

Hypertension in Primary Care: Blood Pressure Goa Aged 60 and Older **Blood Pressure Goals for Adults**

B.C. Provincial Academic Detailing Service

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REFERENCES

Background (p1)

- 1. Alhaawassi T, Krass I, Pont L. Hypertension in older persons. A systematic review of national and international treatment guidelines. J Clin Hypertension 2015;17:486-492
- 2. VA/DoD Clinical practice guideline for the diagnosis and management of hypertension in the primary care setting. [Internet]. https://www.healthquality.va.gov/guidelines/CD/htn/
- 3. Benetos A, Bulpitt C, Petrovic M, et al. An expert opinion from the European Society of Hypertension European Union Geriatric Medicine Society Working Group on the management of hypertension in very old, frail subjects. Hypertension 2016;67:820-825
- 4. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. Hypertension 2017; epub Nov 13
- 5. Qaseem A, Wilt T, Rich R, et al. Pharmacologic treatment of hypertension in adults aged 60 years or older to higher versus lower blood pressure targets: a clinical practice guideline from the American College of Physicians and American Academy of Family Physicians. Ann Int Med 2017;166:430-437
- 6. Hypertension Canada's 2017 guidelines for diagnosis, risk assessment, prevention, and treatment of hypertension in adults. Can J Cardiology 2017;33:557-576

Evidence and Guidelines (p2-3)

- 1. Musini V, Tejani A, Bassett K, Wright J. Pharmacotherapy for hypertension in the elderly. Cochrane Database of Systematic Reviews 2009, Issue 4. Art. No. CD000028
- 2. Garrison S, Kolber M, Korownyk C, et al. Blood pressure targets for hypertension in older adults. Cochrane Database of Systematic Reviews 2017, Issue 8. Art. No. CD011575
- 3. Saiz L, Gorricho J, Garjon J, et al. Blood pressure targets for the treatment of people with hypertension and cardiovascular disease. Cochrane Database of Systematic Reviews 2017, Issue 10. Art. No. CD010315
- 4. Qaseem A, Wilt T, Rich R, et al. Pharmacologic treatment of hypertension in adults aged 60 years or older to higher versus lower blood pressure targets: a clinical practice guideline from the American College of Physicians and American Academy of Family Physicians. Ann Int Med 2017;166:430-437
- 5. Weiss J, Freeman M, Low A, et al. Benefits and harms of intensive blood pressure treatment in adults aged 60 years or older. A systematic review and meta-analysis. Ann Intern Med 2017;166:419-429
- 6. The ACCORD Study Group. Effects of intensive blood-pressure control in type 2 diabetes mellitus. N Engl J Med 2010;362;1575-85
- 7. The SPRINT Research Group. A randomized trial of intensive versus standard blood-pressure control. N Engl J Med 2015;373:2103-2116
- 8. Hypertension Canada's 2017 guidelines for diagnosis, risk assessment, prevention, and treatment of hypertension in adults. Can J Cardiology 2017;33:557-576
- 9. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. Hypertension 2017; epub Nov 13
- 10. Cushman W, Whelton P, Fine L, et al. SPRINT Trial Results: Latest news in hypertension management. Hypertension 2016;67:263-265
- 11. Wang T, Lin H, Chen W, et al. Increased all-cause mortality with intensive blood-pressure control in patients with a baseline systolic blood pressure of ≥ 160 mmHg and a lower Framingham risk score: a cautionary note from SPRINT. European Society Congress 2017. [Internet]. www.escardio.org/ESC2017

12. Pajewski N, Williamson J, Applegate W, et al. Characterizing frailty status in in the Systolic Blood Pressure Intervention Trial. J Gerontol A Biol Sci Med 2016;71:649-655

Thiazides (p4)

- 1. Musini V, Nazer M, Bassett K, Wright J. Blood pressure-lowering efficacy of monotherapy with thiazide diuretics for primary hypertension. Cochrane Database of Systematic Reviews 2014, Issue 5. Art. No.: CD003824
- 2. McKesson Canada. PharmaClik. https://www.mckesson.ca/
- 3. Thiazide Diuretics. CPhA Monograph. e-CPS [Internet]. Ottawa, Ontario: Canadian Pharmacists Association, 2017
- 4. Health Canada Product Monograph. Lozide (indapamide). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 5. Wright JM, Musini VM. First-line drugs for hypertension. Cochrane Database of Systematic Reviews 2009, Issue 3. Art. No.: CD001841
- 6. Xue H, Lu Z, Tang WL, Pang LW, et al. First-line drugs inhibiting the renin angiotensin system versus other first-line antihypertensive drug classes for hypertension. Cochrane Database of Systematic Reviews 2015, Issue 1. Art. No.: CD008170
- 7. The ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). JAMA 2002;288:2981-2997
- 8. Chen N, Zhou M, Yang M, Guo J, Yang J, Wang Y, Yang X, He L. Calcium channel blockers versus other classes of drugs for hypertension. Cochrane Database of Systematic Reviews 2010, Issue 8. Art. No.: CD003654
- 9. US Department of Veterans Affairs. VA CSP Study No. 597: Diuretic Comparison Project. https://www.research.va.gov/programs/csp/597/default.cfm
- 10. Olde Engberink R, Frenkel W, van den Bogaard B, et al. Effects of thiazide-type and thiazide-like diuretics on cardiovascular events and mortality. Systematic review and meta-analysis. Hypertension 2015;65:1033-1040
- 11. Liamis G, Filippatos T, Elisaf M. Thiazide-associated hyponatremia in the elderly: what the clinician needs to know. J Geriatric Cardiology 2016;13:175-182
- 12. Alderman M, Piller L, Ford C, et al. Clinical significance of incident hypokalemia and hyperkalemia in treated hypertensive patients in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Hypertension 2012;59:926-933
- 13. Heran B, Chen J, Wang J, Wright J. Blood pressure lowering efficacy of potassium-sparing diuretics (that block the epithelial sodium channel) for primary hypertension. Cochrane Database of Systematic Reviews 2012, Issue 11. Art. No.: CD008167
- 14. Roush G, Ernst M, Kostis J, et al. Dose doubling, relative potency, and dose equivalence of potassium-sparing diuretics affecting blood pressure and serum potassium: systematic review and meta-analyses. J Hypertension 2016;34:11-19
- 15. Sinha A, Agarwal R. Thiazides are useful agents in CKD. J American Society Hypertension 2016;10:288-289
- 16. Sinha A, Agarwal R. Thiazides in advanced chronic kidney disease: time for a randomized controlled trial. Curr Opin Cardiol 2015;30:366-372
- 17. Canadian Agency for Drugs and Technologies in Health. 2010. Use of diuretics for hypertension in patients with reduced renal function: a review of clinical effectiveness, safety, and guidelines. https://cadth.ca/use-diuretics-hypertension-patients-reduced-renal-function-review-clinical-effectiveness-safety-an-0
- 18. Elliott W, Jurca S. Loop diuretics are most appropriate for hypertension treatment in chronic kidney disease. J American Society Hypertension 2016;10:285-287

ACEI (p5)

- 1. Heran B, Wong M, Heran I, Wright J. Blood pressure lowering efficacy of angiotensin converting enzyme (ACE) inhibitors for primary hypertension. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No. CD003823
- 2. McKesson Canada. PharmaClik. https://www.mckesson.ca/
- 3. Health Canada Product Monograph. Altace (ramipril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 4. Health Canada Product Monograph. Lotensin (benazepril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/

- 5. Health Canada Product Monograph. Inhibace (cilazapril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 6. Health Canada Product Monograph. Vasotec (enalapril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 7. Health Canada Product Monograph. Apo-Fosinopril (fosinopril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 8. Health Canada Product Monograph. Prinivil (lisinopril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 9. Health Canada Product Monograph. Zestril (lisinopril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 10. Health Canada Product Monograph. Coversyl (perindopril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 11. Health Canada Product Monograph. Accupril (quinapril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 12. Health Canada Product Monograph. Mavik (trandolapril). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 13. Wright JM, Musini VM. First-line drugs for hypertension. Cochrane Database of Systematic Reviews 2009, Issue 3. Art. No.: CD001841
- 14. Health Canada. New warnings regarding blood pressure drugs. February 4, 2014. [Internet]. http://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2014/37895a-eng.php
- 15. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. Hypertension 2017; epub Nov 13
- 16. Alderman M, Piller L, Ford C, et al. Clinical significance of incident hypokalemia and hyperkalemia in treated hypertensive patients in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Hypertension 2012;59:926-933
- 17. Raebel M. Hyperkalemia associated with use of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers. Cardiovascular Therapeutics 2012;30:e156-e166
- 18. Joint Task Force on Practice Parameters; American Academy of Allergy, Asthma and Immunology; American College of Allergy, Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. Drug allergy: an updated practice parameter. Ann Allergy Asthma Immunol 2010;105:259-273
- 19. Health Canada Product Monograph. Entresto (sacubitril valsartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 20. Sanders GD, Coeytaux R, Dolor R, et al. Angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor antagonists (ARBs), and direct renin inhibitors for treating essential hypertension: an update. Comparative Effectiveness Review No. 34. AHRQ Publication No. 11-EHCO63-EF. Rockville, MD: Agency for Healthcare Research and Quality. June 2011. https://effectivehealthcare.ahrq.gov/topics/ace-inhibitor-arb-update/research/
- 21. Dicpinigaitis P. Angiotensin-converting enzyme inhibitor-induced cough. ACCP evidence-based clinical practice guidelines. CHEST 2006;129:169S-173S

ARB (p6)

- 1. Heran B, Wong M, Heran I, Wright J. Blood pressure lowering efficacy of angiotensin receptor blockers for primary hypertension. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No. CD003822
- 2. McKesson Canada. PharmaClik. https://www.mckesson.ca/
- 3. Health Canada Product Monograph. Atacand (candesartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 4. Health Canada Product Monograph. Cozaar (losartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 5. Health Canada Product Monograph. Micardis (telmisartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 6. Health Canada Product Monograph. Diovan (valsartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 7. Health Canada Product Monograph. Teveten (eprosartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 8. Health Canada Product Monograph. Avapro (irbesartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 9. Health Canada Product Monograph. Olmetec (olmesartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 10. Health Canada Product Monograph. Edarbi (azilsartan). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 11. Wright JM, Musini VM. First-line drugs for hypertension. Cochrane Database of Systematic Reviews 2009, Issue 3. Art. No.: CD001841
- 12. Li E, Heran B, Wright J. Angiotensin converting enzyme (ACE) inhibitors versus angiotensin receptor blockers for primary hypertension. Cochrane Database of Systematic Reviews 2014, Issue 8. Art. No.: CD009096
- 13. Health Canada. New warnings regarding blood pressure drugs. February 4, 2014. [Internet]. http://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2014/37895a-eng.php

- 14. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. Hypertension 2017; epub Nov 13
- 15. Raebel M. Hyperkalemia associated with use of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers. Cardiovascular Therapeutics 2012;30:e156-e166
- 16. Makani H, Messerli F, Romero J, et al. Meta-analysis of randomized trials of angioedema as an adverse event of renin-angiotensin system inhibitors. Am J Cardiol 2012;110:383-391
- 17. U.S. Food & Drug Administration. FDA Drug Safety Communication: FDA approves label changes to include intestinal problems (sprue-like enteropathy) linked to blood pressure medicine olmesartan medoxomil. 2013. https://www.fda.gov/DrugS/DrugSafety/ucm359477.htm
- 18. Canadian Agency for Drugs and Technologies in Health. Common Drug Review. CDEC Final Recommendation. Azilsartan medoxomil. [Internet]. October 2013. https://www.cadth.ca/sites/default/files/cdr/complete/cdr complete Edarbi October-21-13 e.pdf

CCB (p7)

- 1. Wright JM, Musini VM. First-line drugs for hypertension. Cochrane Database of Systematic Reviews 2009, Issue 3. Art. No.: CD001841
- 2. McKesson Canada. PharmaClik. https://www.mckesson.ca/
- 3. Health Canada Product Monograph. Norvasc (amlodipine). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 4. Health Canada Product Monograph. Plendil (felodipine extended release tablets). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 5. Health Canada Product Monograph. Adalat XL (nifedipine extended release tablets). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 6. Health Canada Product Monograph. Cardizem CD (diltiazem controlled delivery capsules). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 7. Health Canada Product Monograph. Tiaxac (diltiazem extended release capsules). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 8. Health Canada Product Monograph. Tiaxac XC (diltiazem extended release tablets). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 9. Health Canada Product Monograph. Isoptin SR (verapamil sustained release tablets). [Internet]. http://webprod5.hc-sc.gc.ca/dpd-bdpp/
- 10. Chen N, Zhou M, Yang M, Guo J, Yang J, Wang Y, Yang X, He L. Calcium channel blockers versus other classes of drugs for hypertension. Cochrane Database of Systematic Reviews 2010, Issue 8. Art. No.: CD003654
- 11. The ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). JAMA 2002;288:2981-2997
- 12. Xue H, Lu Z, Tang WL, Pang LW, et al. First-line drugs inhibiting the renin angiotensin system versus other first-line antihypertensive drug classes for hypertension. Cochrane Database of Systematic Reviews 2015, Issue 1. Art. No.: CD008170
- 13. Wong M, Heran B, Wright. Blood pressure lowering efficacy of calcium channel blockers for primary hypertension. Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: CD003657
- 14. Ezekowitz J, O'Meara E, McDonald M, et al. 2017 Comprehensive update of the Canadian Cardiovascular Society Guidelines for the Management of Heart Failure. Can J Cardiol 2017; epub September 6, 2017
- 15. Makani H, Bangalore S, Romero J, et al. Peripheral edema associated with calcium channel blockers: incidence and withdrawal rate a meta-analysis of randomized trials. J Hypertens 2011;29:1270-1280
- 16. Ellis J, Seymour R, Steele J, et al. Prevalence of gingival overgrowth induced by calcium channel blockers: a community-based study. J Periodontol 1999;70:63-67
- 17. Livada R, Shiloah J. Calcium channel blocker-induced gingival enlargement. Journal Human Hypertension 2014;28:10-14
- 18. Lexicomp Online. Lexicomp Interactions. [Internet]. https://online.lexi.com/lco/action/interact

- 19. Indiana University. School of Medicine. Flockhart Table. P450 Drug Interaction Table. [Internet]. http://medicine.iupui.edu/clinpharm/ddis/main-table/
- 20. Wright A, Gomes T, Mamdani M, et al. The risk of hypotension following co-prescription of macrolide antibiotics and calcium-channel blockers. CMAJ 2011;193:303-307
- 21. Gandhi S, Bailey D, McArthur E, et al. Calcium-channel blocker-clarithromycin drug interactions and acute kidney injury. JAMA 2013;310:2544-2553
- 22. Kannan S, Gogtay N, Thatte U. Interaction of calcium channel blockers and grapefruit juice in healthy adults. Cochrane Database of Systematic Reviews 2014, Issue 12. Art. No.: CD011452

Beta Blockers, Frailty, Combination Therapy (p8)

- 1. Wiysonge C, Bradley H, Volmink J, et al. Beta-blockers for hypertension. Cochrane Database of Systematic Reviews 2017, Issue 1. Art. No.: CD002003
- 2. Leung A, Daskalopoulou S, Dasgupta K, et al. Hypertension Canada's 2017 guidelines for diagnosis, risk assessment, prevention, and treatment of hypertension in adults. Can J Cardiology 2017;33:557-576
- 3. U.S. Department of Veterans Affairs. VA/DoD Clinical Practice Guidelines. Management of Hypertension in Primary Care (2014). [Internet]. https://www.healthquality.va.gov/guidelines/CD/htn/
- 4. Qaseem A, Wilt T, Rich R, et al. Pharmacologic treatment of hypertension in adults aged 60 years or older to higher versus lower blood pressure targets: a clinical practice guideline from the American College of Physicians and American Academy of Family Physicians. Ann Int Med 2017;166:430-437
- 5. Weiss J, Freeman M, Low A, et al. Benefits and harms of intensive blood pressure treatment in adults aged 60 years or older. A systematic review and meta-analysis. Ann Intern Med 2017;166:419-429
- 6. Garjon J, Saiz L, Azparren A, et al. First-line combination therapy versus first-line monotherapy for primary hypertension. Cochrane Database of Systematic Reviews 2017, Issue 1. Art. No.: CD010316
- 7. Benetos A, Bulpitt C, Petrovic M, et al. An expert opinion from the European Society of Hypertension European Union Geriatric Medicine Society Working Group on the management of hypertension in very old, frail subjects. Hypertension 2016;67:820-825