

Treatment of Hypertension

Updated September 2025



WITHOUT CVD or CKD	CAD ^b	Stroke/TIA ^a	CKD ^b	HFrEF ^b	HFpEF ^b	Other CVD
One, or low-dose combo ^b of two, of these: ACEI ^h or ARB ^h , thiazide, ^a long-acting DHP CCB ^{1,2,e}	Evidence-based ACEI, ^h ARB ^h , or BB ^d (BB especially for recent MI or ACS, or angina) ^{1,11} Add-ons: long-acting DHP CCB, ^e thiazide, ^a MRA ^{a,1,11}	Thiazide, ^a ACEI, ^h or ARB ^{1,h}	ACEI ^h or ARB. ^{1,h} Can add a long-acting DHP CCB ^e or thiazide (loop if eGFR <30 mL/min/1.73m ²). ^{1,4} Consider adding finereone for diabetic kidney disease. ¹⁷	Evidence-based BB; ^d MRA ^g (if symptomatic, eGFR >30 mL/min/1.73m ² , potassium <5 mEq/L); sacubitril/valsartan (NYHA Class II to III [preferred over ACEI ^h or ARB ^h]), and SGLT2 inhibitor (if symptomatic) ¹ Loop diuretic as needed. ¹ Can add hydralazine plus isosorbide dinitrate in Black patients, or other patients who can't take sacubitril/valsartan, ACEI ^h or ARB. ^{1,h}	SGLT2 inhibitor. ^{1,5} Consider MRA ^g or sacubitril/valsartan or ARB. ^{1,5,h} Loop diuretic as needed. ¹ HFmrEF^b SGLT2 inhibitor. ⁵ Consider MRA ^g or sacubitril/valsartan or ARB. ⁵ Consider Evidence-based BB. ^{d,5}	A-fib^b ACEI, ^h ARB ^h , or MRA ^{1,g,1,3} Aortic disease^b BB ^d (largely extrapolated from acute management) ¹ Aortic VALVE regurgitation^b ACEI, ^h ARB ^h (note: antihypertensives that reduce HR may increase SBP)



- Optimize dose, then add another appropriate first-line agent (e.g., thiazide,^a ACEI,^h ARB^h, long-acting dihydropyridine CCB^e).^{2,4}
 - DO NOT combine an ACEI plus ARB and/or aliskiren.¹
- Consider SGLT2 inhibitor (for diabetes, HF) or GLP-1 agonist (diabetes, obesity) for appropriate patients.^{1,18}



Investigate resistant HTN (i.e., BP >goal despite optimal dosing of three antihypertensives from different classes,^{6,7} or BP controlled with four antihypertensives.⁶) Consider pseudoresistance and secondary HTN. **See footnote c** for more information on resistant HTN.



Add a drug(s) from a class not currently in use.

Spironolactone (preferred^{1,2,4}) or eplerenone^{1,6,g}

OR

Amiloride^{4,7,13}

If HR ≥70 bpm:
Beta-blocker (consider carvedilol)^{6,14,d}

OR

Clonidine^{4,6}

OR

Guanfacine⁶

OR

Long-acting diltiazem or verapamil^{6,e}

Doxazosin
Consider for BPH^{1,4} Risk of orthostatic hypotension, especially with first dose and in older patients.¹

Hydralazine
Max dose 50 mg TID to reduce lupus risk.⁶ Use with BB and diuretic to counteract reflex tachycardia and fluid retention. Add nitrate for HFrEF.⁶

OR

Minoxidil⁶
Causes hirsutism.⁶ Use with BB and diuretic to counteract reflex tachycardia and fluid retention.¹

Aprocitan (Tryvio [US]).¹² Risk of embryo-fetal toxicity. Lacks CV risk reduction data. Can cause fluid retention, hepatotoxicity, hemoglobin eGFR reduction, reduced sperm count.

Therapy Optimization (consider during all steps above)



- Optimize lifestyle interventions (e.g., healthy diet, exercise, weight loss, sodium restriction [e.g., 2,400 mg/day], increased dietary potassium [if appropriate], alcohol restriction, stress reduction).^{1,6,7}
- Consider discontinuation or dose reduction of drugs or substances that may increase blood pressure.
- Consider use of once-daily antihypertensives (to improve adherence), giving at least one dose at bedtime; patients with resistant HTN often have BP that doesn't "dip" at night like it should.^{6,10}
- Consider choosing indapamide or chlorthalidone (with azilsartan for resistant HTN) over hydrochlorothiazide.^{6,7,a} See footnote a for details.
- Consider switching amlodipine to long-acting nifedipine.⁶

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Footnotes

- a. **Thiazide considerations.** "Thiazide" includes thiazide-like diuretics. Chlorthalidone or indapamide have a longer duration of action than hydrochlorothiazide and may be preferable in patients with resistant HTN.^{1,7} Chlorthalidone may provide better CV outcomes in patients with a history of stroke or MI, at the expense of higher risk of hypokalemia.^{1,2} Thiazides are effective to eGFR 25 to 30 mL/min/1.73m².⁶ Chlorthalidone is about twice as potent as hydrochlorothiazide.⁹ Chlorthalidone is available alone or in combination with azilsartan (Edarbyclor). Azilsartan may provide more BP reduction than other ARBs or ACEIs.⁶
- b. Combination Therapy vs. Stepped-Care
 - Consider starting with a **combo** of two meds, especially if baseline BP $\geq$ 140/90 mm Hg, Black, or CV risk $>$ 7.5%.¹ Hypertension Canada recommends starting with a combo in all patients.²
 - Monitor older adults for orthostatic hypotension.¹
 - Choose a single-pill combination with two meds to promote adherence.^{1,2,4} Available single-pill combinations include ACEI/CCB, ARB/CCB, ACEI/diuretic, ARB/diuretic.
 - Consider starting with a single agent, carefully uptitrating, then adding other agents if needed (**stepped care**) when starting antihypertensives in frail patients, patients with a history of adverse effects with antihypertensives (e.g., hypotension), and/or baseline BP 130 to 139/80 to 89 mm Hg.¹
- c. Resistant Hypertension
 - Hypertension Canada recommends specialist referral for patients not at goal with three agents.⁷
 - Consider pseudoresistance due to **nonadherence, blood pressure measurement error, or white coat HTN.**^{6,7}
 - Consider secondary HTN due to obstructive sleep apnea (very common),⁸ primary hyperaldosteronism (AHA guidelines recommend screening all patients⁶), CKD, renal artery stenosis, chromaffin cell tumors (e.g., pheochromocytoma), coarctation of the aorta (even post-repair), Cushing's disease, rare endocrine disorders.⁶
 - Adverse effects are an important consideration when choosing an add-on antihypertensive because evidence that BP reduction improves CV outcomes in resistant HTN is lacking.⁷
- d. Beta-blocker considerations:
 - BB are not recommended first-line for HTN unless the patient has CAD or HF.¹
 - In **HTN**, BBs do not reduce stroke risk as much as ACEIs, ARBs, thiazides, or dihydropyridine CCBs.²
 - For **CAD**, evidence-based BB choices include carvedilol, metoprolol succinate, nadolol, bisoprolol, propranolol, or timolol.¹¹
 - Avoid atenolol; it is inferior to other BBs for reducing CV events.¹¹
 - For **HF**, evidence-based BB choices include metoprolol succinate, bisoprolol, or carvedilol.¹
 - Avoid combining a BB with clonidine or a non-DHP CCB (diltiazem, verapamil).¹²
 - For indications and dosing, see our chart, [Comparison of Oral Beta-Blockers](#).
- e. Calcium channel blocker considerations
 - Do not use short-acting nifedipine.¹
 - Consider use of long-acting nifedipine over amlodipine for potentially better BP control; however, nifedipine may cause more edema than amlodipine.⁶
 - Do not use a non-DHP CCB (diltiazem, verapamil) in patients with HFrEF.¹
 - A nondihydropyridine CCB (diltiazem, verapamil) can be used **instead of** a BB for angina unless the patient has significant left ventricular dysfunction.¹¹
 - DHP and non-DHP (diltiazem, verapamil) can be combined.¹
- f. Some evidence suggests that ACEIs or ARBs may reduce A-fib recurrence, and MRAs may reduce A-fib burden.^{1,3}
- g. Mineralocorticoid receptor antagonist considerations
 - Do not combine MRAs (spironolactone, eplerenone, finerenone).¹
 - MRAs with evidence in HFrEF are spironolactone and eplerenone.⁵
 - In HFpEF, consider MRAs (spironolactone or finerenone) for females, or males with ejection fraction $<$ 55% to 60%).^{5,15,16}
 - MRAs with evidence in HFmrEF are spironolactone and finerenone.^{5,16}
 - Spironolactone has been studied for BP control in resistant HTN, and is a first-line-add-on.¹
 - Eplerenone is dosed BID for HTN, but poses lower risk of gynecomastia and erectile dysfunction than spironolactone.¹
 - Like eplerenone, finerenone is less likely than spironolactone to cause gynecomastia.¹⁷
- h. ACEIs and ARBs: for indications and dosing, see our chart, [Angiotensin Receptor Blockers and Angiotensin-Converting Enzyme Inhibitors](#).

Abbreviations: ACEI = Angiotensin converting enzyme inhibitor; A-fib = atrial fibrillation; ARB = angiotensin receptor blocker; BB = beta-blocker; BID = twice daily; BNP = brain natriuretic peptide; BP = blood pressure; BPH = benign prostatic hypertrophy; bpm = beats per minute; CCB = calcium channel blocker; CKD = chronic kidney disease; CVD = cardiovascular disease; DBP = diastolic blood pressure; DHP = dihydropyridine; DM = diabetes mellitus; GLP-1 = glucagon-like peptide-1; HF = heart failure; HR = heart rate; HTN = hypertension; ISH = isolated systolic hypertension; LVH = left ventricular hypertrophy; MI = myocardial infarction; MRA = mineralocorticoid receptor antagonist; NT-proBNP = N terminal pro-B-type natriuretic peptide; NYHA = New York Heart Association; SGLT2 = sodium-glucose cotransporter-2

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Hypertension Goals in Adults

Modified August 2025

Clinical scenario	Start pharmacotherapy (at)... ^b 	Goal ^{a,b,c} 
Patients without comorbidities and without older age		
Patients with BP 130-139/80-89 mm Hg with 10-year CV risk <7.5%. ¹	after a three- to six month trial of lifestyle interventions alone (AHA/ACC) ¹	SBP <130 mm Hg, with encouragement to achieve SBP <120 mm Hg. Consider a DBP target <80 mm Hg. (AHA/ACC) ¹
Patients with BP ≥140/90 mm Hg with 10-year CV risk <7.5%. ¹	immediately (AHA/ACC) ¹	
Patients <75 years of age (Hypertension Canada) ²	140/90 mm Hg (Hypertension Canada) ²	SBP <130 mm Hg (Hypertension Canada) ²
Patients with BP ≥160/100 mm Hg (Int Soc HTN) ³	immediately (Int Soc HTN) ³	See footnote d (Int Soc HTN). ³
Patients with BP 140-159/90-99 mm Hg (Int Soc HTN) ³	after a three- to six-month trial of lifestyle interventions alone (Int Soc HTN) ³	See footnote d (Int Soc HTN) ³
Patients <60 years of age (JNC8) ⁴	140/90 mm Hg (JNC8) ⁴	<140/90 mmHg (JNC8) ⁴
Cardiovascular Disease		
Clinical CV disease (e.g., CAD, cerebrovascular disease, heart failure, PAD) ^{1,2}	130/80 mm Hg (AHA/ACC)¹ - SBP 130 to 139 mm Hg (Hypertension Canada)² 140/90 mmHg (Int Soc HTN)³	- CAD:<130/80 mm Hg (if elderly, <140/80 mm Hg [Int Soc HTN])^{3,10} - SBP <130 mm Hg (Hypertension Canada)²
Secondary stroke prevention	130/80 mm Hg (AHA/ACC)¹ 140/90 mm Hg (Int Soc HTN)³	<130/80 mm Hg (AHA/ACC; Int Soc HTN)^{1,3} <140/80 in elderly patients (Int Soc HTN)³
Cardiovascular Risk		
10-year atherosclerotic CV risk ≥7.5% (AHA/ACC) ¹	130/80 mm Hg (AHA/ACC) ¹	<130/80 mm Hg, with encouragement to achieve SBP <120 mm Hg (AHA/ACC) ¹
10-year Framingham Risk Score ≥20% (Hypertension Canada) ²	SBP 130 to 139 mm Hg (Hypertension Canada) ²	SBP <130 mm Hg (Hypertension Canada) ²
Heart Failure		
Heart failure	130/80 mm Hg (AHA/ACC)¹ - SBP 130 to 139 mm Hg (Hypertension Canada)² 140/90 mm Hg (Int Soc HTN)³	<130/80 mm Hg but >120/70 mm Hg (Int Soc HTN)³ - SBP <130 mm Hg (Hypertension Canada)²
Diabetes		
Diabetes	130/80 mm Hg (AHA/ACC)¹ - SBP 130 to 139 mm Hg (Hypertension Canada)² 140/90 mmHg (Int Soc HTN; JNC8)^{3,4}	130/80 mm Hg (AHA/ACC; Diabetes Canada; ADA)^{1,7,8} AHA/ACC: can encourage achievement of SBP <120 mm Hg).¹ - SBP <130 mm Hg (Hypertension Canada)² <140/90 mm Hg (JNC8)⁴ - See footnote d (Int Soc HTN)³
Kidney Insufficiency		
CKD (e.g., eGFR <60 mL/min/1.73 m ² or albuminuria [≥30 mg albumin/g creatinine (Canada: ≥3 mg/mmol)] ^{1,2,4}	130/80 mm Hg (AHA/ACC)¹ - SBP 130 to 139 mm Hg (Hypertension Canada)² 140/90 mmHg (Int Soc HTN; JNC8)^{3,4}	- SBP <130 mm Hg (AHA/ACC; Hypertension Canada)^{1,2} <140/90 mm Hg (JNC8)⁴ <130/80 mm Hg (if elderly, <140/80 mm Hg [Int Soc HTN])³
Older Age (also see comorbidities, above)		
≥75 years of age (Hypertension Canada) ²	SBP 130 to 139 mm Hg (Hypertension Canada) ²	SBP <130 mm Hg (Hypertension Canada) ²
≥60 years of age (JNC8) ⁴	150/90 mm Hg (JNC8) ⁴	150/90 mm Hg (JNC8) ⁴

Hypertension Goals in Adults

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Footnotes

a. Individualizing BP Goals: Consider factors such as life expectancy, frailty, independence, comorbidities, and patient goals in older adults.¹

Age. Age itself does not preclude a lower goal; almost 30% of the patients randomized to intensive treatment in SPRINT were 75 years of age or older.⁹

Comorbidities. The higher the baseline CV risk, the greater the absolute benefit from lower goals.^{7,9} As SBP decreases, so does CV risk.¹

Intensive Targets. Some patients will benefit from a SBP <120 mm Hg, particularly those with high CV risk.¹ Although SPRINT showed benefit of a SBP target of <120 mm Hg vs a target of <140 mm Hg, most patients in trials targeting a SBP <120 mm Hg were not able to reach this goal.² Also, in clinical trials, BP measurements are ~5 to 10 mm Hg below those measured in practice.² Intensive control increases the risk of syncope, falls, electrolyte disturbances, and kidney injury.²

b. Hypertension goals may differ among guidelines. AHA/ACC guidelines considered results of studies of intensive targets (SPRINT, ACCORD, SPS-3, and meta-analyses.¹ Hypertension Canada considered studies of intensive targets, plus input from clinicians and patients.² A DBP goal was not specified in the Canadian guidelines because patients with SBP <130 mm Hg have low CV risk if DBP is 70 to 90 mm Hg.² At the time of JNC8, there were no studies proving a clear benefit of targets lower than 140 mm Hg.⁴

c. The American Academy of Family Practice recommends a target of <140/90 mm Hg for most patients, to reduce all-cause and CV mortality.⁵ Using shared decision-making, consider a target of <135/85 mm Hg to further reduce MI risk.⁵ These recommendations were based largely on the results of a meta-analysis [Evidence Level A-2].⁶

d. Int Soc HTN: at minimum reduce BP by at least 20/10 mm Hg, ideally to <140/90 mm Hg.³ If <65 years of age, optimally target <130/80 mm Hg (but >120/70 mm Hg). If ≥65 years of age, target <140/90 mm Hg if tolerated, but consider frailty, function, and treatment tolerability.³

Abbreviations: ADA = American Diabetes Association; ACC = American College of Cardiology; AHA = American Heart Association; CAD = coronary artery disease; CV = cardiovascular; DBP = diastolic blood pressure; HTN = hypertension; Int Soc HTN = International Society of Hypertension; MI = myocardial infarction; PAD = peripheral artery disease; SBP = systolic blood pressure

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Meds That Can Increase Blood Pressure

Updated September 2025

--List not all-inclusive--

Acetaminophen	- Limit to <4 g/day in patients with HTN.¹ - Scheduled doses (1,000 mg PO four times daily for ~2 weeks) in patients with HTN increased SBP ~5 mm Hg vs placebo [Evidence Level B-1].⁷ - It is unknown if patients without HTN are affected; if lower doses/shorter durations affect BP; if BP elevation persists with long-term use; or if CV risk is affected.⁸
ADHD stimulants (e.g., methylphenidate, amphetamines, atomoxetine ²)	Management: consider dose reduction or switching to a nonstimulant (e.g., clonidine ER [US], guanfacine ER).¹ See our charts, Comparison of ADHD Medications (US) (Canada) for help.
Antiandrogens	Most common with abiraterone, apalutamide, enzalutamide (≥10% incidence).¹⁷
Bupropion	- Product labeling carries a warning about BP elevation, but data are conflicting.^{3,5,6} - BP elevation may be more common when used with nicotine for smoking cessation.²
Caffeine	- Limit to <300 mg/day in patients with HTN, or one cup/day if HTN is severe and uncontrolled.¹ - Caffeine intake of about 200 to 300 mg (1 to 2 cups of coffee) may increase SBP by about 8 mm Hg and DBP by about 6 mm Hg.⁴ - Effects may be more evident within 2 to 3 hours of periodic use, as tolerance to BP elevations seems to occur with regular caffeine intake (e.g., daily coffee).⁴
Calcineurin Inhibitors (cyclosporine, tacrolimus [not topical ²])	Management. Consider: - switching from cyclosporine to tacrolimus (lesser effect on BP).¹ - use of a thiazide (monitor for prerenal uremia) or DHP CCB to treat HTN.¹²
CGRP antagonists	- Erenumab (Aimovig)(and possibly other CGRP antagonists) has been associated with new or worsening hypertension.¹⁹ - Onset is often within the first week of treatment.²
Clonidine	- Consider clonidine patch over immediate-release oral clonidine due to higher risk of rebound HTN if discontinued without tapering.^{1,18} - See our chart, Common Oral Medications that May Need Tapering, for help
Corticosteroids	- Consider nonsystemic alternative (e.g., topical, inhaled).¹ - Use lowest effective dose for shortest duration necessary.¹³ - Consider a diuretic, ACEI, or ARB to treat HTN.⁴
Dietary supplements (e.g., ephedra, black licorice [Glycyrrhiza glabra], blue cohosh [Caulophyllum thalictroides], bitter orange [Citrus aurantium], hoodia [Hoodia gordonii])	Management: discontinue.¹ - See our NatMed database for help identifying other supplements' effects on BP.
Erythropoietin	- Common (10% to 20% of patients). Usually starts two weeks to 4 months after starting treatment.¹⁵ May be temporary in some patients.¹⁵ Management. Consider:¹⁵ - antihypertensive(s). - dose reduction or temporary discontinuation. - switch from intravenous to subcutaneous route
Estrogen-containing contraceptives	See our chart, Choosing a Contraceptive and Emergency Contraception for information on use in patients with HTN, and alternatives.
Ethanol	Limit to 1 drink/day for women or 2 drinks/day for men.¹
Lasmiditan	BP may transiently increase for one to two hours post-dose.²
NSAIDs	- Avoid in patients with HTN, if possible.¹ Consider topical diclofenac instead.¹ Management. Consider: - dose reduction.⁴ - switching to celecoxib (lower risk).⁹ - use of a thiazide or DHP CCB (e.g., amlodipine, felodipine) to treat HTN.^{10,11}
Pseudoephedrine	- Limit to shortest duration necessary.¹ - Avoid if HTN is severe or uncontrolled.¹
Testosterone	- Avoid if HTN is uncontrolled.² - Monitor BP in all patients, especially those with HTN.² - Topical products have less of an effect on BP than oral or injectable products.²
Tizanidine	- Risk of rebound HTN if discontinued without tapering.¹ - Generally reserve for spasticity; consider alternate muscle relaxants (e.g., cyclobenzaprine).^{1,14} See our chart, Muscle Relaxants, for more alternatives. - See our chart, Common Oral Medications that May Need Tapering, for tapering help.
VEGF inhibitors (e.g., bevacizumab, sorafenib, sunitinib)	- Risk varies among agents, but is very common, occurs within hours to days, and can be severe.¹⁶ Management: - Advise patients to monitor BP at home daily during the first cycle or dosage increase, then every two to three weeks.¹⁷ - Consider with an ACEIs, ARBs, or DHP CCB to treat HTN.¹⁶ - When VEGF inhibitor treatment is stopped, reduce/stop antihypertensive therapy as appropriate.¹⁷
Venlafaxine	- May increase DBP by up to 15 mm Hg.² Management. Consider: - dose reduction.² - switching from immediate-release to extended-release venlafaxine.³ - switching to duloxetine (low risk with therapeutic doses) or SSRI (unlikely to significantly increase blood pressure).^{1,3}
Weight Loss Meds (diethylpropion, phentermine)	- Monitor blood pressure.² - Avoid in severe hypertension.²

Meds That Can Increase Blood Pressure

Updated September 2025

Abbreviations: ADHD = attention deficit hyperactivity disorder; BP = blood pressure; CCB = calcium channel blocker; CGRP = calcitonin gene-related peptide; DBP = diastolic blood pressure; DHP = dihydropyridine; NSAID = nonsteroidal anti-inflammatory drug; MAP = mean arterial pressure; SBP = systolic blood pressure; VEGF = vascular endothelial growth factor

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