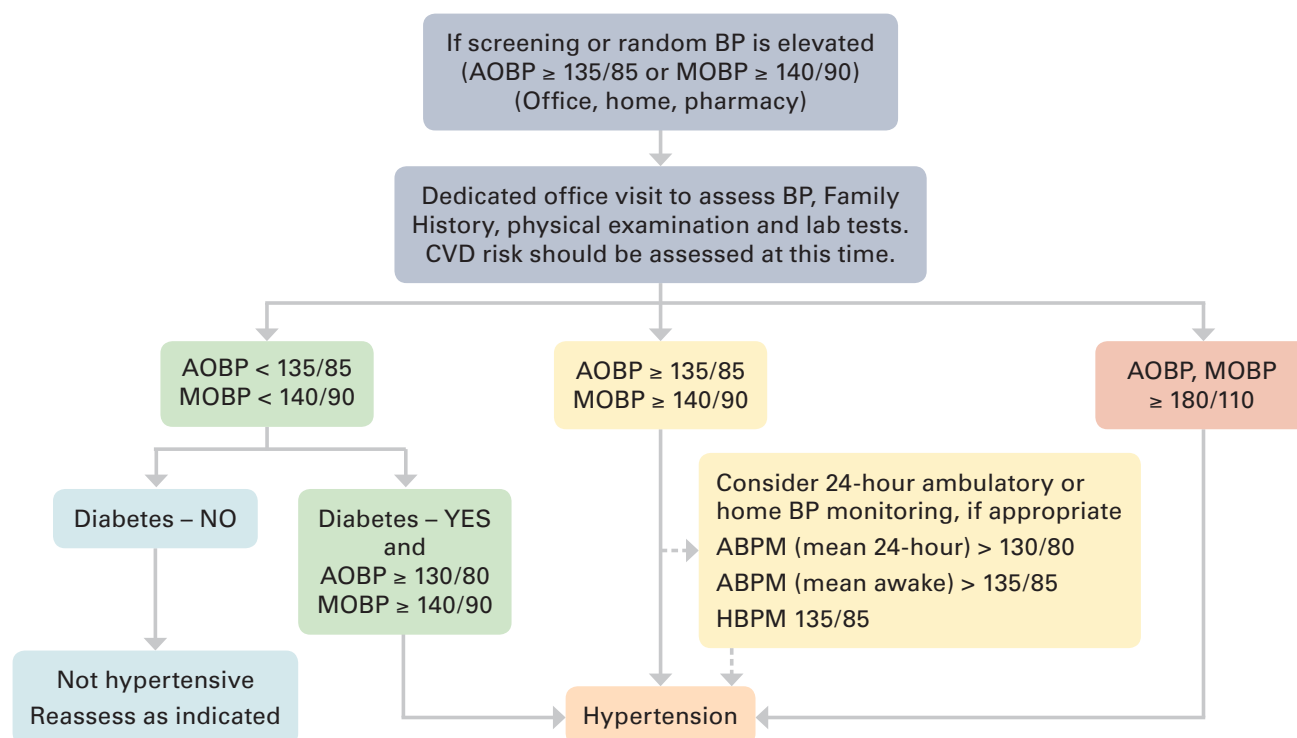
► Assessment of Blood Pressure

- Automated office BP measuring electronic device is recommended, in preference to manual office BP technique. Using automated office BP reduces errors and avoids an overestimation of BP values (white-coat HTN), underestimation of BP values (masked HTN), reduces threshold avoidance (where the BP reading is adjusted to avoid thresholds that entails making a diagnosis) and digit preference (rounding their BP recording to a nearest zero end-digit).^{2,16,17} The advantages and limitations of the different methods are listed in [Appendix B: Recommended Methods and Techniques for Measuring Blood Pressure – Table 1](#).
- Assessment of postural hypotension should be included for appropriate patients (e.g., elderly).
- Ensure patient has not consumed caffeine or smoked in the last 30 minutes. Measure BP in both arms with the patient in a seated position resting quietly for at least 5 mins prior to measuring. Select the arm with the higher reading for further measurements. If average AOBP using the arm with the higher reading exceeds threshold for Hypertension diagnosis, proceed to investigations and work-up to assess target organ damage and cardiovascular disease (CVD) risk. **If still using manual office technique, measure BP three more times using the arm with the higher reading, then discard the 1st reading and average the latter two.**
- Consider 24 hour ambulatory or home BP monitoring for patients with borderline or variable measurements, significant anxiety or white coat syndrome.¹⁸

Table 1: Definition of Hypertension (in uncomplicated patients without co-morbidities)

Definition of Hypertension according to measurement method	SBP mm Hg	DBP mm Hg
	(and/or)	
Automated Office BP (AOBP)	≥135	≥85
Manual Office BP (MOBP)	≥140	≥90
Ambulatory BP monitoring (ABPM)		
Daytime (awake) mean	≥135	≥85
Night-time (asleep) mean	≥120	≥70
24 hr mean	≥130	≥80
Home blood pressure measurement (HBPM) mean	≥135	≥85

Figure 3. Diagnosis of hypertension algorithm



Abbreviations: AOBP = automatic office blood pressure; ABPM = ambulatory blood pressure monitoring; BP = blood pressure; CVD = cardiovascular disease; DBP = diastolic blood pressure; HBPM = home blood pressure monitoring; MOBP = manual office blood pressure.

► Evaluation and Investigations

Medical history

Collect personal and family medical history to identify risk factors and potential secondary causes of hypertension (See [Appendix C: Examples of Secondary Causes of Hypertension](#)).

Risk Factors

- **Modifiable:** smoking; high alcohol consumption; low physical activity levels/sedentary lifestyle; unhealthy eating (such as high sodium intake and low vegetable and fruit intake); body composition (e.g., high body weight, high body mass index, waist circumference); poor sleep; poor psychological factors (e.g., stress levels).
- **Non-modifiable:** age; family history; ethnicity (e.g., African, Caribbean, South Asian including East Indian, Pakistani, Bangladeshi, Sri Lankan origin)
- Prescription drugs (e.g., nonsteroidal anti-inflammatory drugs (NSAIDs), steroids, decongestants, oral contraceptive use); others (e.g., alcohol, stimulants, sodium).

Indications for a secondary cause of hypertension

- Severe or refractory hypertension;
- An acute rise over previously stable values;
- Age < 30 years without family history; and/or
- No nocturnal fall in blood pressure (BP) during a 24-hour ambulatory BP monitoring period.

Refer to [Appendix C: Examples of Secondary Causes of Hypertension](#) for more details.

Physical examination

- Weight, height, waist circumference, dilated fundoscopy, central and peripheral cardiovascular examination, and abdominal examination.

Laboratory tests

- Urinalysis - albumin to creatinine ratio (ACR), hematuria
- Blood chemistry - potassium, sodium, creatinine/estimated glomerular filtration rate (eGFR)
- Fasting blood glucose or hemoglobin A1c level
- Blood lipids – non-HDL cholesterol and triglycerides (non-fasting is acceptable)
- Electrocardiogram (ECG) standard 12-lead

Cardiovascular Risk Assessment

Administer a Cardiovascular Risk Assessment using one of the several assessment tools available, including the Framingham Risk Score (for patients age ≤ 74), [Qrisk risk calculator](#) (for patients age ≤ 84), [Absolute CVD Risk/Benefit Calculator](#) (for patients age ≤ 80). It is recommended to be familiar with at least one of the tools to predict CVD risk.

- CVD risk assessment tools can provide only an approximate CVD risk value and clinical judgement is essential in the interpretation of the scores. Some tools (e.g., QRISK2) may not provide accurate risk scores when co-morbidities such as non-insulin dependent diabetes mellitus is present.¹⁹
- Use of risk assessment tools is not recommended for those with type 1 diabetes mellitus²⁰ or chronic kidney disease due to the known increased risk of CVD in this group²¹.

Refer to [BCGuidelines.ca: Cardiovascular Disease – Primary Prevention](#) for further information on cardiovascular risk.

► Indications for Consultation

Indications for consultation with a specialist include:

- Hypertensive emergency – DBP > 130 or BP > 180/110 with signs/symptoms[§];
- Sudden onset in the elderly;
- Abnormal nocturnal BP differences¹⁸ – an extreme nocturnal BP dip (>20%), non/small nocturnal BP dip (<10%), or an increase in nocturnal BP are at risk for CVD;
- Signs or symptoms suggesting of secondary causes of the HTN (See [Appendix C: Examples of Secondary Causes of Hypertension](#));
- Resistant HTN – Not achieving desired BP despite considerable treatment effort; and
- More than 15 mm Hg difference between the arms.

Management

Once a diagnosis has been confirmed, conduct a patient-centred discussion to agree upon desirable BP readings and an individualized treatment plan. Engage the patients in committing towards changes in lifestyle to lower their BP and informed decisions on pharmacological interventions. This discussion should consider any benefits and potential harms.

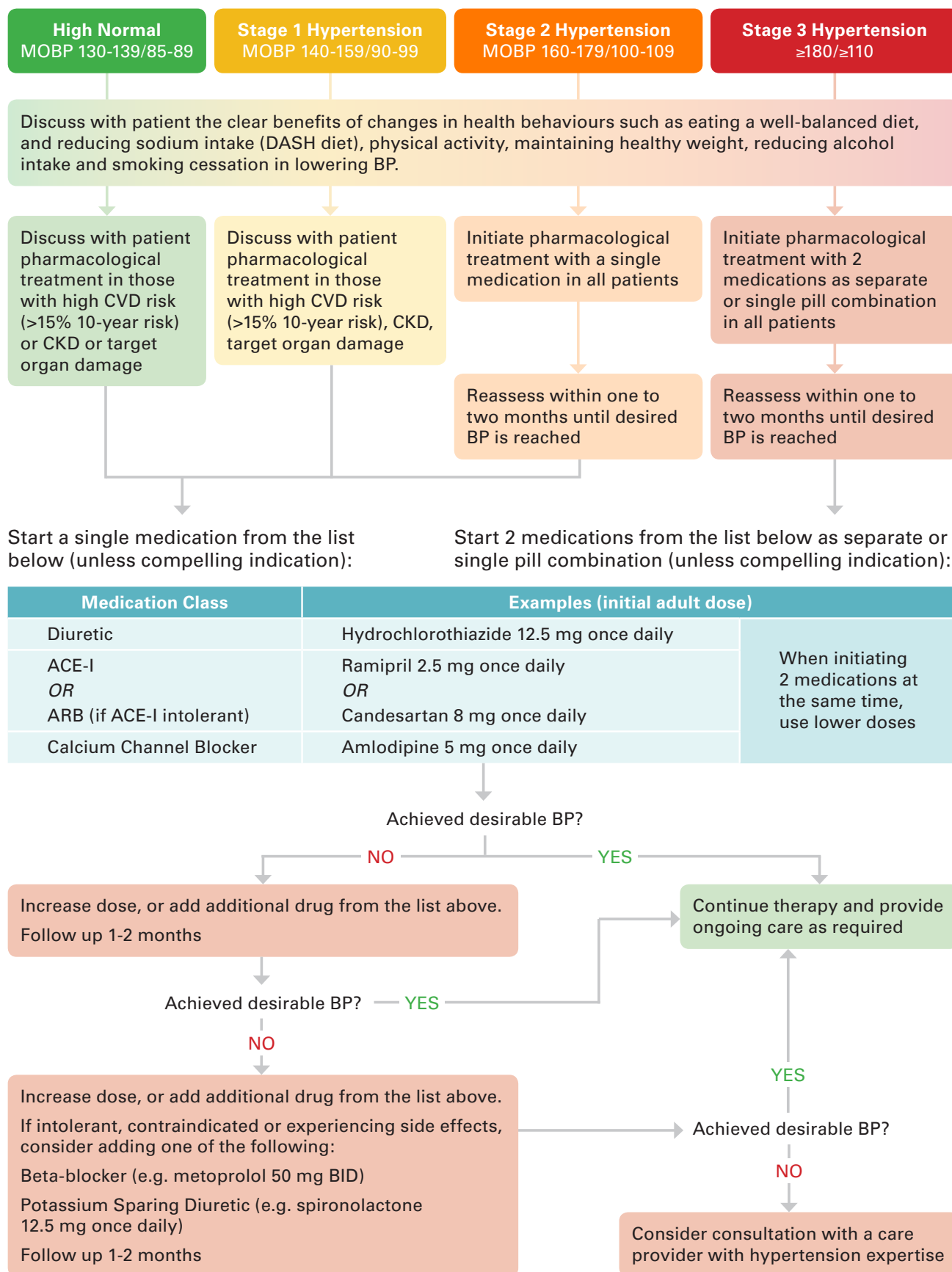
► Desirable Blood Pressure Readings

AOBP less than 135/85 is the desirable blood pressure reading for an adult with no-comorbid conditions, diabetes, chronic kidney disease or other target organ damage.^{4–6,8} However, an individual patient's desirable BP is influenced by their age, presence of target organ damage, CVD risk level and/or the presence of other CVD risk factors (refer to [BCGuidelines.ca: Cardiovascular Disease – Primary Prevention](#)) and influenced by patient preferences, medication side effects and medication compliance.

This guideline uses the term 'desirable BP' instead of 'targets' to encourage individualized and patient-centred care. The suggested desirable BP readings of $\leq 135/85$ is provided as guidance only, since recommending a uniform threshold for all patients or even patient groups is not optimal. Also, the term 'targets' is not used because the treat-to-target approach is not recommended.

§ For more information on difference between hypertensive urgency and emergency, refer to www.rxfiles.ca/rxfiles/uploads/documents/Hypertensive-Urgency-Management.pdf

Figure 4: Management of Hypertension



► Healthy Behaviours

Recommend health behaviour changes for all patients with hypertension. The benefits of healthy behaviours such as smoking cessation, decreasing alcohol intake, increasing physical activity, obtaining or maintaining a healthy body composition, eating a well-balanced diet, and monitoring sodium intake has been shown to have clear benefits for high normal, stage I, and stage II hypertensive patients.^{22,23}

Patients in B.C. can access registered dietitian and exercise physiologist services by calling 8-1-1. Patient resources on lowering blood pressure are available through [HealthLinkBC - Lifestyle Steps to Lower Your Blood Pressure \(www.healthlinkbc.ca\)](http://www.healthlinkbc.ca). Additional links for patient resources are available under [Practitioner Resources](#) and in 'A Guide for Patients: Diagnosis and Management of Hypertension'.

Health behaviour modification is recommended as a first line intervention for those in the high normal group (125/75-134/84 mm Hg) and those with stage I and II hypertension with <15% 10-year CVD risk. Recent meta-analyses and clinical trials showed pharmacologic treatment in the high-normal group and stage I and stage II group without established CVD and low to moderate CVD risk only minimally reduced the risk of cardiovascular morbidity and mortality and no reduction in all-cause mortality and coronary heart disease.^{4,5,12,13,24,25}

Table 2. Impact of health behaviours on blood pressure^{23,26}

<i>Intervention</i>	<i>SBP (mm Hg)</i>	<i>DBP (mm Hg)</i>	<i>Goal</i>
DASH diet ^b	-11.4	-5.5	
Weight control	-6.0	-4.8	• BMI < 25 kg/m ² ; WC ≤ 102/88 cm (Caucasian men/women), ≤ 90/80 cm (Asian men/women)
Reduced salt/sodium intake	-5.4	-2.8	• < 2000 mg of sodium ^a
Reduced alcohol intake (heavy drinkers)	-3.4	-3.4	• ≤ 2 drinks/day
Physical activity	-3.1	-1.8	• 30-40 minutes 4-7 days/week
Smoking cessation	-	-	• Smoke free environment
Relaxation therapies	-3.7	-3.5	-
Multiple interventions	-5.5	-4.5	-

Abbreviations: BMI = body mass index; DASH = dietary approaches to stop hypertension; DBP = diastolic blood pressure; kg/m² = kilogram per square metre; mm Hg = millimetre of mercury; SBP = systolic blood pressure; WC = waist circumference.

Footnotes: ^a Hypertension Canada now recommends a salt/sodium intake threshold 2000 mg (5 g of salt/sodium) per day. The previous threshold was ≤ 1500 mg (3.75 g of salt/sodium) and was changed based on clinical trial evidence from two systematic reviews published in 2013. The aim is to identify salt sensitive patients. ^b There are no mortality outcome studies of the DASH diet.

► Pharmacologic Management

Instigate pharmaceutical management in context of the patient's overall CVD risk (e.g., not solely based on a patient's BP) and in conjunction with health behaviour change.^{27,28}

Pharmacologic management should be considered in addition to lifestyle management if:

- 1) average BP is > 135/85 with target organ damage or CVD risk >15%;
- 2) average BP is > 135/85 with 1+ co-morbidities (refer to Table 4 for co-morbidities list);
- 3) average BP is ≥ 160/100; or
- 4) desirable BP is not reached with health behaviour change.

Treatment of Hypertension without Specific Indications

When prescribing, take into account cost of the drug, any potential side-effects and any contraindications.^{25,29–31}

Without specific indications, consider monotherapy or single pill combination with one of the following first-line drugs³²:

- low-dose thiazides and thiazide-like diuretic;
- long-acting calcium channel blocker (CCB);
- angiotensin converting enzyme inhibitor (ACE-I; in non-black patients); or
- angiotensin II receptor blocker (ARB).

Table 3. Contraindications for antihypertensive medications

Drug	Contraindications	Precautions
Angiotensin converting enzyme inhibitors	Pregnancy History of angioedema	Electrolyte imbalances Severe renal impairment
Angiotensin II receptor blocker	Bilateral renal artery stenosis	
Beta-blockers	Second- or third-degree AV block Sick sinus syndrome or SA block Bradycardia Decompensated HF Severe peripheral arterial circulatory disorders	Athletes and physically active patients Asthma (non-selective BBs)
Calcium Channel Blockers – Dihydropyridine (e.g., amlodipine)		Heart Failure Pre-existing severe leg edema Severe aortic stenosis Chronic constipation
Thiazides and Thiazide-like diuretics	Anuria	Gout Glucose intolerance Electrolyte imbalances Significant hepatic disease

Among these, thiazide diuretics are the least costly agents. Evidence suggests a non-significant difference in CV events and all-cause mortality between chlorthalidone and hydrochlorothiazide.^{33,34} In a recent meta analysis of routinely collected health data, chlorthalidone was associated with a significantly higher risk of hypokalemia, hyponatremia, acute renal failure, chronic kidney disease, and type 2 diabetes mellitus when compared to hydrochlorothiazide.³⁵

Note that alpha-blockers and beta-blockers are no longer considered to be a first-line option.³⁶

If desirable BP is not achieved with standard-dose monotherapy, use combination therapy by adding one or more of the first-line drugs. Combination of ACE-I and ARB is not recommended, and caution with combining a non-dihydropyridine CCB (i.e., verapamil or diltiazem) and a beta-blocker.

For a list of commonly prescribed antihypertensive medications in each class, refer to [Appendix D: Commonly Used Antihypertensive Drugs](#).

Treatment of Hypertension with Specific Indications

Selecting an antihypertensive drug for a patient with 1+ co-morbidities may require a specific first-line drug. Refer to Table 4 for recommended first-line and second-line treatments.

Table 4. Pharmacologic treatment recommendations of hypertension complicated by co-morbidity⁷

Co-morbidity	Pharmacologic Treatment Recommendations		Notes
Cardiovascular Disease			
Coronary heart disease	First-line	ACE-I or ARB or Beta-blockers (for patients with stable angina)	1) Do not use short-acting nifedipine; 2) Do not use ACE-I + ARB; 3) Caution when lowering SBP to a desired level, if DBP is ≤ 60 mm Hg.
	Second-line	Long-acting CCB or DHP-CCB (for high-risk patients and in combination with a first-line ACE-I)	
Myocardial infarction (recent)	First-line	Beta-blockers + ACE-I/ARB (if ACE-I intolerant)	1) Do not use non-DHP-CCB (diltiazem, verapamil) if heart failure is present. 2) Caution when lowering SBP to a desired level, if DBP is ≤ 60 mm Hg.
	Second-line	Long-acting CCB (if beta-blockers contraindicated or ineffective)	
Left ventricular hypertrophy	First-line	ACE-I/ARB (if ACE-I intolerant) or Thiazide/Thiazide-like diuretic or Long-acting CCB	Do not use direct arterial vasodilators such as hydralazine and minoxidil.
	Second-line	Combination of first-line drugs.	
Heart failure reduced Ejection Fraction	First-line	Beta-blockers + ACE-I/ARB (if ACE-I intolerant) <ul style="list-style-type: none">Aldosterone antagonist may be added in patients with recent CV hospitalization, acute MI, elevated BNP or NT-proBNP level, or NYHA Class II to IV symptoms.	1) If combining aldosterone antagonist to ACE-I/ARB, monitor for hyperkalemia. 2) If combining ACE-I + ARB, monitor for potential adverse events including hypotension, hyperkalemia and worsening of renal function. 3) If bradycardia is also present, avoid use of beta-blockers.
	Second-line	Hydralazine + Isosorbide dinitrate (if ACE-I and ARBs are contraindicated or not tolerated) or Add ARB to ACE-I <ul style="list-style-type: none">Thiazide/thiazide-like for BP control or loop diuretics for volume control as additive therapy. DHP-CCB may also be used.	
Cerebrovascular disease After acute stroke	First-line	ACE-I + Thiazide/Thiazide-like diuretic	1) During acute stroke and not eligible for thrombolytic therapy do not treat HTN unless extreme BP increase. 2) Combination of ACE-I + ARB is not recommended.
	Second-line	Long-acting DHP-CCB or combination of additional drugs	
Diabetes			
Diabetes with microalbuminuria ^b , CKD, CVD or CVD risk factors	First-line	ACE-I/ARB (if ACE-I intolerant)	
	Second-line	DHP-CCB	
Diabetes	First-line	ACE-I or ARB or Thiazide/Thiazide-like diuretic or DHP-CCB	
	Second-line	Combination of first-line drugs <ul style="list-style-type: none">In combination with ACE-I or ARB, a DHP-CCB is preferable to a thiazide/thiazide-like diuretic.	
Chronic Kidney Disease			
Chronic kidney disease without diabetes	First-line	ACE-I/ARB (if ACE-I intolerant) <ul style="list-style-type: none">Thiazide/thiazide-like diuretic as additive therapy. Loop diuretics for those with volume overload.	1) If using ACE-I or ARB, monitor renal function and potassium. 2) Combination of ACE-I + ARB is not recommended for patients without proteinuria.
	Second-line	Combination with first line drugs (ACE, ARB, thiazide or CCB)	
Renovascular disease	First-line	Thiazide diuretic or ACE-I or ARB (if ACE-I intolerant) or Long-acting CCB	Avoid ACE-I or ARB if bilateral renal artery stenosis or unilateral disease with solitary kidney.
	Second-line	Combination of first-line drugs	

Peripheral arterial disease: Does not affect initial treatment recommendations. Avoid beta-blockers with severe disease.

Abbreviations: ACE-I = angiotensin-converting enzyme inhibitors; ACR = albumin to creatinine ratio; ARB = angiotensin II receptor blocker; BP = blood pressure; BNP = brain natriuretic peptide; CCB = calcium channel blocker; CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease; DBP = diastolic blood pressure; DHP = dihydropyridine; HF = heart failure; HTN = hypertension; MI = myocardial infarction; mm Hg = millimeter of mercury; NYHA = New York Heart Association functional classification system; NT-proBNP = N-terminal prohormone of brain natriuretic peptide; SBP = systolic blood pressure.

Footnotes: ^a Proteinuria is defined as urinary protein > 500 mg/24hr or ACR >30 mg/mmol in 2 of 3 specimens. ^b The term microalbuminuria is being phased out, which is now referred to as moderately increased albuminuria and as defined as ACR = 3 mg/mmol - 30 mg/mmol.

Follow-up to Treatment

Two weeks after initiating antihypertensive medications, follow-up with an eGFR to monitor kidney function and monitor for adherence to medications. Then, follow-up with the patient at monthly intervals until BP is in a desired range for two consecutive visits. Review every 3 - 6 months (as long as the patient remains stable). Establish the minimum dose of medication required to achieve the desired BP and reassess medication adherence with patients prior to adding/increasing medications. Periodically, consider discontinuing or reducing antihypertensive medications to assess the appropriate level of pharmacologic management. Monitor kidney function whenever medications are changed (e.g., dose adjustments).

Ongoing Care

Implement self-management strategies to assist the patient in managing their BP including measurement of their BP at home, committing to healthy behaviours and appropriate use of medications. At least annually, review the patient's medication, lifestyle change behaviours, risk factors, and examine for evidence of target organ damage.

Controversies in Care

Blood Pressure Readings in Population with Diabetes: For patients with diabetes, reaching a desirable MOBP reading of <130/80 is recommended by Hypertension Canada, American College of Cardiology, European Society of Hypertension and the Diabetes Canada Clinical Practice Guidelines. The desired level of MOBP <130/80 was determined by these groups following review of several recent clinical trials that support lower BP levels with reductions in risk of microvascular diabetic endpoints, stroke and major cardiovascular events.^{11,37}

Chronic Kidney Disease: For those diagnosed with chronic kidney disease a BP reading of AOBP < 135/85 is recommended as a desired level. Although there are differences in recommended BP targets for this population between the American College of Cardiology and of Hypertension Canada and the European Society of Hypertension, our recommendations align with the latter as the current evidence failed to show improved clinical outcomes for BP targets < 125/75 compared to < 135/85.^{9,38,39}

Older Adults: For adults aged 60 and above desirable BP reading of AOBP < 145/85 is recommended. Treating older adults to < 145/85 has been shown to significantly reduce mortality, stroke and cardiac events. BP targets lower than < 145/85 maybe beneficial for some (such as those with high cardiovascular risk) however clinical outcomes vary between trials.^{40–42}

A paradoxical relationship between lower BP and increased mortality in older adults has been suggested to be explained by frailty.⁴³ Elevated BP is associated with greater mortality in *fit persons* whereas in *frail persons* higher BP was associated with lower mortality risk (e.g., National Health and Nutrition Examination Survey⁴⁴). The American College of Cardiology/American Heart Association Task Force provides no specific recommendation on treatment for this population due to the lack of evidence.⁴⁵

Finally, Frailty is associated with limited life expectancy. Therefore, the time-until-benefit of a given treatment might exceed the life expectancy in frail individuals and may modify the risk–benefit ratio of preventive treatments for chronic diseases, including hypertension.⁴³

Hydrochlorothiazide and Skin Cancer Association:

At this time, substantial uncertainty exists around the evidence on the link between Hydrochlorothiazide (HCTZ) and skin cancer. Although photosensitivity is a known rare adverse reaction of HCTZ, and patients are advised of possible skin reactions such as sunburn, premature aging, and rash, malignancy is not one of them. Patients should be advised of the potential risk. Advise patients to regularly check for skin lesions, limit sun exposure and use adequate sun protection. Engage in shared-decision making with patients to find alternative medications especially in those with high risk for non-melanoma skin cancer.⁴⁶

HCTZ is a commonly prescribed medication for hypertension. In January of 2019, Health Canada issued a safety alert that concluded that prolonged use of HCTZ may be associated with a risk of non-melanoma skin cancer that is at least four times the risk of not using HCTZ.⁴⁶ The evidence for this safety alert came from 2 published studies from Denmark where nested case-control studies using the National database suggested a link between HCTZ use and the risk of cutaneous squamous cell carcinoma (cSCC) and cutaneous basal cell carcinoma (cBCC) (non-melanoma skin cancers). The studies suggested that high use of HCTZ (i.e., >3 years) could lead to 122 more (95% CI, from 112 more to 133 more) cases of cSCC per 1000 treated patients compared with its non-use (meta-analysis of 3 observational studies; very low certainty evidence) and 31 more (95% CI, from 24 more to 37 more) cases of cBCC per 1000 treated patients compared with its non-use (meta-analysis of 2 observational studies; very low certainty evidence).^{47,48}

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► Practitioner Resources

• **RACE: Rapid Access to Consultative Expertise Program** – www.raceconnect.ca

A telephone consultation line for select specialty services for physicians, nurse practitioners and medical residents. **If the relevant specialty area is available through your local RACE line, please contact them first.** Contact your local RACE line for the list of available specialty areas. If your local RACE line does not cover the relevant specialty service or there is no local RACE line in your area, or to access Provincial Services, please contact the Vancouver/Providence RACE line.

o **Vancouver Coastal Health Region/Providence Health Care:** www.raceconnect.ca

604-696-2131 (Vancouver) or 1-877-696-2131 (toll free)

Available Monday to Friday, 8 am to 5 pm

o **Northern RACE:** (1-877-605-7223 (toll free)

o **Kootenay Boundary RACE:** www.divisionsbc.ca/kb/race 1-844-365-7223 (toll free)

o **For Fraser Valley RACE:** www.raceapp.ca (download at Apple and Android stores)

o **South Island RACE:** www.raceapp.ca (download at Apple and Android stores) or see www.divisionsbc.ca/south-island/RACE

• **Health Data Coalition:** <https://hdcbc.ca/>

An online, physician-led data sharing platform that can assist you in assessing your own practice in areas such as chronic disease management or medication prescribing. HDC data can graphically represent patients in your practice with chronic kidney disease in a clear and simple fashion, allowing for reflection on practice and tracking improvements over time.

• **Hypertension Canada,** www.hypertension.ca

• **BHS** - British Hypertension Society, www.bhsoc.org/

• **Heart and Stroke Foundation,** www.heartandstroke.ca

o **The DASH Diet: Heart and Stroke Foundation:** <https://www.heartandstroke.ca/get-healthy/healthy-eating/dash-diet>

• **BC Guidelines** - www.BCGuidelines.ca - *Cardiovascular Disease – Primary Prevention (2014)*

- **HealthLink BC**, www.healthlinkbc.ca. You may call HealthLinkBC at 8-1-1 toll-free in B.C., or for the deaf and the hard of hearing, call 7-1-1. You will be connected with an English speaking health-service navigator, who can provide health and health-service information and connect you with a registered dietitian, exercise physiologist, nurse, or pharmacist.
 - **HealthLinkBC**, [Lifestyle Steps to Lower Your Blood Pressure](#)
 - **HealthLink BC**: DASH Diet Sample Menu <https://www.healthlinkbc.ca/health-topics/zp3302>
- **Island Health Community Virtual Care**: Community Virtual Care provides support to people with a range of medical conditions. Registered nurses help you to manage your condition from the comfort of your home. All the tools needed are loaned to you at no cost.
- **Quit Smoking**: QuitNow.ca provides one-on-one support and valuable resources in multiple languages to help you plan your strategy and connect with a Quit Coach.
Phone: 1-877-455-2233 (toll-free) Email: quitnow@bc.lung.ca
- The **BC Smoking Cessation Program** helps cover the cost of nicotine replacement therapy products (nicotine gum, lozenges, patches, inhaler) and specific smoking cessation prescription drugs (Zyban® or Champix®). For prescription medications to help you quit smoking, speak to your doctor.
- For more information about **reducing alcohol intake**
 - Refer to [Canada's Low Risk Drinking Guidelines](#) – also available at [HealthLink BC: Alcohol: Drinking and Your Health](#)
 - Refer to **BC Guidelines** - www.BCGuidelines.ca - *Problem Drinking (2013)* – under revision in collaboration with BC Centre on Substance Use (www.bccsu.ca)
 - **BC Centre on Substance Use** has recently published guidance on supporting those living with alcohol addiction.
 - A Provincial Guideline for the Clinical Management of High-Risk Drinking and Alcohol Use Disorder (December 2019; www.bccsu.ca/aud-guideline)
 - A Guideline for the Clinical Management of High-Risk Drinking and Alcohol Use Disorder (December 2019; www.bccsu.ca/aud-recommendations)

► Appendices

- Appendix A: Diagnosis and Management of Hypertension Algorithm
- Appendix B: Recommended Methods and Techniques for Measuring Blood Pressure
- Appendix C: Examples of Secondary Causes of Hypertension
- Appendix D: Commonly Used Antihypertensive Drugs
- Appendix E: Hypertension Quality Indicators

► Associated Documents

The following documents accompany this guideline:

- Summary of Guideline: Hypertension – Diagnosis and Management
- A Guide for Patients: Diagnosis and Management of Hypertension

This guideline is based on scientific evidence current as of the effective date.

The guideline was developed by the Guidelines and Protocols Advisory Committee and adopted by the Medical Services Commission.

For more information about how BC Guidelines are developed, refer to the GPAC Handbook available at BCGuidelines.ca: [GPAC Handbook](#).

THE GUIDELINES AND PROTOCOLS ADVISORY COMMITTEE

The principles of the Guidelines and Protocols Advisory Committee are to:

- encourage appropriate responses to common medical situations
- recommend actions that are sufficient and efficient, neither excessive nor deficient
- permit exceptions when justified by clinical circumstances

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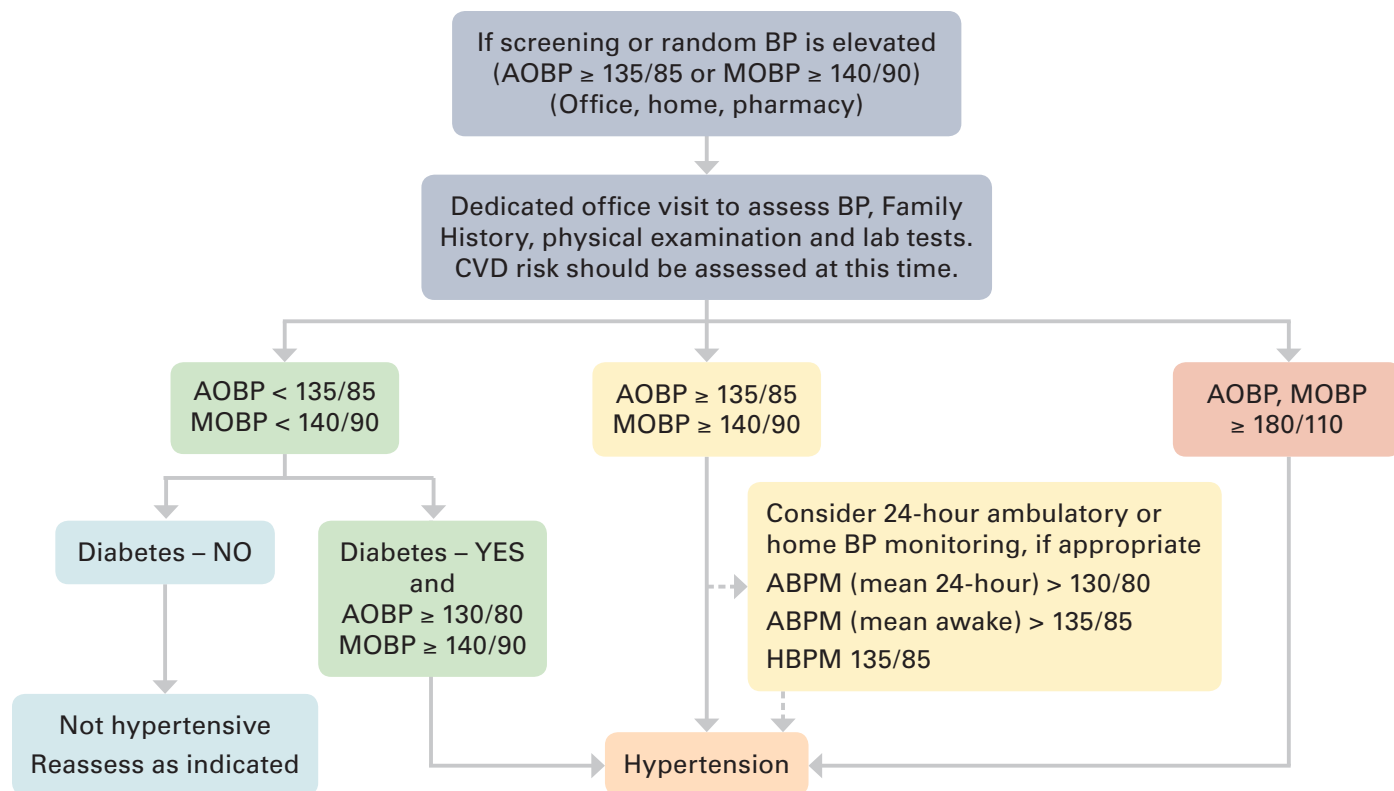
The Clinical Practice Guidelines (the “Guidelines”) have been developed by the Guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The Guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The Guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problem. **We cannot respond to patients or patient advocates requesting advice on issues related to medical conditions. If you need medical advice, please contact a health care professional.**



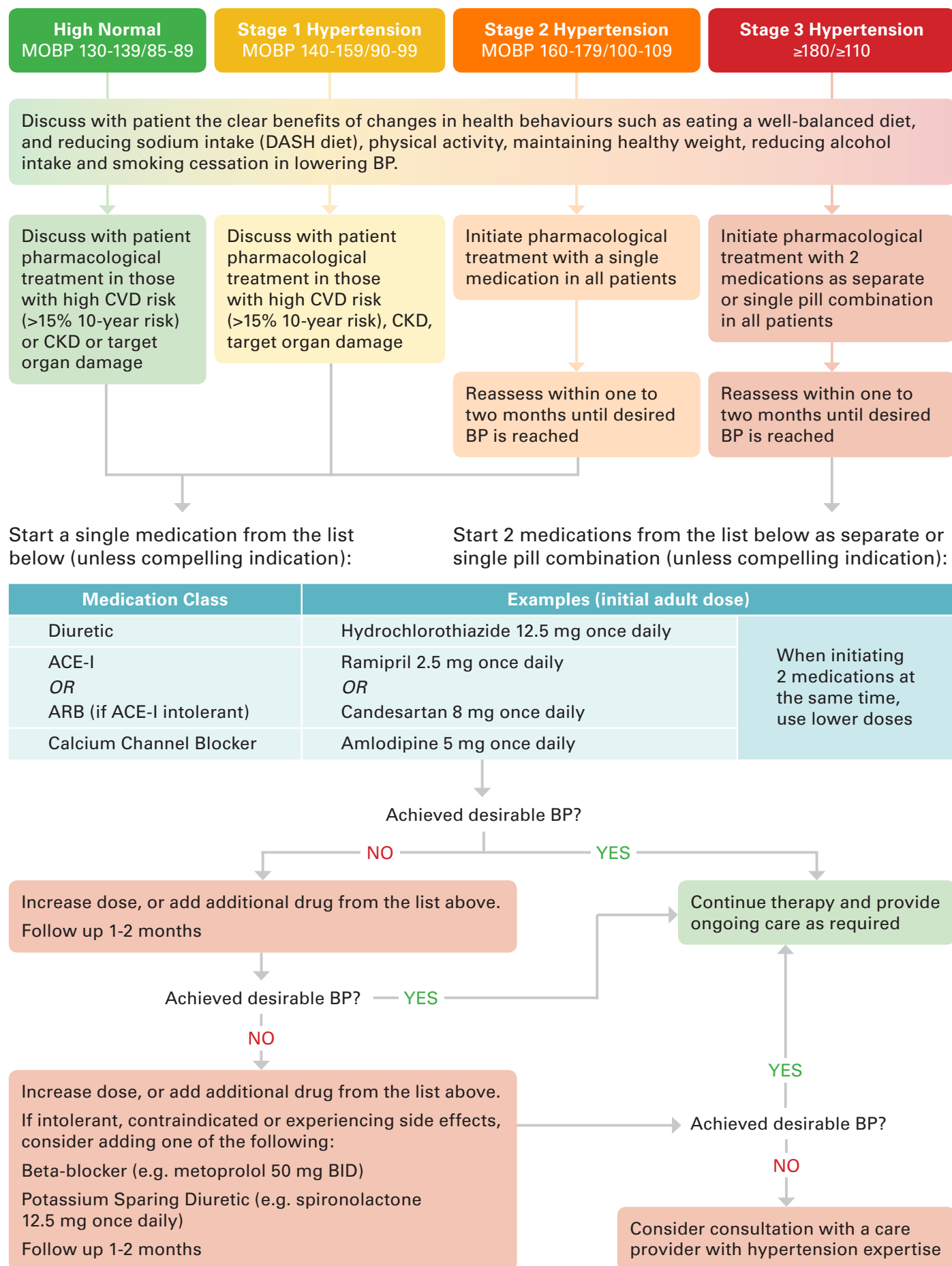
Appendix A: Diagnosis and Management of Hypertension Algorithm

AOBP	135-154* 85-94					Systolic (mm Hg) Diastolic (mm Hg)	
	Low Normal	Normal	High Normal	Stage 1	Stage 2	Stage 3	
MOBP	<120 <80	120-129 80-84	130-139 85-89	140-159 90-99	160-179 100-109	≥180 ≥110	Systolic (mm Hg) Diastolic (mm Hg)

*Validated AOBP levels for the other classifications are currently unavailable and hence only previously published MOBP levels are listed.



Abbreviations: AOBP = automatic office blood pressure; ABPM = ambulatory blood pressure monitoring; BP = blood pressure; CVD = cardiovascular disease; DBP = diastolic blood pressure; HBPM = home blood pressure monitoring; MOBP = manual office blood pressure.





Appendix B: Recommended Methods and Techniques for Measuring Blood Pressure

Recommended Methods for Measuring Blood Pressure

At appropriate visits, ask permission to check BP on all adults (trauma-informed practice). Inform patients that they may be sensitive to the tightening of the cuff on their arm.

In the office setting, the use of automated office blood pressure (BP) electronic device, which averages multiple readings, is recommended as an alternative to taking a manual office BP. The advantages of automated office BP measurements include: 1) BP measurements are comparable to ambulatory BP monitoring; 2) readings are consistent from visit-to-visit; 3) reduces white-coat and masked hypertension (HTN); and 3) correlates well with cardiovascular (CV) outcomes (e.g., acute myocardial infarction, cerebrovascular events). However, manual office BP may be appropriate in cases such as for patients with arrhythmias.

Table 1. Comparison of measurement equivalence numbers

<i>Method</i>	<i>Automated Office BP</i>	<i>Ambulatory BP Monitoring (mean 24-hour)</i>	<i>Ambulatory BP Monitoring (mean awake)</i>	<i>Home BP Monitoring</i>	<i>Manual Office BP</i>
Measurements (mm Hg)	135/85	130/80	135/85	135/85	140/90

Abbreviations: BP = blood pressure; mm Hg = millimetre of mercury.

When confirming a HTN diagnosis, consider a 24-hour ambulatory or home BP monitoring for appropriate patients (e.g., suspected white-coat HTN, unusual fluctuating office-based BP readings).^{7,11} Even though ambulatory BP monitoring is considered the most accurate for BP measurements, there are some known limitations including: 1) cost (patient-pay ~ \$50); 2) accessibility issues (both in actual devices and trained professionals to interpret results); and 3) patient may not be able to tolerate ambulatory BP monitoring device. Home BP measurements are comparable to ambulatory BP measurement and may be used if ambulatory BP monitoring is not tolerated or available. Ambulatory and home BP monitoring may also have a role in the management of HTN, including determining the efficacy of antihypertensive drugs or assessing resistant HTN.

Both the method used and the presence of any errors (refer to Table 2 below) may lead to a misdiagnosis and/or inappropriate treatment decision. When comparing common manual office BP practices versus proper standardized technique measurements, the mean manual office BP was at least 10/5 mm Hg higher. As well, manual office BP was consistently higher than the recognized 5 mm Hg difference when compared to mean ambulatory BP monitoring (awake).

Table 2. Common errors in when measuring blood pressure

<i>Type of Error</i>	<i>% Affect</i>	<i>Notes</i>
Natural variation	≥ 14%	<ul style="list-style-type: none"> After 2 office visits, a patient with a true systolic BP of 130 mm Hg will have a 14% chance of an average above 140 mm Hg. After 10 visits, the risk of this average (and potential misdiagnosis) increases to 64%. In healthy adults < 35 years, the probability of misclassification exceeds that of accurate diagnosis.
Incorrect measurement technique	> 60%	<ul style="list-style-type: none"> 63% of physicians and nurses were found to be out of range in BP measurement (false increases or reductions); none followed the American Heart Association's technique recommendations. When comparing common MOBP practices to proper technique, the mean MOBP was at least 10/5 mm Hg higher than the proper technique.
White-coat HTN	20%	<ul style="list-style-type: none"> More common in elderly patients and is generally associated with a relatively benign prognosis. Physicians consistently obtain higher readings than nurses.
Office-based measurement	~ 100%	<ul style="list-style-type: none"> An AOBP measurement, which averages multiple readings, is superior to MOBP in the office setting.
CVD risk not assessed	~ 100%	<ul style="list-style-type: none"> Patients with CVD or are high-risk for CVD are approached the same as low-risk patients.

Abbreviations: ABPM = ambulatory blood pressure monitoring; AOBP = automated office blood pressure; BP = blood pressure; CVD = cardiovascular disease; HTN = hypertension; MOBP = manual office blood pressure; mm Hg = millimetre of mercury.

Techniques for Measuring Blood Pressure

► Office Blood Pressure Measurement

Equipment Requirements

- Ensure appropriate equipment is being used (e.g., accurate sphygmomanometer, calibrated and validated electronic devices, cuff with an appropriate bladder size).

Patient Requirements

- Patient has rested comfortably for 5 minutes in a seated position, legs uncrossed and a supported bare arm.
- For elderly and diabetic patients, BP may be measured in a supine position.

Arm Selection

- Select which arm to be used by measuring both arms with the BP cuff at heart level. Use the arm with the higher BP for future measurement and interpretation.

Taking Measurements

- For AOBP: Set the device to take measurements at 1- or 2-minute intervals. Discard the 1st reading and average the latter readings.
- For auscultation:
 - o Take 3 measurements, with at least one-minute elapse between readings. Discard the 1st reading and average the latter 2 readings.
 - o Increase the pressure rapidly to 30 mm Hg above the level at which the radial pulse is extinguished.
 - o Place the bell or diaphragm of the stethoscope gently and steadily over the brachial artery.
 - o Open the control valve so that the rate of deflation of the cuff is approximately 2 mm Hg per heartbeat. A cuff deflation rate of 2 mm Hg per beat is necessary for accurate systolic and diastolic estimation.
 - o Read the systolic level - the first appearance of a clear tapping sound (phase I Korotkoff) – and the diastolic level (the point at which the sounds disappear (phase V Korotkoff)). If Korotkoff sounds persist as the level approaches 0 mm Hg, then the point of muffling of the sound is used (phase IV) to indicate the diastolic pressure. Leaving the cuff partially inflated for too long will fill the venous system and make the sounds difficult to hear.
- For those with an arrhythmia: additional readings with auscultation may be required to estimate the average systolic and diastolic pressure.

Results

- Record BP to the closest 2 mm Hg (for manual office BP) or 1 mm Hg (for automated office BP); which arm was used; position of patient (i.e., supine, sitting or standing); and heart rate.
- A mean 24-hour ambulatory BP monitoring 130/80 equates to an automated office BP 135/85 and a manual office BP of 140/90 mm Hg.

► Ambulatory Blood Pressure Monitoring Measurement

Equipment Requirements

- Ensure ambulatory BP monitoring device has been validated independently using established protocols. A list of validated devices is provided at Hypertension Canada's website on [Blood Pressure Measurement Devices](http://www.hypertension.ca) under the 'Hypertension & You' heading (www.hypertension.ca)

Patient Requirements

- Ensure the patient is able to tolerate ambulatory BP monitoring (e.g., keeping cuff in correct position and dry) and is willing to keep a diary of events (e.g., when medication(s) were taken, bedtime).

Taking Measurements

- Have the device take 2 measurements per hour during the patient's daytime (i.e., awake) hours. Record the average BP from at least 14 measurements.

Results

- A mean 24-hour ambulatory BP monitoring 130/80 equates to a mean awake ambulatory BP monitoring of 135/85 and a manual office BP of 140/90 mm Hg.
- Any changes in nocturnal BP should be taken into account with any decisions to prescribe or withhold drug therapy. This is because a decrease in nocturnal BP of less than 10% is associated with increased risk of CV events.

Resources

- Ambulatory BP monitoring Educational Resource Video for healthcare professionals from the [British and Irish Hypertension Society \(BIHS\)](#) YouTube channel, under 'Blood Pressure Measurement'.

► Home Blood Pressure Monitoring Measurement

Equipment Requirements

- Ensure home BP monitoring device has been validated independently and is calibrated. Follow the instruction manual that comes with the device and reach out to a health care professional to confirm accuracy of BP measurements. A list of validated devices is listed on Hypertension Canada's website (www.hypertension.ca) and have the endorsement logo on their package.



Patient Requirements

- Ensure patient is well suited (e.g., does not have arrhythmia or experiences undue anxiety) and is capable of implementing proper technique (e.g., using proper cuff size being relaxed, seated position, reasonable amount of time after heavy physical activity, drinking coffee or smoking).



Taking Measurements

- Have the patient take 2 consecutive (at 1 minute intervals) measurements once in the morning and once in the evening for 4–7 days. Discard 1st day of measurements, and average the remaining measurements.

Results

- A home BP monitoring 135/85 equates to a mean awake ambulatory BP monitoring 135/85 and a manual office BP 140/90 mm Hg.

Table 1. Ranking of preferred methods for measuring blood pressure by accuracy and accessibility^{2,7,15–17}

1. Automated Office BP	
135/85 (automated office BP) = 135/85 (ambulatory BP monitoring: mean awake)	
Advantages	1) Measurements are comparable to ambulatory BP monitoring (the gold standard); 2) readings are consistent from visit-to-visit and between care providers; 3) reduces white-coat and masked HTN; and 4) correlates well with CV outcomes (e.g., acute MI and cerebrovascular events); 5) Can be performed by trained non-medical staff such as medical office assistants, saving healthcare provider and patient visit time.
Limitations	1) May be challenging to find quiet/alone place and appropriate positioning of the patient; 2) Staff may have time and space constraints to perform AOBP.
2. Ambulatory BP Monitoring	
130/80 (ambulatory BP monitoring: mean 24-hour) = 135/85 (ambulatory BP monitoring: mean awake) = 140/90 (manual office BP)	
Advantages	Ambulatory BP monitoring is considered the preferred method for accurate BP measurements.
Limitations	1) May cost (patient-pay ~ \$50); 2) accessibility issues (both in actual devices and trained professionals to interpret results); and 3) patient may not be able to tolerate ambulatory BP monitoring.
Technical Notes	Offer ambulatory BP monitoring to patients with elevated BP and who can tolerate keeping the cuff position correctly and dry for 24 hours. Use 24 hr standard (average) and not awake when there is uncertainty regarding patient sleep times.
3. Home BP Monitoring	
135/85 (home BP monitoring) = 135/85 (ambulatory BP monitoring: mean awake) = 140/90 (manual office BP)	
Advantages	1) Measurements are comparable to ambulatory BP monitoring (the gold standard); 2) correlates well with target organ damage and CV mortality.
Limitations	Offer home BP monitoring if ambulatory BP monitoring is not tolerated. Ensure device is appropriate (e.g., cuff size) and validated (i.e., includes the endorsement logo and/or listed on www.hypertension.ca). A Standard protocol should be used.
 	
4. Manual Office BP	
Advantages	1) Considered a more accurate reading for patients with arrhythmias; and 2) accessibility.
Limitations	1) Known issues with the accuracy of manual office BP (e.g., white-coat effect, improper technique, faulty equipment, digit preference, & threshold avoidance) that may result in approximately 10/5 mm Hg higher readings; and 2) relatively poor predictor of CV risk related to BP status.

Abbreviations: BP = blood pressure; CV = cardiovascular; HTN = hypertension; mm Hg = millimetre of mercury; MI = myocardial infarction.



Appendix C: Examples of Secondary Causes of Hypertension

Indications for a secondary cause of hypertension are: 1) severe or refractory hypertension; 2) an acute rise over previously stable values; 3) age < 30 years without family history; and/or 4) no nocturnal fall in blood pressure (BP) during a 24-hour ambulatory BP monitoring period.

Table 1. Examples of identifiable secondary causes of hypertension and initial investigations

Aldosteronism (Primary)	
Signs/symptoms: <ul style="list-style-type: none"> Spontaneous hypokalemia (though more than one-half of patients are normokalemic) Profound diuretic-induced hypokalemia (< 3.0 mmol/L) Hypertension refractory to treatment with 3 or more drugs Hypertension and adrenal incidentaloma 	Initial Investigations: <ul style="list-style-type: none"> Plasma renin activity and plasma aldosterone concentration <p>Note: ideally measured before 10 am after 1 hour of ambulation, if possible. Patient should be on an unrestricted sodium diet. Certain medications affect aldosterone and renin. If safe, suggested drug-free periods prior to testing are:</p> <ul style="list-style-type: none"> Beta-blockers = 1 week ACE-I, ARB, diuretics, NSAIDs = 2 weeks Spironolactone, eplerenone, amiloride, triamterene, potassium-wasting diuretics = 4 weeks.
Sleep Apnea	
Signs/symptoms: <ul style="list-style-type: none"> Loud snoring Daytime somnolence and fatigue 	Initial Investigations: <ul style="list-style-type: none"> Sleep diary Overnight oximetry
Renovascular Disease	
Signs/symptoms: <ul style="list-style-type: none"> ↑ > 30% creatinine after introducing angiotensin converting enzyme inhibitor (ACE-I) or angiotensin II receptor blocker (ARB) Hypertension with diffuse atherosclerosis or a unilateral small kidney Episodes of flash pulmonary edema Abdominal bruit (not very sensitive) 	Initial Investigations may include: <ul style="list-style-type: none"> Magnetic resonance angiography (MRA) Computed tomography angiography (CTA)
Kidney Disease (Primary)	
Signs/symptoms: <ul style="list-style-type: none"> ↓ estimated glomerular filtration rate (eGFR) and/or abnormal urinalysis <p>Refer to BCGuidelines.ca – Chronic Kidney Disease – Identification, Evaluation and Management of Adult Patients.</p>	Initial Investigations: <ul style="list-style-type: none"> eGFR Urinalysis - albumin to creatinine ratio (ACR), hematuria Physical exam & medical history Renal ultrasound
Cushing's Syndrome	
Signs/symptoms: <ul style="list-style-type: none"> Cushingoid facies Central obesity Proximal muscle weakness Ecchymoses 	Initial Investigations may include any of: <ul style="list-style-type: none"> late-night salivary cortisol levels 24-hour urine free cortisol (UFC) low-dose (1-mg overnight or 48-hour [2-mg/24-hour]) dexamethasone suppression test (LDDST)

Pheochromocytoma	
<i>Signs/symptoms:</i> <ul style="list-style-type: none"> • Paroxysmal elevations in BP • Headache • Palpitations • Sweating 	<i>Initial Investigations:</i> <ul style="list-style-type: none"> • 24-hour urine for catecholamines and metanephrines <p>Note: False positives can be caused by tricyclic antidepressants, antipsychotics, levodopa, decongestants, labetalol, sotalol, buspirone, ethanol, acetaminophen, phenoxybenzamine, withdrawal from clonidine (and other drug withdrawal) and major physical stress (e.g., surgery, stroke, sleep apnea).</p>
Oral Contraceptives	
<i>Signs/symptoms:</i> <ul style="list-style-type: none"> • ↑ BP temporally related to oral contraceptive use 	<i>Initial Investigations:</i> <ul style="list-style-type: none"> –
Coarctation of the Aorta	
<i>Signs/symptoms:</i> <ul style="list-style-type: none"> • ↑ BP in right arm with diminished or delayed femoral pulses, and low BP in the legs 	<i>Initial Investigations:</i> <ul style="list-style-type: none"> • Echocardiogram <p>Note: most occur just distal to the left subclavian origin.</p>
Hypo/Hyperthyroidism	
<i>Signs/symptoms:</i> Refer to BCGuidelines.ca – <i>Thyroid Function Tests in the Diagnosis and Monitoring of Adults</i>	<i>Initial Investigations:</i> <ul style="list-style-type: none"> • Thyroid-stimulating hormone (TSH)
Hyperparathyroidism	
<i>Signs/symptoms:</i> <ul style="list-style-type: none"> • Bone pain • Non-specific symptoms • Patients often asymptomatic 	<i>Initial Investigations:</i> <ul style="list-style-type: none"> • Parathyroid hormone (PTH) • Total Calcium (follow-up with ionized calcium, if necessary) • Phosphate



Appendix D: Commonly Used Antihypertensive Drugs^{1-4, a}

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension ^b	Annual Cost ^c	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
Diuretics					
chlorthalidone G Tabs: 50 mg	Initial: 12.5 mg once daily Usual: 12.5 mg to 25 mg once daily Maximum: 50 mg per day (some sources: max 25 mg per day)	\$12-25	Regular Benefit	Common • Hypotension, muscle cramps, weakness, erectile dysfunction • Hypokalemia, hyponatremia, hyperglycemia, hyperlipidemia, hyperuricemia Less Common • Allergic reactions (cross sensitivity to sulfonamides not proven), photosensitivity, fatigue, blood dyscrasias, azotemia	• Monitor SCr and potassium. • Generally ineffective in CrCl < 30 mL/min. • Use cautiously in patients with history of or predisposition to gout (may precipitate gout) or renal impairment (cumulative effects may develop). • May change glycemic control in patient with diabetes or prediabetes. • Consider an alternative antihypertensive for patients with or predisposed to arrhythmias. • May be available in combination with other entity. See other agents for available combination products.
hydrochlorothiazide G Tabs: 12.5, 25, 50, 100 mg	Initial: 12.5 mg daily Usual: 12.5 mg to 25 mg once daily Maximum: 50 mg per day (some sources: max. 25 mg per day)	\$12-13	Regular Benefit		
triamterene/ hydrochlorothiazide <i>Triazide, G</i> Tabs: 50/25 mg	Initial: 25/12.5 mg once daily Usual: 50/25 mg once daily	\$25			
indapamide <i>Lozide, G</i> Tabs: 1.25, 2.5 mg	Initial: 1.25 mg once daily Usual: 1.25 mg to 2.5 mg once daily Maximum: 2.5 mg per day	\$30-45	Limited Coverage		
spironolactone <i>Aldactone, G</i> Tabs: 25, 100 mg	Initial: 12.5 mg once daily Usual: 25-50 mg once daily Maximum: 200 mg per day	\$50-115	Regular Benefit	Common • Gynecomastia, breast tenderness, headache, erectile dysfunction • Hyperkalemia, hyponatremia, hypochloremia Less Common • Allergic reactions, irregular menses	• Monitor SCr and potassium. • May change glycemic control in patient with diabetes or prediabetes. • Particularly effective in ISH, the elderly and black patients. • Use cautiously in patients with history of or predisposition to gout (may precipitate gout) Combination: Lower incidence of hypokalemia than with hydrochlorothiazide alone
spironolactone/ hydrochlorothiazide <i>Aldactazide, G</i> Tabs: 25/25, 50/50 mg					
Angiotensin-Converting Enzyme Inhibitor (ACE-I)					
ramipril <i>Altace, G</i> Caps: 1.25, 2.5, 5, 10, 15 mg	Initial: 2.5 mg once daily Usual: 2.5 to 10 mg once daily Maximum: 20 mg per day	\$30-80	Regular Benefit, RDP	Common • Dry cough • Hyperkalemia Less Common • Angioedema • Precipitation of renal failure in patients with renovascular disease, volume depletion or concomitant NSAID use	• Monitor SCr and potassium at initiation of therapy and periodically. • Reduce initial dose by 50% if on concomitant diuretics (risk of hypotension with hypovolemia). • Cough associated with ACE-I is dry, hacking and non-productive and typically occurs within months of initiation of therapy. • Risk factors for hyperkalemia include renal dysfunction, diabetes and concomitant use of potassium supplements, potassium-sparing diuretics or potassium-containing salts. • Consider a thiazide diuretic or CCB instead of an ACE-I or ARB as initial antihypertensive therapy in black patients. • For patients who experience reduced antihypertensive effect near the end of the 24-hour dosing interval, divide total daily dose into two equal doses given every 12 hours or increase once daily dose.
ramipril/ hydrochlorothiazide <i>Altace-HCT, G</i> Tabs: 2.5/12.5, 5/12.5, 5/25, 10/12.5, 10/25 mg		\$50-80	Reference Drug		
benazepril <i>Lotensin, G</i> Tabs: 5, 10, 20 mg	Initial: 10 mg once daily Usual: 20 mg once daily Maximum: 40 mg per day	\$365-742	Partial Benefit, RDP		
captopril <i>Capoten, G</i> Tabs: 6.25, 12.5, 25, 50, 100 mg	Initial: 12.5 - 25 mg BID to TID Usual: 50 mg BID to TID Maximum: 450 mg per day <i>Administer one hour prior to meals</i>	\$230-1570	Partial Benefit, RDP		
cilazapril <i>Inhibace, G</i> Tabs: 1, 2.5, 5 mg	Initial: 2.5 mg once daily Usual: 2.5 to 5 mg once daily Maximum: 10 mg per day	\$70-160	Partial Benefit, RDP		
cilazapril/ hydrochlorothiazide <i>Inhibace Plus, G</i> Tabs: 5/12.5 mg		\$160			
					For combination products , see other entity for additional therapeutic considerations

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension ^b	Annual Cost ^c	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
enalapril <i>Vasotec, G</i> Tabs: 2.5, 5, 10, 20 mg	Initial: 5 mg once daily Usual: 10 mg to 40 mg daily as a single dose or two divided doses Maximum: 40 mg per day	\$85-240	Partial Benefit, RDP		
enalapril/ hydrochlorothiazide <i>Vaseretic, G</i> Tabs: 5/12.5, 10/25 mg		\$290-400			
fosinopril <i>Monopril, G</i> Tabs: 10, 20 mg	Initial: 10 mg once daily Usual: 20 mg once daily Maximum: 40 mg per day	\$85-200	Partial Benefit, RDP		
lisinopril <i>Prinivil, Zestril, G</i> Tabs: 5, 10, 20 mg	Initial: 10 mg once daily Usual: 10 to 40 mg once daily Maximum: 80 mg per day	\$65-150	Partial Benefit, RDP		
lisinopril/ hydrochlorothiazide <i>Zestoretic, G</i> Tabs: 10/12.5, 20/12.5, 20/25 mg		\$80-100			
perindopril erbumine <i>Coversyl, G</i> Tabs: 2, 4, 8 mg	Initial: 4 mg once daily Usual: 4 to 8 mg once daily Maximum: 8 mg per day	\$75-100	Partial Benefit, RDP		
perindopril erbumine/ indapamide <i>Coversyl Plus, G</i> Tabs: 2/0.625, 4/1.25, 8/2.5 mg		\$280-370	Non-benefit		
perindopril arginine/ amlodipine <i>Viacoram</i> Tabs: 3.5/2.5, 7/5, 14/10 mg	Initial: 3.5/2.5 mg once daily Usual: 3.5/2.5 to 7/5mg once daily Maximum: 14/10 mg per day		Non-benefit		
quinapril <i>Accupril, G</i> Tabs: 5, 10, 20, 40 mg	Initial: 10 mg once daily Usual: 10 to 20 mg once daily Maximum: 40 mg per day	\$90	Partial Benefit, RDP		
quinapril/ hydrochlorothiazide <i>Accuretic, G</i> Tabs: 10/12.5, 20/12.5, 20/25 mg		\$270			
trandolapril <i>Mavik, G</i> Caps: 0.5, 1, 2, 4 mg	Initial: 1 mg once daily Usual: 1 to 2 mg once daily Maximum: 4 mg per day	\$65-95	Partial Benefit, RDP		
		\$670-750			
Angiotensin II Receptor Blockers (ARB)					
candesartan <i>Atacand, G</i> Tabs: 4, 8, 16, 32 mg	Initial: 8 mg once daily Usual: 8 to 32 mg once daily Maximum: 32 mg per day	\$90	Limited Coverage, RDP Reference Drug	Common <ul style="list-style-type: none">Hyperkalemia Less Common <ul style="list-style-type: none">AngioedemaPrecipitation of renal failure in patients with renovascular disease, volume depletion or concomitant NSAID use For combination products , see other entity for additional adverse effects	<ul style="list-style-type: none">Monitor SCr and potassium at initiation of therapy and regularly.Reduce initial dose if using concomitant diuretics (risk of hypotension with hypovolemia).Risk factors for hyperkalemia include renal dysfunction, diabetes and concomitant use of potassium supplements, potassium-sparing diuretics or potassium-containing saltsConsider a thiazide diuretic or CCB instead of an ACE-I or ARB as initial antihypertensive therapy in black patients.
candesartan/ hydrochlorothiazide <i>Atacand Plus, G</i> Tabs: 16/12.5, 32/12.5, 32/25 mg		\$85			
losartan <i>Cozaar, G</i> Tabs: 25, 50, 100 mg	Initial: 25-50 mg once daily Usual: 50 to 100 mg once daily Maximum: 100 mg per day	\$95	Limited Coverage, RDP Reference Drug		
losartan/ hydrochlorothiazide <i>Hyzaar, G</i> Tabs: 50/12.5, 100/12.5, 100/25 mg		\$100-120			
					For combination products , see other entity for additional therapeutic considerations

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension ^b	Annual Cost ^c	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
telmisartan <i>Micardis, G</i> Tabs: 40, 80 mg	Initial: 40 mg once daily Usual: 40 to 80 mg once daily Maximum: 80 mg per day	\$85	Limited Coverage, RDP Reference Drug		
telmisartan/ amlodipine <i>Twynsta</i> Tabs: 40/5, 40/10, 80/5, 80/10 mg		\$270			
telmisartan/ hydrochlorothiazide <i>Micardis Plus, G</i> Tabs: 80/12.5, 80/25 mg		\$80			
valsartan <i>Diovan, G</i> Tabs: 40, 80, 160, 320 mg	Initial: 80 mg once daily Usual: 80 to 320 mg once daily Maximum: 320 mg per day	\$85	Limited Coverage, RDP Reference Drug		
valsartan/ hydrochlorothiazide <i>Diovan HCT, G</i> Tabs: 80/12.5, 160/12.5, 160/25, 320/12.5, 320/25 mg		\$90			
azilsartan <i>Edarbi</i> Tabs: 40, 80 mg	Initial: 20 mg once daily Usual: 40 to 80 mg once daily Maximum: 80 mg per day	\$450	Non-benefit		
azilsartan/ chlorthalidone <i>Edarbyclor</i> Tabs: 40/12.5, 40/25 mg		\$450			
eprosartan <i>Teveten</i> Tabs: 400, 600 mg	Initial: 600 mg once daily Maximum: 800 mg per day	\$420	Limited Coverage, Partial benefit RDP		
eprosartan/ hydrochlorothiazide <i>Teveten Plus</i> Tabs: 600/12.5 mg		\$420			
irbesartan <i>Avapro, G</i> Tabs: 75, 150, 300 mg	Initial: 75-150 mg once daily Usual: 150 to 300 mg once daily Maximum: 300 mg per day	\$90	Limited Coverage, Partial benefit RDP		
irbesartan/ hydrochlorothiazide <i>Avalide, G</i> Tabs: 150/12.5, 300/12.5, 300/25 mg		\$90			
olmesartan <i>Olmotec, G</i> Tabs: 20, 40 mg	Initial: 20 mg once daily Usual: 20 to 40 mg once daily Maximum: 40 mg per day	\$100	Limited Coverage, Partial benefit RDP		
olmesartan/ hydrochlorothiazide <i>Olmotec plus</i> Tabs: 20/12.5, 40/12.5, 40/25 mg		\$210			

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension ^b	Annual Cost ^c	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
Beta ₁ -Adrenergic Antagonists (Beta-Blockers)					
Beta ₁ -selective					
atenolol Tenormin, G Tabs: 25, 50, 100 mg	Initial: 50 mg once daily Usual: 50 to 100 mg once daily Maximum: 100 mg per day	\$45-70	Regular Benefit	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams	• Low doses of beta1-selective beta-blockers may be used in patients with mild to moderate reversible airway disease (ensure access to a bronchodilating beta2-agonist is readily available). • Initiate cautiously and titrate slowly in patients with heart failure. • When discontinuing in chronic users, gradually taper doses over 1 to 2 weeks (abrupt discontinuation may precipitate cardiac events, sinus tachycardia and rebound hypertension). • Consider alternatives in patients at high risk of heart block (contraindicated in 2nd or 3rd degree heart block without pacemaker). • Avoid in severe PAD. • Avoid beta-blockers as initial therapy in patients > 60 years without other compelling indications.
bisoprolol Monacor, G Tabs: 5, 10 mg	Initial: 5 mg once daily Usual: 10 mg once daily Maximum: 20 mg per day	\$30-80	Regular Benefit		
metoprolol Lopressor, Betaloc, G Tabs: 50, 100 mg SR tabs: 100, 200 mg	Initial: 50 mg BID Usual: IR: 50 to 100 mg BID SR: 100 to 200 mg once daily Maximum: 400 mg per day <i>Regular release: dose BID; Sustained release: dose once daily.</i>	\$50-245	Regular Benefit	Less Common • Hyperglycemia, heart failure, heart block, depression <i>Cardiac selectivity of beta1- selective beta-blockers may result in fewer non-cardiac adverse effects.</i>	
Non-selective with intrinsic sympathomimetic activity (ISA)					
labetalol <i>Trandate,</i> Tabs: 100, 200 mg Duration of action: 8-12 h	Initial: 100 mg BID Usual: 200 to 400 mg BID Maximum: 1200 mg per day	\$285- 1500	Regular Benefit	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams Less Common • Hyperglycemia, heart failure, heart block, depression Adverse effects specific to labetalol • Edema, postural hypotension, dizziness, nasal congestion	• Beta-blockers with ISA have a lesser effect on resting heart rate compared to agents without ISA. • Avoid non-selective beta-blockers in reactive airways disease. • Initiate cautiously and titrate slowly in patients with heart failure. • When discontinuing in chronic users, gradually taper doses over 1 to 2 weeks (abrupt discontinuation may precipitate cardiac events, sinus tachycardia and rebound hypertension). • Consider alternatives in patients at high risk of heart block (contraindicated in 2nd or 3rd degree heart block without pacemaker). • Avoid in severe PAD. • Avoid beta-blockers as initial therapy in patients > 60 years without other compelling indications.
Non-selective					
propranolol <i>Inderal, G [regular release], Inderal-LA (24h)</i> Tabs: 10, 20, 40, 80, 120 mg LA tabs: 60, 80, 120, 160 mg	Initial: 40 mg BID using <u>regular release</u> tablets Usual: 60 to 320 mg once daily (LA tabs) for patients stabilized on maintenance dosage of regular release formulation Maximum: 320 mg per day <i>Some patients may require upward titration of the total daily dose of extended release propranolol when switching from regular release tablets.</i>	\$100- 1020	Regular Benefit	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams Less Common • Hyperglycemia, heart failure, heart block, depression <i>Propranolol has higher lipophilicity than other beta- blockers and is more likely to cause CNS adverse effects (e.g., insomnia, depression, vivid dreams).</i>	• Avoid non-selective beta-blockers in reactive airways disease (risk of bronchospasm or bronchoconstriction). • Initiate cautiously and titrate slowly in patients with heart failure. • When discontinuing in chronic users, gradually taper doses over 1 to 2 weeks (abrupt discontinuation may precipitate cardiac events, sinus tachycardia and rebound HTN). • Consider alternatives in patients at high risk of heart block (contraindicated in 2nd or 3rd degree heart block without pacemaker). • Avoid in severe PAD. • Avoid beta-blockers as initial therapy in patients > 60 years without other compelling indications.

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension ^b	Annual Cost ^c	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
Calcium Channel Blockers (CCB)					
Dihydropyridine (DHP)					
amlodipine <i>Norvasc, G</i> Tabs: 2.5, 5, 10 mg	Initial: 5 mg once daily Usual: 5 to 10 mg once daily Maximum: 10 mg per day	\$50-75	Regular Benefit, RDP Reference Drug	Common <ul style="list-style-type: none">Adverse effects related to vasodilation (e.g., pedal edema, flushing, headache, palpitations)	<ul style="list-style-type: none">Do not use immediate release DHP-CCBs for acute reduction of BP (strokes have been reported).Do not use immediate release nifedipine to treat essential HTN.DHP-CCBs may worsen heart failure symptoms.Grapefruit juice may increase drug levels and potentiate adverse effects (particularly with felodipine).When discontinuing, taper doses gradually (abrupt withdrawal may provoke chest pain).
telmisartan/amlodipine <i>Twynsta</i> Tabs: 40/5, 40/10, 80/5, 80/10 mg		\$270	Limited Coverage, RDP Reference Drug	Serious <ul style="list-style-type: none">Angina, heart failure, pulmonary edema, tachycardia, bradycardia, skin rashes	
felodipine <i>Plendil, G</i> XR tabs: 2.5, 5, 10 mg	Initial: 2.5 to 5 mg once daily Usual: 2.5 to 10 mg once daily Maximum: 20 mg per day	\$145-385	Partial Benefit RDP		
nifedipine <i>Adalat XL, G</i> XL tabs: 20 (brand only), 30, 60 mg	Initial: 20 to 30 mg once daily Usual: 30 to 60 mg once daily Maximum: 90 mg per day	\$235-590	Partial Benefit RDP		
Non-dihydropyridine (non-DHP)					
diltiazem <i>Cardizem CD, Tiazac XC, Tiazac (ER), G</i> CD, ER, T, TZ, or XR capsule or tablet: 120, 180, 240, 300, 360 mg	Initial: 120 to 240 mg once daily Usual: 240 to 360 mg once daily Maximum: 360 mg per day <i>Note: a SR formulation is available for BID dosing</i>	\$85-300	Regular Benefit	Common <ul style="list-style-type: none">Headache, peripheral edema, dizziness, bradycardia, flushing, nausea, constipation	<ul style="list-style-type: none">Contraindicated post-MI in patients with moderate or severe left ventricular dysfunction.Use cautiously in patients with heart failure, or 2nd or 3rd degree heart block without pacemaker.Grapefruit juice may increase drug levels and potentiate adverse effects.When discontinuing, taper doses gradually (abrupt withdrawal may provoke chest pain).
verapamil <i>Isoptin, Isoptin SR, G</i> Tabs: 80, 120 mg SR tabs: 120, 180, 240 mg	<i>Immediate-release (IR):</i> Initial: 80 mg TID Usual: 160 mg TID Maximum: 480 mg per day <i>Sustained-release (SR):</i> Initial: 180 to 240 mg once daily Usual: 180-240 mg BID Maximum: 480 mg per day	\$200-640	Regular Benefit	Serious <ul style="list-style-type: none">Heart block, worsening of heart failure, hypotension, ECG abnormality, asthenia, arrhythmia	

Abbreviations: ACE-I = angiotensin-converting enzyme inhibitor; ARB = angiotensin II receptor blockers; BID = twice daily; BP = blood pressure; Caps = capsules; CCB = calcium channel blocker; CD = controlled delivery; CR = controlled release; CNS = central nervous system, CrCl = creatinine clearance in milliliters per minute, CV = cardiovascular, DHP = dihydropyridine; ECG = electrocardiogram; ER = extended release; G = generics available; HCTZ = hydrochlorothiazide; HTN = hypertension; IR = immediate release; ISA = intrinsic sympathomimetic activity; MI = myocardial infarction, mg = milligram; NSAID = nonsteroidal anti-inflammatory drugs; PAD = peripheral arterial disease; RDP = reference drug program; SCr = Serum creatinine; SR = sustained release; Tabs = tablets; TID = three times daily; XL = extended release.

Footnotes: ^a Not an exhaustive list; ^b For normal renal and hepatic function. Consult product monograph for detailed dosing instructions and dose adjustments for unique patient populations; ^c Pricing is approximate of usual dose as per October 2019 and does not include dispensing fees or additional markups.

Note: Please review product monographs at hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php and regularly review current Health Canada advisories, warnings and recalls at www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/index_e.html.

PharmaCare Coverage Definitions: **Regular Benefit:** Eligible for full reimbursement*; does not require Special Authority. **Limited Coverage:** Requires Special Authority to be eligible for reimbursement*. **RDP:** Reference Drug Program. Drugs included in the RDP are comparable agents of the same therapeutic class. **RDP Reference Drug:** Eligible for full reimbursement* within the therapeutic class, subject to Benefit status of the therapeutic class. **Partial Benefit RDP:** Eligible for limited reimbursement* under the RDP program up to the price of the Reference Drug. **Non-benefit:** Not eligible for coverage under any circumstances.

Note: Information on which products PharmaCare covers can be obtained using the B.C. PharmaCare Formulary Search (www2.gov.bc.ca/gov/content/health/health-drug-coverage/pharmacare-for-bc-residents). *Reimbursement is subject to the rules of a patient's PharmaCare plan, including any deductibles. In all cases, coverage is subject to drug price limits set by PharmaCare. See: www.health.gov.bc.ca/pharmacare/policy.html for further information.

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Appendix E: Hypertension Quality Indicators

Hypertension is a public health issue and an important CVD risk factor requiring continuous evaluation and quality improvement. Included here are quality indicators for key recommendations that can facilitate optimal team-based intervention for hypertension.

Quality indicators are evidence based and can provide comparable and actionable information across different geographic or organizational boundaries and/or can track progress over time. This list of quality indicators can be an initial discussion document for primary care teams, patient medical homes and/or patient medical networks to engage EMR vendors and stakeholders to initiate quality improvement initiatives.

No	Key Recommendation	Quality Indicator 
1.	Blood pressure should be measured accurately in adults, at all appropriate visits, by trained healthcare practitioners.	Percentage and/or number of people who had their BP recorded during their office visit
2.	When measuring blood pressure in the office, the use of an automated office blood pressure (AOBP) electronic device is recommended in patients with regular heart rate.	Physician office has access to automated office BP devices for BP measurements
3.	Hypertension is diagnosed in adults when automated office blood pressure reading is $\geq 135/85$ in the higher BP arm.	Percentage and/or number of patients with hypertension
4.	Consider 24-hour ambulatory blood pressure monitoring, or standardized home blood pressure monitoring, to confirm a hypertension diagnosis in all patients.	People with suspected hypertension are offered ambulatory blood pressure monitoring (ABPM) to confirm a diagnosis of hypertension
5.	Achieving an automated blood pressure reading of $\leq 135/85$ is associated with the greatest reduction of risk for adults, with no co-morbid conditions.	Proportion of patients with hypertension who have met their desired BP level
6.	Health behaviour change is recommended as a first step for those with average blood pressure 135-154/85-94 (AOBP), low-risk for cardiovascular disease and no co-morbidities.	Patients engaged in a discussion about the role of health behaviour change as a first step towards their desired BP level
7.	Initiate pharmaceutical management in context of the patient's overall cardiovascular risk and not solely on their blood pressure.	Patients with hypertension have CVD risk assessment performed and engaged in a discussion about risk scores



Summary of Guideline: Hypertension – Diagnosis and Management

Effective Date: April 15, 2020

For full guideline, go to: www.BCGuidelines.ca.

When to take BP measurements

- Record BP in all adults at every appropriate visit.
- Use an automated office BP measuring electronic device when taking an office BP.

When is BP considered elevated

- 135/85 or less measured using AOBP is the desirable BP reading for an adult with no co-morbid conditions, diabetes, chronic kidney disease or other target organ damage.
- Individual's desirable BP is influenced by their age, presence of target organ damage, CVD risk level and/or the presence of other CVD risk factors.
- If at any time diastolic BP is > 130 or BP is > 180/110 with signs or symptoms, seek immediate treatment.

How to diagnose hypertension

- If an elevated BP is detected, schedule an office visit.
- If BP is elevated again - assess target organ damage and CVD risk: family history, physical examination, urinalysis, blood chemistry, FBG or A1c, lipids, ECG, and CVD risk assessment (e.g., Framingham).
- If white-coat hypertension is suspected or unusual fluctuating office-based BP readings, consider ambulatory or home BP monitoring.

When a consultation with a specialist is indicated

- Hypertensive emergency; sudden onset in the elderly; abnormal nocturnal BP differences; signs or symptoms suggesting of secondary causes of hypertension; and if BP is difficult to control, more than 15 mm Hg difference between arms.

When to implement health behaviour change

- Recommended for all hypertensive patients.
- It includes: smoking cessation, increasing physical activity, obtaining or maintaining a healthy body composition, eating a well-balanced diet, moderate alcohol consumption and monitoring sodium intake.

When to initiate antihypertensive pharmaceutical management

- Initiate pharmaceutical management in context of the patient's overall CVD risk (e.g., not solely on their BP) and in conjunction with health behaviour change. Engage the patient to set goals towards achieving the desired BP levels.
- Pharmacologic management may be considered if: 1) average BP is > 135/85 and with target organ damage or CVD risk > 15%; 2) average BP is > 135/85 with 1+ co-morbidities; 3) average BP is \geq 160/100; or desirable BP is not reached with lifestyle management.

Which antihypertensive drug to use when treating without a specific indication

- When prescribing, take into account cost of the drug, any potential side-effects and any contraindications
- Consider monotherapy with a first-line drug: low-dose thiazide diuretic, calcium channel blocker, ACE-I, or ARB.
- If desirable BP is not achieved with standard-dose monotherapy, use combination therapy by adding one or more of the first-line drugs. **For more information on which antihypertensive drug to use when treating with a specific indication refer to Table 4 in the guideline.**



A Guide for Patients: Diagnosis and Management of Hypertension

What is hypertension?

Hypertension is the medical term for high blood pressure, in which the pressure on your arteries is higher than it should be. Blood pressure refers to the force of blood against the blood vessel walls as it circulates through your body. Naturally, a person's blood pressure rises and falls during the day. However, when blood pressure constantly stays higher than normal pressure a person is considered to have hypertension. A normal blood pressure is considered less than or equivalent to 135/85 mm Hg, but this may vary depending on the individual's factors.

Discuss with your health care professional what measurements are desirable for you.

My desirable blood pressure is:

_____ / _____ mm Hg

What causes hypertension?

For about 90 - 95% of peoples with mildly elevated blood pressure, inactive lifestyle, smoking, excess abdominal weight, unhealthy diet (such as high sodium/salt intake and low vegetable and fruit intake), alcohol consumption and stress contribute to the condition. For the other 5 - 10% of people, there may be a serious underlying cause of high blood pressure that requires urgent medical attention.

Risk factors for developing hypertension that you can control include lifestyle choices such as:

- Unhealthy diet (such as high sodium/salt intake and low vegetable and fruit intake)
- Excessive sodium/salt intake
- Physical inactivity
- Excess weight (especially around the waist)
- Excessive alcohol consumption
- Smoking

Risk factors for developing hypertension that you cannot change are:

- Family history of hypertension, heart disease or stroke
- Age (45 years or older for men; 55 years or older for women)
- Ethnicity (including South Asian, Indigenous or African descent)

Another cause of hypertension may be the use of prescription drugs (such as steroids, oral contraceptives, decongestants and nonsteroidal anti-inflammatory drugs).

How do I know if I have high blood pressure?

Unfortunately, a person with high blood pressure usually does not see or feel any obvious symptoms of hypertension. To confirm you have hypertension, you need to consult a health care professional. Normally this requires several blood pressure measurements at various times.

How can I measure my blood pressure?

There are several ways your blood pressure can be measured, including:

- By a health care professional at their office
- Using an ambulatory blood pressure monitoring device
- Using a home blood pressure monitoring device
- Using a blood pressure monitoring device in a public place (e.g., pharmacy).

For accurate blood pressure measurements, it is important to follow these ABC's:

- **Achieve a calm state** – sit comfortably for 5 minutes, quiet and relaxed. Do not smoke, drink caffeine or alcohol, or exercise within 30 minutes before taking the measurement. Readings are accurate when you are alone, and with no distractions such as reading your email, checking your phone etc.,
- **Body posture** – sit in a chair with back supported, both feet on the floor with the legs uncrossed, and the arm bare and supported at heart level.
- **Calibrate & check equipment** – use a properly calibrated and validated instrument. Follow the instruction manual that comes with the device and reach out to your doctor, pharmacist or other health care professional if you have any questions or to confirm you are measuring your BP correctly. Ensure you use the correct cuff size and position the cuff in the mid-way between the elbow and shoulder. For home blood pressure devices, a list of validated devices is listed on Hypertension Canada's website (www.hypertension.ca) and ensure it has the endorsement logo on their package.



What else do I need to know if I am using a home blood pressure monitoring device?

- Confirm with your health care professional which arm you should use for measurements.
- Twice a day (once in the morning and once in the evening), take two measurements using the same arm. Wait one minute in between measurements. In the morning, measure blood pressure twice within two hours of waking up, before taking medication and eating, and after your bladder and bowels are empty. In the evening, measure blood pressure twice before taking medication and before going to bed.
- Record the date and time of both measurements. A blood pressure log and further information can be found on the Hypertension Canada's website (hypertension.ca/hypertension-and-you/)

What else do I need to know if I am using an ambulatory blood pressure monitoring device?

- Ambulatory blood pressure monitoring includes having a small digital blood pressure monitor attached to a belt around your waist and connected to a cuff around your upper arm. It is small enough for you to carry on with your normal daily life, though some individuals may find it uncomfortable for the 24-hour monitoring period.
- It is important to keep the device in the correct position on the arm and dry (e.g., no showers, baths or heavy sweating).
- When the machine is about to take a measurement, try to: sit down with legs uncrossed, keep the cuff at the same level as your heart, and arm still.
- It is recommended that you do not drive or do vigorous exercise during the monitoring period.
- Keep a diary of your activities each time a measurement is taken. Also include what time you went to sleep. An activity diary and further information can be found on the British Hypertension Society's website (www.bhsoc.org/resources/abpm/).

What are the complications of hypertension?

Hypertension can lead to a number of potentially life-threatening conditions if it is not controlled or treated. The higher your blood pressure, the greater your risk of developing the following problems:

- Heart disease: Hypertension is a major risk factor for heart attack, and the number one risk factor for congestive heart failure.
- Stroke: Hypertension is the leading risk factor for stroke. Very high blood pressure can cause a weakened blood vessel to rupture and bleed into the brain. A blood clot blocking a narrowed artery can also cause a stroke.
- Chronic kidney disease (or CKD): Hypertension is the second leading cause of CKD (diabetes is its leading cause) and kidney failure requiring dialysis or transplant.
- Retinopathy (eye damage): Hypertension can cause small blood vessels in the eye to burst or bleed. This can lead to blurred vision or even blindness.
- Peripheral vascular disease (or PVD): Hypertension is an important risk factor for PVD, which is a narrowing and hardening of arteries that leads to restricted blood flow to the legs, arms, stomach or kidneys.
- Impotence or erectile dysfunction: Hypertension is a common cause of erectile dysfunction in males. Hypertension can lead to changes in the blood vessels that may prevent blood from filling the penis or from remaining there long enough to maintain an erection.

How can I reduce my blood pressure?

Discuss with your health care professional what the best management plan is for you. This plan may include lifestyle changes and/or being prescribed an anti-hypertensive medication.

Lifestyle changes may include:

- Stop smoking
- Exercise regularly
- Maintaining a healthy body weight
- Eating a well-balanced diet (e.g., DASH diet) – which includes monitoring sodium/salt intake
- Limiting alcohol consumption
- Relaxation therapies

Medications work in different ways to help lower blood pressure. You may be prescribed one or more of the following drugs:

- Diuretics – which rids the body of excess salt and water
- Vasodilators, angiotensin-converting enzyme inhibitors (ACE-I), angiotensin II receptor blockers (ARBs) and calcium channel blockers – which relax and open up the narrowed blood vessels.

What should I know about taking medications?

- Take medication only as prescribed and do not stop taking medications on your own.
- Ensure you are aware of any side-effects or what other substances (e.g., cold medicines) that may interfere with your anti-hypertensive medications. Tell your health care professional of any side effects. Side-effects depends on which drugs you are taking, but common side effects include:
 - ✓ Weakness, tiredness or drowsiness – Avoid getting up quickly from a seated or lying position, as this can cause dizziness and lead to falls
 - ✓ Cold hands and feet
 - ✓ Depression or sluggishness
 - ✓ Slow or fast heartbeat
 - ✓ Impotence
 - ✓ Skin rash
 - ✓ Loss of taste or dry mouth
 - ✓ Dry, constant cough, stuffy nose or asthma symptoms
 - ✓ Ankle swelling, leg cramps or aches in the joints
 - ✓ Headache, dizziness or swelling around the eyes
 - ✓ Constipation or diarrhea
 - ✓ Fever or anemia
- Ensure the medications are stored as instructed by your health care professional.
- Medications only work when you take it regularly, so it is important to remember to take them. To help remember to take your medications:
 - ✓ Take them at the same time each day, at a meal or another daily event (e.g., brushing your teeth)
 - ✓ Use a weekly pill box with separate compartments for each day, or time of day
 - ✓ Use a medicine calendar, and note every time you take your dose.

Should I use home blood pressure monitoring for my management?

Tracking your blood pressure using a home blood pressure monitoring can help you see the benefits of treatment and lifestyle changes. It may also remind you to take to stick to your management plan. However, even after your blood pressure is lower, you may still need to take medicine – do not stop taking medications unless directed by a health care professional.

How can I find out more about hypertension and managing hypertension?

- **Hypertension Canada**, www.hypertension.ca
- **Heart and Stroke Foundation**, www.heartandstroke.ca
 - **The DASH Diet: Heart and Stroke Foundation**: <https://www.heartandstroke.ca/get-healthy/healthy-eating/dash-diet>
- **British Hypertension Society**, www.bhsoc.org/
- **HealthLink BC**, www.healthlinkbc.ca. You may call HealthLinkBC at 8-1-1 toll-free in B.C., or for the deaf and the hard of hearing, call 7-1-1. You will be connected with an English speaking health-service navigator, who can provide health and health-service information and connect you with a registered dietitian, exercise physiologist, nurse, or pharmacist.
 - **HealthLinkBC**, [High Blood Pressure: Checking Your Blood Pressure at Home](#)
 - **HealthLinkBC**, [Lifestyle Steps to Lower Your Blood Pressure](#)
 - **HealthLink BC**: DASH Diet Sample Menu <https://www.healthlinkbc.ca/health-topics/zp3302>
- **Quit Smoking**: QuitNow.ca provides one-on-one support and valuable resources in multiple languages to help you plan your strategy and connect with a Quit Coach.
Phone: 1-877-455-2233 (toll-free) Email: quitnow@bc.lung.ca
- The **BC Smoking Cessation Program** helps cover the cost of nicotine replacement therapy products (nicotine gum, lozenges, patches, inhaler) and specific smoking cessation prescription drugs (Zyban® or Champix®). For prescription medications to help you quit smoking, speak to your doctor.