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
Thiazide Diuretics					
chlorthalidone (G) (Tabs: 50, 100 mg)	**Initial**: 12.5 mg daily **Usual**: 12.5-25 mg daily	$12-25	Regular Coverage	Common • Hypotension, muscle cramps, weakness, erectile dysfunction • Hypokalemia, hyponatremia, hyperglycemia, hyperlipidemia, hyperuricemia Less Common • Allergic reactions (cross sensitivity to other sulfonamide derivatives), 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
hydrochlorothiazide (G) (Tabs: 12.5, 25, 50, 100 mg)	**Initial**: 12.5 mg daily **Usual (as monotherapy)**: 12.5 mg to 50 mg once daily **Usual (as adjunctive therapy)**: 12.5 mg to 25 mg once daily **Maximum**: 50 mg daily (some sources recommend maximum 25 mg daily)	$12-13	Regular Coverage		
indapamide (Lozide, G) (Tabs: 1.25, 2.5 mg)	**Initial**: 1.25 mg once daily **Usual (as monotherapy)**: 2.5 mg once daily **Usual (as adjunctive therapy)**: 1.25 mg to 2.5 mg once daily **Maximum**: 5 mg daily (some sources recommend maximum 2.5 mg daily)	$29-93	Limited Coverage		
Angiotensin-Converting Enzyme Inhibitor (ACE-I)					
ramipril (Altace, G) (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 daily	$58-147	Regular Coverage RDP, Reference Drug	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. • Contraindicated in pregnancy. • 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.
captopril (Capoten, G) (Tabs: 6.25, 12.5, 25, 50, 100 mg tablet)	**Initial**: 12.5-25 mg BID to TID **Usual**: 50 mg BID to TID **Maximum**: 450 mg daily *Administer one hour prior to meals*	$125-922	Partial Coverage RDP		
cilazapril (Inhibace, G) (Tabs: 1, 2.5, 5 mg)	**Initial**: 2.5 mg once daily **Usual**: 2.5 to 5 mg once daily **Maximum**: 10 mg daily	$71-164	Partial Coverage RDP		
quinapril (Accupril, G) (Tabs: 5, 10, 20, 40 mg)	**Initial**: 10 mg once daily **Usual**: 10 to 20 mg once daily **Maximum:** 40 mg daily	$359	Partial Coverage RDP		
trandolapril (Mavik) (Caps: 0.5, 1, 2, 4 mg)	**Initial**: 1 mg once daily **Usual**: 1 to 2 mg once daily **Maximum**: 4 mg daily	$264-374	Partial Coverage RDP		
benazepril (Lotensin, G) (Tabs: 5, 10, 20 mg)	**Initial**: 10 mg once daily **Usual**: 20 mg once daily **Maximum:** 40 mg daily	$265-304	Partial Coverage RDP		
enalapril (Vasotec, G) (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 daily	$243-485	Partial Coverage RDP		
fosinopril (Monopril, G) (Tabs: 10, 20 mg)	**Initial**: 10 mg once daily **Usual**: 20 mg once daily **Maximum:** 40 mg daily	$243-485	Partial Coverage RDP		
lisinopril (Prinivil, Zestril, G) (Tabs: 5, 10, 20 mg)	**Initial**: 10 mg once daily **Usual**: 10 to 40 mg once daily **Maximum:** 80 mg daily	$243-970	Partial Coverage RDP		
perindopril (Coversyl, G) (Tabs: 2, 4, 8 mg)	**Initial**: 4 mg once daily **Usual**: 4 to 8 mg once daily **Maximum**: 8 mg daily	$243	Partial Coverage RDP		

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension[b]	Annual Cost[c]	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
Angiotensin II Receptor Blockers (ARB)					
candesartan (Atacand, G) (Tabs: 4, 8, 16, 32 mg)	**Initial**: 8 mg once daily **Usual**: 8 to 16 mg once daily **Maximum**: 32 mg daily	$112	Limited Coverage, Regular Coverage RDP, Reference Drug	Common • 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 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 salts • Consider a thiazide diuretic or CCB instead of an ACE-I or ARB as initial antihypertensive therapy in black patients. • Contraindicated in pregnancy.
eprosartan (Teveten) (Tabs: 400, 600 mg)	**Initial**: 600 mg once daily **Maximum**: 800 mg daily as a single dose or two divided doses	$437	Limited Coverage, Regular Coverage RDP		
irbesartan (Avapro, G) (Tabs: 75, 150, 300 mg)	**Initial**: 150 mg once daily **Usual**: 150 to 300 mg once daily **Maximum** daily dose: 300 mg	$119	Limited Coverage, Regular Coverage RDP		
losartan (Cozaar, G) (Tabs: 25, 50, 100 mg)	**Initial**: 50 mg once daily **Usual**: 25 to 100 mg daily as single dose or two divided doses **Maximum**: 100 mg daily	$124	Limited Coverage, Regular Coverage RDP, Reference Drug		
olmesartan (Olmetec) (Tabs: 20, 40 mg)	**Initial**: 20 mg once daily **Usual**: 20 to 40 mg once daily **Maximum**: 40 mg daily	$403	Limited Coverage, Regular Coverage RDP		
telmisartan (Micardis, G) (Tabs: 40, 80 mg)	**Initial**: 40 mg once daily **Usual**: 40 to 80 mg once daily **Maximum**: 80 mg daily	$111	Limited Coverage, Regular Coverage RDP, Reference Drug		
valsartan (Diovan, G) (Tabs: 40, 80, 160, 320 mg)	**Initial**: 80 mg once daily **Usual**: 80 to 320 mg once daily **Maximum**: 320 mg daily	$112-117	Limited Coverage, Regular Coverage RDP, Reference Drug		
Beta[1]-Adrenergic Antagonists (Beta-Blockers)					
Non-selective					
nadolol (Corgard, G) (Tabs: 40, 80, 160 mg)	**Initial**: 20 mg once daily **Usual**: 160 mg once daily **Maximum**: 320 mg once daily	$89-949	Regular Coverage	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams Less Common • Hyperglycemia, heart failure, heart block, depression *Propranolol has higher lipophilicity than other beta-blockers and is more likely to cause CNS adverse effects (e.g., insomnia, depression, vivid dreams).*	• Avoid non-selective beta-blockers in reactive airways disease (risk of bronchospasm or bronchoconstriction). • Initiate cautiously and titrate slowly in patients with heart failure as beta-blockers may worsen 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 alternative antihypertensive 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 antihypertensive therapy in patients > 60 years without other compelling indications.antihypertensive therapy in patients > 60 years without other compelling indications.
propranolol (Inderal, G [regular release], Inderal-LA) (10, 20, 40, 80, 120 mg regular release tablet; 60, 80, 120, 160 mg extended release capsule [Inderal-LA])	**Initial**: 40 mg BID using regular release tablets **Usual**: 60 to 320 mg once daily (extended release) for patients stabilized on maintenance dosage of regular release formulation **Maximum**: 320 mg daily *Some patients may require upward titration of the total daily dose of extended release propranolol when switching from regular release tablets.*	$223-914	Regular Coverage		
timolol (Blocadren, G) (Tabs: 5, 10, 20 mg)	**Initial**: 5 mg BID **Usual**: 20 mg BID **Maximum**: 30 mg BID	$130-597	Regular Coverage		

Generic Name (trade name) (strengths and dosage form)	Usual Adult Dosages for Hypertension[b]	Annual Cost[c]	PharmaCare Coverage	Common Adverse Effects	Therapeutic Considerations
Non-selective with intrinsic sympathomimetic activity (ISA)					
pindolol (Visken, G) (Tabs: 5, 10, 15 mg)	**Initial**: 5 mg BID **Usual**: 15 to 45 mg daily **Maximum**: 45 mg daily *For doses > 30 mg daily, give as 3 divided doses.*	$107-399	Regular Coverage	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 (risk of bronchospasm or bronchoconstriction). • Initiate cautiously and titrate slowly in patients with heart failure as beta-blockers may worsen 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 alternative antihypertensive 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 antihypertensive therapy in patients > 60 years without other compelling indications.
labetalol (Trandate, G) (Tabs: 100, 200 mg)	**Initial**: 50 mg BID **Usual**: 200 mg BID **Maximum**: 600 mg BID	$65-1377	Regular Coverage		
Beta$_1$-selective					
atenolol (Tenormin, G) (Tabs: 25, 50, 100 mg)	**Initial**: 25 mg daily **Usual**: 50 mg daily as single dose or divided BID **Maximum**: 100 mg daily as single dose or divided BID	$27-93	Regular Coverage	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams Less Common • Hyperglycemia, heart failure, heart block, depression *Cardiac selectivity of beta$_1$-selective beta-blockers may result in fewer non-cardiac adverse effects.*	• Low doses of beta[1]-selective beta-blockers may be used in patients with mild to moderate reversible airway disease (ensure access to a bronchodilating beta[2]-agonist is readily available). • Initiate cautiously and titrate slowly in patients with heart failure as beta-blockers may worsen 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 alternative antihypertensive 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 antihypertensive therapy in patients > 60 years without other compelling indications.
bisoprolol (Monocor, G) (Tabs: 5, 10 mg)	**Initial**: 5 mg once daily **Usual**: 10 mg once daily **Maximum**: 20 mg once daily	$39-114	Regular Coverage		
metoprolol (Lopressor, Betaloc, G) (50, 100 mg regular release tablet; 100, 200 mg sustained release tablet)	**Initial**: 50 mg daily **Usual**: 100 to 200 mg daily **Maximum**: 400 mg daily *Regular release: dose BID; Sustained release: dose once daily.*	$25-197	Regular Coverage		
Beta$_1$-selective with intrinsic sympathomimetic activity (ISA)					
acebutolol (Rhotral, G) (Tabs: 100, 200, 400 mg)	**Initial**: 100 mg daily **Usual**: 400 mg daily as single dose or divided BID **Maximum**: 800 mg daily as single dose or divided BID	$31-194	Regular Coverage	Common • Bradycardia, fatigue, decreased exercise tolerance, headache, erectile dysfunction, vivid dreams Less Common • Hyperglycemia, heart failure, heart block, depression *Cardiac selectivity of beta$_1$-selective beta-blockers may result in fewer non-cardiac adverse effects.*	• Beta-blockers with ISA have a lesser effect on resting heart rate compared to agents without ISA. • Low doses of beta$_1$-selective beta-blockers may be used in patients with mild to moderate reversible airway disease (ensure access to a bronchodilator beta$_2$-agonist is readily available). • Initiate cautiously and titrate slowly in patients with heart failure as beta-blockers may worsen heart failure. • When discontinuing beta-blockers in chronic users, gradually taper doses over 1 to 2 weeks (abrupt discontinuation may precipitate cardiac events, sinus tachycardia and rebound HTN). • Consider alternative antihypertensive 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 antihypertensive 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 (Norvasc, G) (Tabs: 2.5, 5, 10 mg)	**Initial**: 2.5 mg once daily **Usual**: 5 to 10 mg once daily **Maximum**: 10 mg daily	$165-331	Regular Coverage RDP, Reference Drug	Common • Adverse effects related to vasodilation (e.g., pedal edema, flushing, headache, palpitations) Serious • Angina, heart failure, pulmonary edema, tachycardia, bradycardia, skin rashes	• 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).
felodipine (Plendil, Renedil, G) (2.5, 5, 10 mg extended release tablet)	**Initial**: 2.5 mg once daily **Usual**: 2.5 to 10 mg once daily **Maximum**: 10 mg daily	$125-265	Partial Coverage RDP		
nifedipine (Adalat XL, G) (20, 30, 60 mg extended release tablet)	**Initial**: 30 mg once daily **Usual**: 30 to 60 mg once daily **Maximum**: 90 mg daily	$331-827	Partial Coverage RDP		
Non-dihydropyridine (non-DHP)					
diltiazem (Cardizem CD, Tiazac XC, G) (120, 180, 240, 300, 360 mg extended-release capsule or tablet)	**Initial**: 120 to 240 mg once daily **Usual**: 240 to 360 mg once daily **Maximum**: 360 mg daily	$84-228	Regular Coverage	Common • Headache, peripheral edema, dizziness, bradycardia, flushing, nausea, constipation Serious • Heart block, worsening of heart failure, hypotension, ECG abnormality, asthenia, arrhythmia	• 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 (Isoptin SR, G) (80, 120 mg immediate release tablet; 120, 180, 240 mg sustained-release tablet)	**Initial**: 80 mg TID immediate release; 180 to 240 mg daily sustained-release **Usual**: 160 mg TID immediate release; 180 to 240 mg BID sustained-release **Maximum**: 480 mg daily	$200-688	Regular Coverage		

Abbreviations: ACE-I = angiotensin-converting enzyme inhibitor; ARB = angiotensin II receptor blockers; BID = twice daily; BP = blood pressure; CCB = calcium channel blocker; CNS = central nervous system, CrCl = creatinine clearance in millimeters per minute, CV = cardiovascular, DHP = dihydropyridine; ECG = electrocardiogram; HTN = hypertension; 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; TID = three times daily.

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 as per PharmaNet from 2014/05/30 to 2014/06/16 and does not include dispensing fee or additional markups, updates to coverage made June 2016.

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: G: generic(s) are available; **Regular Coverage**: also known as regular benefit; does not require Special Authority. Regular benefits may be fully or partially covered.*; **Limited Coverage**: requires Special Authority for coverage. Limited Coverage benefits approved by Special Authority may be fully or partially covered.*; **RDP**: Reference Drug Program. Drugs included in the RDP are comparable agents of the same therapeutic class. Patients receive full coverage of drugs designated as the Reference Drug(s) of the therapeutic class. Other drugs in the same RDP category are covered up to the price of the Reference Drug; **No coverage**: also known as non-benefit; does not fit the above categories.
* Note: Information on which products PharmaCare covers can be obtained using the B.C. PharmaCare Formulary Search (www.health.gov.bc.ca/pharmacare/benefitslookup/). In all cases, coverage is subject to drug price limits set by PharmaCare and to the patient's PharmaCare plan rules and deductibles. See: www.health.gov.bc.ca/pharmacare/plans/index.html and www.health.gov.bc.ca/pharmacare/policy.html for further information.

References:

1. Gray Jean, editor. e-Therapeutics+ [Internet]. Ottawa (ON): Canadian Pharmacists Association; c2014 [cited 2014 Jun 3].
2. e-CPS [Internet]. Ottawa, ON: Canadian Pharmacists Association; c2014 [cited 2014 Jun 3].
3. Lexi-Comp Online [Internet]. Hudson, OH: Lexi-Comp, Inc.; c2014 [cited 2014 Jun 3].
4. Health Canada Drug Product Database Product Monographs. Ottawa, ON: Health Canada; 2014 [cited 2014 Jun 16].