



2025 Hypertension Guideline Updates

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Agenda

Prevalence and relevance of hypertension

Diagnosis

Risk estimation and treatment thresholds

Lifestyle and pharmacologic management

Resistant and secondary hypertension

Significance of Hypertension

Approximately **46%** of US adults have hypertension

CV risk approximately **doubles** for every 20/10 mmHg increase in SBP/DBP

Associated with elevated risk for coronary heart disease, heart failure, stroke, peripheral vascular disease, chronic kidney disease, dementia, and cognitive impairment¹⁻³

The **“rural mortality penalty”**

Cardiovascular disease mortality is significantly higher for rural residents

18-20% higher death rates from ischemic heart disease⁴

Control rates remain poor—only approximately 24% of adults with hypertension achieve control to <130/80 mm Hg, and among those taking antihypertensive medication, 53% remain above treatment goals^{5,6}

Barriers to Hypertension Control

Patient: Medication nonadherence, difficulty with lifestyle changes, low health/digital literacy, socioeconomic and access constraints

Provider: Treatment inertia; uncertainty in guidelines; limited time

Health System: Non-standardized BP measurement; lack of protocol-driven and team-based care; workforce shortages; inadequate reimbursement models

Community & Policy: Food insecurity, unsafe environments for exercise, transportation barriers; limited insurance coverage; weak nutrition policies; structural racism

Rural-Specific: Geographic isolation, difficulty recruiting clinicians

Accurate in-office measurement

- Empty bladder
- Correct cuff size
- Bare arm
- Arm supported at heart level
- No talking (patient or staff)



Office Blood Pressure Measurement

1. The patient should avoid caffeine, exercise, and smoking for at least 30 minutes before measurement. Ensure the patient has emptied their bladder.
2. Use a blood pressure device that has been validated for accuracy (validatebp.org).
3. Use the correct cuff size on a bare arm.
4. The patient's arm should be supported at heart level.
5. Have the patient relax, sitting in a chair (feet on floor, legs uncrossed, and back supported) for more than 5 minutes of rest.
6. Neither the patient nor the clinician should talk during the rest period or during the measurement. The patient should not be using their phone.
7. Blood pressure measurement should be taken in a temperature-controlled room.
8. Take 2 or more blood pressure measurements at least 1 minute apart. Average the readings, and provide the patient their blood pressure readings both verbally and in writing.

Jones D et al. *Circulation* 2025

Out-of-Office Blood Pressure Monitoring

- Home BP Monitoring (HBPM) vs. 24-hour Ambulatory BP Monitoring (ABPM)
- Use validated cuff (validatebp.org)
- Benefits:
 - More data points enhances ability to detect a patient's true and usual BP levels
- Recommendations:
 - Either HBPM or ABPM to confirm the diagnosis of HTN
 - HBPM for continued home monitoring of therapy
 - Cuffless devices are NOT recommended due to mixed results



Stages of Hypertension

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (top/upper number)	and/or	DIASTOLIC mm Hg (bottom/lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
STAGE 1 HYPERTENSION (High Blood Pressure)	130 – 139	or	80 – 89
STAGE 2 HYPERTENSION (High Blood Pressure)	140 OR HIGHER	or	90 OR HIGHER

Risk estimation: ASCVD → PREVENT

ASCVD RISK ESTIMATOR

10-year risk of atherosclerotic cardiovascular disease (ASCVD) and lifetime ASCVD risk

Age range: 40-79

Traditional CVD risk factors

Use of Race (White, African American, Other)

Treatment threshold: >10%

PREVENT

10-year and 30-year total cardiovascular disease (ASCVD and HF)

Age range: 30-79

Traditional risk factors PLUS cardio-renal-metabolic parameters: **eGFR, HbA1C, and BMI**

Optional inclusion of **Urine Albumin-Creatinine ratio, Social Deprivation Index (Zip Code)**

Treatment threshold: >7.5%

Use of Risk-Based Thresholds for Initiation of BP Treatment in Adults

BP Level-Only

Does the patient have an average BP $\geq 140/90$ mm Hg?

YES

Initiate antihypertensive medications to lower BP and reduce CVD risk for primary or secondary prevention of CVD

1

NO

Risk-Based Thresholds for Initiation of BP Treatment for Adults*

Does the patient have existing clinical CVD (CHD, stroke, HF)?

YES

Initiate antihypertensive medications to lower BP and reduce CVD risk if average SBP ≥ 130 mm Hg or DBP ≥ 80 mm Hg for secondary prevention of CVD

1

NO

Does the patient have diabetes or CKD, or is the patient at increased short-term risk of CVD (10-year PREVENT-CVD risk $\geq 7.5\%^{\dagger}$)?

YES

Initiate antihypertensive medications to lower BP and reduce CVD risk if average SBP ≥ 130 mm Hg or DBP ≥ 80 mm Hg for primary prevention of CVD

1

NO

Initiate antihypertensive medications to lower BP if average SBP ≥ 130 mm Hg or DBP ≥ 80 mm Hg after 3-6 months of lifestyle intervention

1



LEGEND

- COR 1
- COR 2a
- COR 2b
- COR 3-No Benefit
- COR 3-Harm

(Class of Recommendation)



2025 High Blood Pressure

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First-Line Agents

Class	Examples	Comorbid conditions
Thiazide-like diuretics	Chlorthalidone Hydrochlorothiazide Indapamide	
ACE inhibitors	Lisinopril Benazepril Enalapril Ramipril	Diabetes CKD HFrEF
ARBs	Losartan Irbesartan Candesartan Olmesartan	Diabetes CKD HFrEF
CCB – dihydropyridine	Amlodipine Nifedipine	CAD/Angina

Initial Combination Therapy vs Stepped Care

No RCTs directly compare initial stepped-care therapy with combination therapy

Combination therapy:

- Produces **greater and more consistent BP reduction** by targeting different mechanisms of action
- **Reduces class-specific side effects** (e.g., RAS blocker + thiazide lowers potassium abnormalities)
- **Improves adherence**, especially when delivered as a **single-pill combination (SPC)**⁷

Clinical exceptions: Some patients with **stage 1 hypertension** and BP near goal may achieve control with **monotherapy**

Guideline preference:

- **Initial combination therapy** recommended for **stage 2 hypertension**
- Also recommended for **high-risk stage 1 patients**

Alternatives



Class	Examples	Comorbid conditions
CCB – non-dihydropyridine	Diltiazem Verapamil	Atrial fibrillation Contraindicated in HFrEF
Aldosterone antagonists	Eplerenone Spironolactone Finerenone (non-steroidal)	HFrEF HFpEF DM CKD Resistant HTN/Primary Aldosteronism
Beta blockers – cardioselective	Metoprolol succinate* Metoprolol tartrate Bisoprolol* Atenolol	*HFrEF Avoid in HFpEF unless other indications Atrial fibrillation CAD
Beta blockers – non-selective	Nadolol Propranolol	Tremor, anxiety, migraine
Beta blockers – cardioselective and vasodilatory	Nebivolol Carvedilol* Labetalol	HFrEF (Carvedilol)

Others

Class	Examples	Comorbid conditions
Alpha-1 Blockers	Doxazosin Prazosin Terazosin	BPH
Central alpha-2 agonist	Clonidine	Psychiatric
Direct vasodilators	Hydralazine	HFrEF (+ nitrate)



Honestly, not a big fan

Honorable mentions

Angiotensin-receptor Neprilysin Inhibitor (ARNI): Sacubitril-Valsartan

- First-line agent for treatment of HFrEF and some HFpEF
- Improved reduction in SBP compared to ARB⁸
- Demonstrated safety in CKD stage 3-5⁹

Sodium glucose transport 2 inhibitor (SGLT2i): Empagliflozin, Dapagliflozin

- First-line agent for treatment of HFrEF and HFpEF
- Modest but clinically meaningful BP reduction¹⁰
- Recommended in DM2 and CKD independent of glucose lowering to reduce CKD progression, HF, ASCVD risk

GLP-1 Receptor Agonists: Semaglutide, Liraglutide, Tirzepatide (GIP/GLP1)

Modest reductions in BP via weight-dependent and weight-independent mechanisms^{11,12}

Intervention	Goal	BP ↓ (mm Hg)
Weight loss	≥5% reduction in body weight or ≥3 kg/m ² reduction in BMI; expect ~ 1 mm Hg reduction per 1-kg reduction in body weight	6–8
DASH diet	Fruits, vegetables, whole grains, low saturated fat	5–8
Lower sodium	<2300 mg/day (ideal <1500 mg)	6–8
Salt substitute	Replace regular salt with K ⁺ -enriched salt	5–7
Increase potassium	3500–5000 mg/day (diet preferred)	~6
Reduce alcohol	≤2 drinks/day (men), ≤1 (women)	4–6
Aerobic exercise	90–150 min/week (moderate intensity)	4–8
Resistance exercise	2–3 sessions/week	2–7
Isometric exercise	Handgrip training, 3×/week	5–10
Meditation	20 min, twice daily	5–7
Breathing control	Slow breathing, 15 min/day	~5

Impact of lifestyle interventions

Fu J et al. *J Am Heart Assoc.* 2020

Potassium-based Salt Substitutes

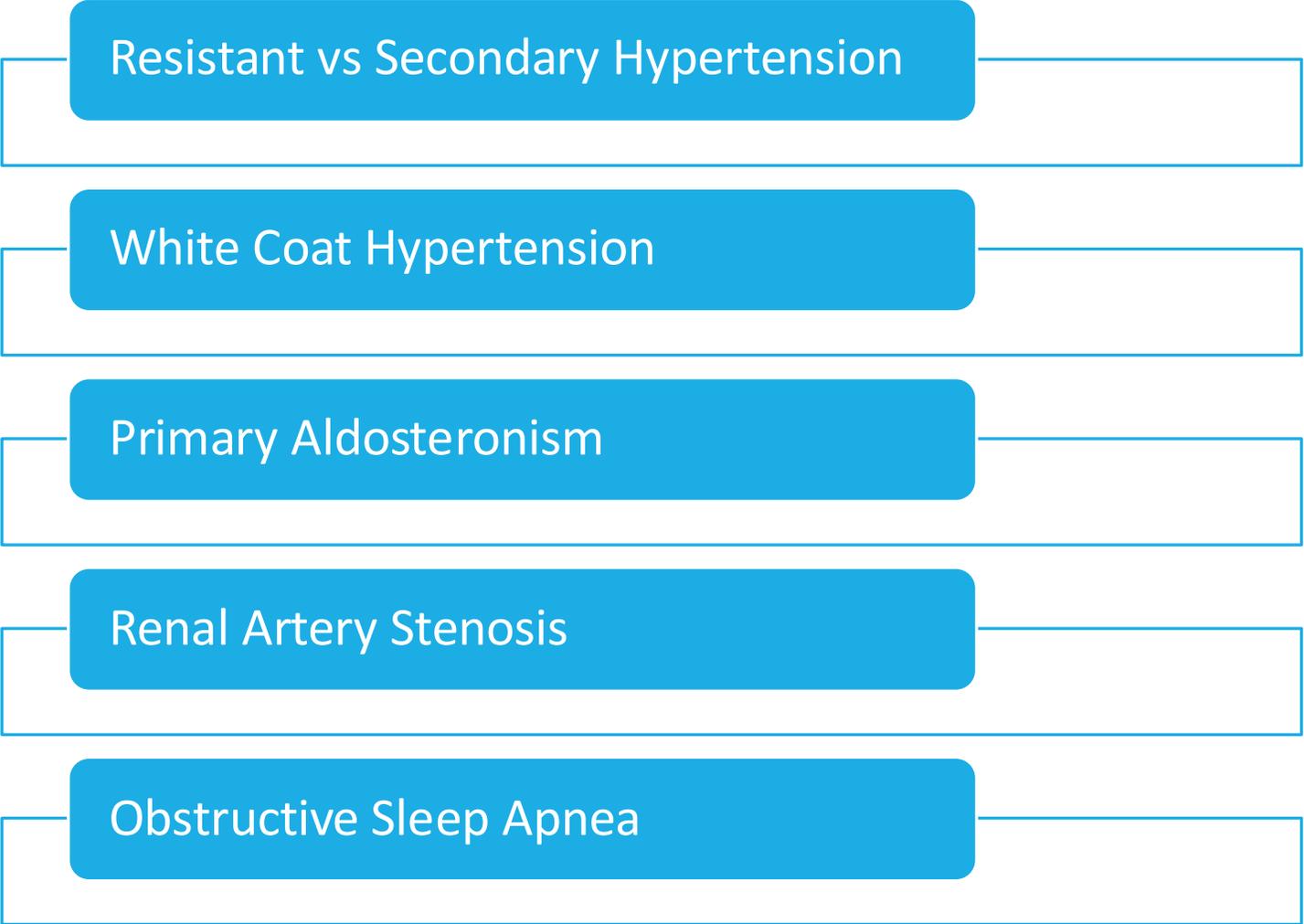
Associated with **reduction in blood pressure** and **significant reductions in stroke, MACE, and all-cause mortality** with no increased risk of hyperkalemia¹³

Dual benefit of reduced sodium, increased potassium

Majority of sodium intake in the US comes from **processed foods or dining out**, so benefit of salt substitutes may be limited in our population

Caution with patients with CKD and use of other potassium-sparing/increasing medications





Resistant vs Secondary Hypertension

White Coat Hypertension

Primary Aldosteronism

Renal Artery Stenosis

Obstructive Sleep Apnea

Resistant Hypertension

- Remains above goal despite adherence to **3+ optimally dosed medications** of different classes
- Based on **treatment response**, not cause
- Diagnosis requires **exclusion of pseudoresistance** and confirmation with **out-of-office BP monitoring**
- Consideration and workup for secondary hypertension

Secondary Hypertension

- Hypertension due to **potentially correctable underlying cause**
- 5-25% of patients with hypertension
- Common causes:
 - Primary aldosteronism
 - Obstructive sleep apnea
 - Renovascular hypertension

White Coat Hypertension



Carries **low to moderate cardiovascular (CVD) risk** compared with normal blood pressure.

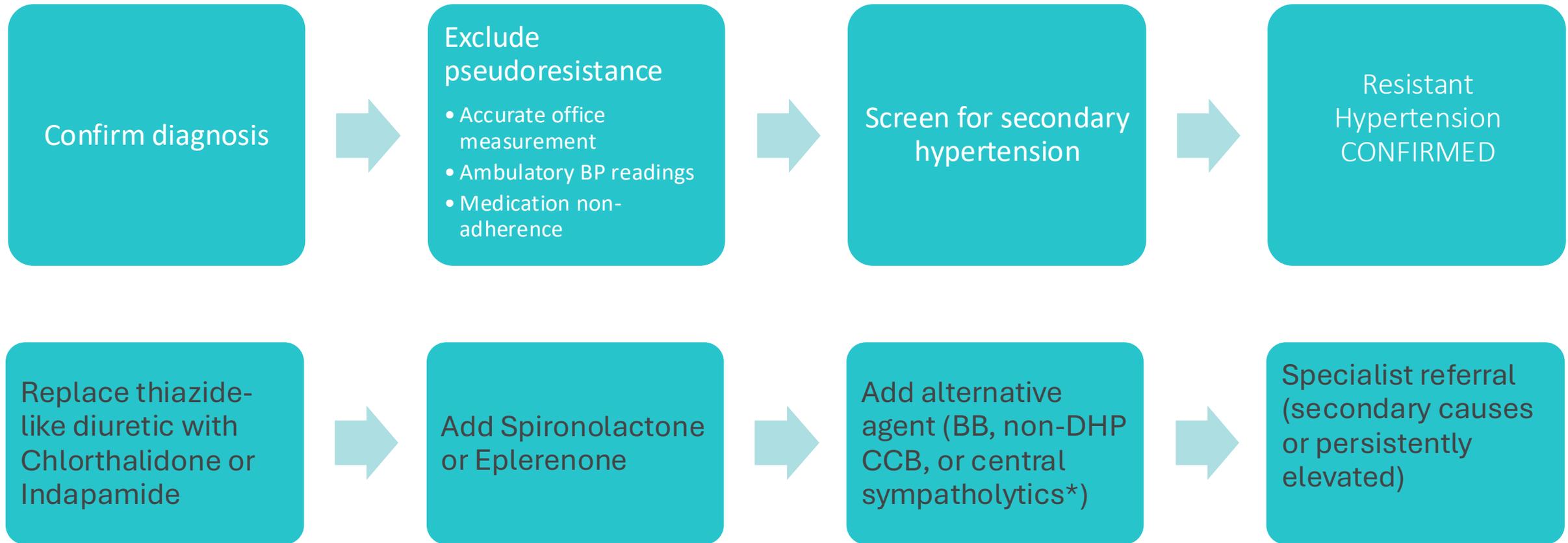
- Risk may be **higher in older adults** or those with **already high CVD risk**.
- CVD risk is **lower than with sustained (true) hypertension**.^{14,15}

More likely to develop sustained hypertension later compared with those with normal BP.

Out-of-office BP monitoring (home or ambulatory) is recommended to confirm diagnosis when office BP is $\geq 130/80$ mm Hg.

Patients with **very high office BP ($\geq 160/100$ mm Hg)** should likely be treated, as true white-coat hypertension less common at these levels.

Treatment of Resistant Hypertension



*Consider comorbid conditions

Primary Aldosteronism

Overproduction of aldosterone leads to high blood pressure, sodium and water retention, potassium loss, and heart and kidney damage

Although aldosterone increases potassium loss, **most patients do not have low potassium**

More commonly from **bilateral adrenal hyperplasia**, less commonly from **unilateral aldosterone overproduction** (eg. adenoma)

5-10% of all hypertension, 20% of resistant hypertension cases

Causes **more organ damage** than primary hypertension at the same BP level¹⁶

Higher risk of heart failure, stroke, CAD, atrial fibrillation and kidney damage

Screening for PA

Measurement:

- Plasma aldosterone, renin activity, and aldosterone-to-renin ratio
- Potassium level
- Diagnosis: suppressed Renin, elevated Aldosterone, elevated ARR

Conditions for accurate testing:

- Potassium in normal range
- Initial screening can usually be done **without stopping most medications** (ie. MRA, ACE/ARB, diuretics)
- If results are unclear and suspicion is high, medications can be temporarily switched to **noninterfering drugs** before repeat testing

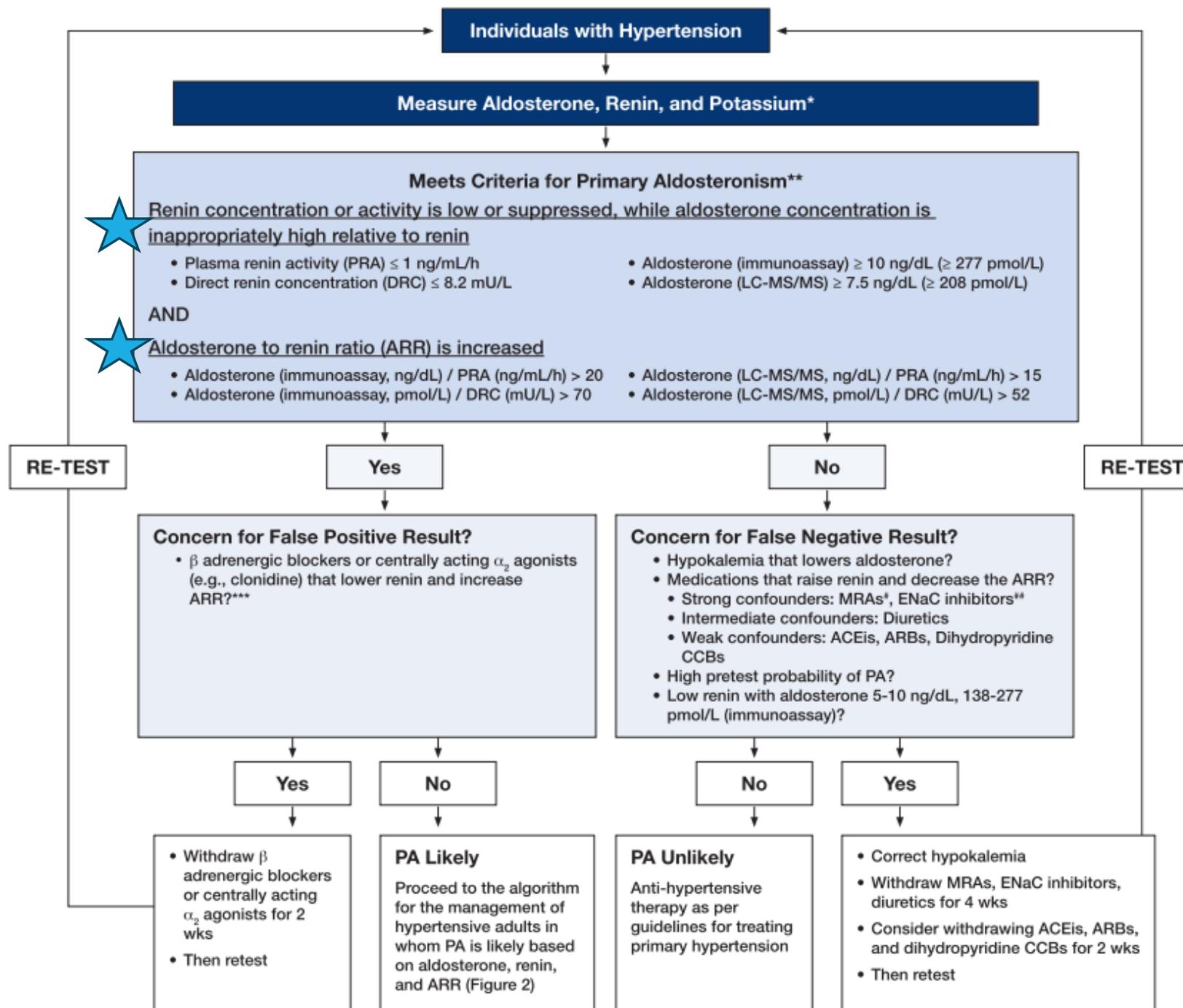


Table 6. Managing interfering antihypertensive medications during PA screening and interpretation of aldosterone, renin, and ARR

Management strategy	Medication to withdraw	Timeline of withdrawal	Replacement antihypertensive agents	Interpretation of negative screen	Interpretation of positive screen
No medication withdrawal	None	–	–	Possible false negative if moderate to high pretest probability Repeat screen on different day with minimal- or full-medication withdrawal strategy	Possible false positive if individual taking β -adrenergic blockers or centrally acting α_2 -agonists (clonidine, α -methyldopa) Repeat screen after withdrawing these medications
Minimal medication withdrawal	Stop MRAs and ENaC inhibitors (amiloride, triamterene) Stop β -adrenergic blockers and centrally acting α_2 -agonists (clonidine, α -methyldopa)	4 weeks before testing 2 weeks before testing	Hydralazine ^a α_1 -adrenergic blockers Non-dihydropyridine CCBs Moxonidine	Possible false negative if moderate to high pretest probability Repeat screen on different day with full withdrawal strategy If pretest probability is low, then likely true negative	Likely true positive Proceed to algorithm (Fig. 2)
Ideal full medication withdrawal	Stop MRAs, ENaC inhibitors (amiloride, triamterene), and other diuretics β -adrenergic blockers ACE inhibitors ARBs Dihydropyridine CCBs Centrally acting α_2 -agonists (clonidine, α -methyldopa) SGLT2 inhibitors	4 weeks before testing 2 weeks before testing	Hydralazine ^a α_1 -adrenergic blockers Non-dihydropyridine CCBs Moxonidine	Possible false negative if moderate to high pretest probability Repeat screen on different day. If repeat is negative, then likely true negative If pretest probability is low, then likely true negative	Likely true positive Proceed to algorithm (Fig. 2)

Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin II-receptor blocker; CCB, calcium-channel blocker; ENaC, epithelial sodium-channel, MRA, mineralocorticoid antagonist; SGLT2, sodium-glucose cotransporter 2.

^aIdeally individuals receiving hydralazine should also be administered a negative chronotropic agent such as verapamil slow release to avoid reflex tachycardia.

Renal Artery Stenosis

Narrowing of the renal artery that **significantly reduces blood flow** (usually >75%)

Atherosclerosis causes about **90%** of cases, rarely nonatherosclerotic causes such as FMD

RAS may be present in **14%–40%** of adults with hypertension, however...

Only a **small percentage (0.1%–5%)** causes blood flow reduction severe enough to cause hypertension

No overall benefit of revascularization compared with **aggressive medical therapy** alone for most patients

Revascularization may be indicated/more effective in patients with worsening renal function, sudden pulmonary edema and in patients with FMD

Strong surrogate marker for **systemic cardiovascular disease**¹⁷

OSA and HTN

The prevalence of OSA among hypertensive patients ranges from **30% to 50%**, increasing to 60-90% in those with resistant hypertension¹⁸

Untreated OSA confers a **2- to 3-fold increased risk of developing incident hypertension**¹⁹

Standard screening questionnaires perform poorly in patients with resistant hypertension and CVD

CPAP utilization improves BP control and cardiovascular risk

- Each additional hour of nightly CPAP use correlates with incremental blood pressure reduction²¹
- Reduced CVD risk with adequate compliance (≥ 4 h/night) and in high-risk, symptomatic OSA phenotypes

Renal Denervation Therapy

Targets renal sympathetic nerves through **catheter-based ablation** using radiofrequency or ultrasound

FDA approval (2023) as an **adjunctive therapy** for patients with:

Uncontrolled or resistant hypertension when lifestyle changes and antihypertensive medications are insufficient

Patients with **medication intolerance or nonadherence**

Demonstrates a **favorable safety profile and effectiveness**, ongoing studies continue²²

Confirmation of ambulatory BP, medication adherence

Referral to center with expertise/high-volume experience

Final thoughts

Knowledge is power

- Patients should understand the significance of hypertension and relevance in the context of their long-term health and personal goals
- Understand how to identify and manage hypertension at home

Comorbidities are key

- Evaluate and manage hypertension in the context of patient's comorbidities.
- Can we optimize therapy for DM, CKD, CAD while also positively impacting HTN control?

Continued reassessment

- Tolerance
- Changing health status
- Anticipatory guidance in the context of weight loss

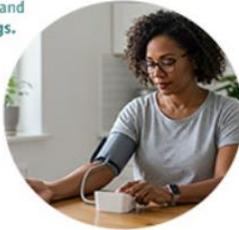
How to Take Your Blood Pressure at Home



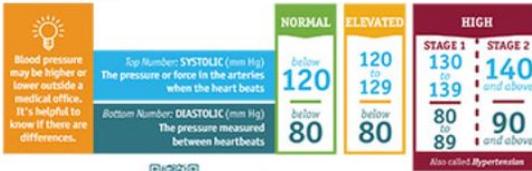
Knowing if you have high blood pressure and controlling it depends on correct readings.

6 Tips to Correctly Measure Your Blood Pressure

- 1. Be sure your monitor is accurate**
 - If you need help choosing one, visit [ValidateBP.org](#) or ask a member of your health care team.
 - Bring the monitor to your next health visit to compare its results with those taken in the office.
- 2. Get ready to take a reading**
 - Avoid smoking, caffeinated beverages, or exercise for 30 minutes.
 - Empty your bladder.
 - Rest for at least 5 minutes and try to relax - that means ideally no talking, using your phone or watching TV.
- 3. Sit correctly**
 - Sit up straight in an armchair, with back supported.
 - Place feet flat on the floor.
 - Rest your arm comfortably at heart level on a table.
- 4. Place cuff above the bend in the elbow**
 - Make sure the cuff is the correct size for your arm and fits properly.



- 5. Take at least 2 readings, 1 minute apart, twice a day (so 4 readings total)**
 - 2 readings in the morning before taking any blood pressure medicine.
 - 2 readings around bedtime.
- 6. Record your results**
 - Bring them to your next health visit.
 - Keep an eye on how readings compare to your target goal.



For more information, visit [CardioSmart.org/BloodPressure](https://www.cardiosmart.org/BloodPressure)

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Patient Resources

Before You Measure

- No smoking, caffeinated beverages, alcohol or exercise 30 minutes prior.
- Use a validated device with the correct cuff size. (Visit [ValidateBP.org](#) to find a device you can trust.)
- Empty your bladder.
- Sit quietly for more than 5 minutes and do not talk.

During Measurement

- Stay relaxed and do not talk.
- Take at least two readings, 1 minute apart.
- Record all results once measurement is completed and share them with your health care professional to help confirm your office blood pressure category.

Proper Positioning

- Sit upright with back supported, feet on floor and legs uncrossed.
- Rest your arm comfortably on a flat surface at heart level.
- Wrap the cuff on your bare skin above the bend of the elbow, not over clothing.

MAY BE A HYPERTENSIVE EMERGENCY*

BLOOD PRESSURE HIGHER THAN 180/120 MM Hg

American Heart Association recommended office blood pressure categories

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (top/upper number)	and	DIASTOLIC mm Hg (bottom/lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120-129	and	LESS THAN 80
STAGE 1 HYPERTENSION (high Blood Pressure)	130-139	or	80-89
STAGE 2 HYPERTENSION (high Blood Pressure)	140 OR HIGHER	or	90 OR HIGHER
SEVERE HYPERTENSION (if you don't have symptoms*, see your health care professional.)	HIGHER THAN 180	and/or	HIGHER THAN 120
HYPERTENSIVE EMERGENCY (if you have one of these symptoms**, call 911.)	HIGHER THAN 180	and/or	HIGHER THAN 120

*Symptoms: chest pain, shortness of breath, back pain, numbness, weakness, change in vision or difficulty speaking

Learn more at [heart.org/BP](https://www.heart.org/BP)

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DASH Diet Guide



References

1. Jones, D. W., Ferdinand, K. C., Taler, S. J., et al. (2025). *2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM guideline for the prevention, detection, evaluation, and management of high blood pressure in adults*. JACC.
2. Carey, R. M., Moran, A. E., & Whelton, P. K. (2022). Treatment of hypertension: A review. JAMA.
3. Fuchs, F. D., & Whelton, P. K. (2020). High blood pressure and cardiovascular disease. Hypertension.
4. Brandt, E. J., Tobb, K., Cambron, J. C., et al. (2023). Assessing and addressing social determinants of cardiovascular health. JACC.
5. Muntner, P., Carey, R. M., Gidding, S., et al. (2018). Potential U.S. population impact of the 2017 ACC/AHA blood pressure guideline. Circulation.
6. Ogunniyi, M. O., Commodore-Mensah, Y., & Ferdinand, K. C. (2021). Race, ethnicity, hypertension, and heart disease. JACC.
7. Abdalla M, Bolen SD, Brettler J, et al. (2023) Implementation strategies to improve blood pressure control in the United States: a scientific statement from the AHA and AMA. *Hypertension*.
8. Malik, A. H., & Aronow, W. S. (2019). Efficacy of sacubitril/valsartan in hypertension. Am J Ther.
9. Yan, Y., Li, X., Cao, J., et al. (2024). Sacubitril/valsartan for blood pressure lowering in CKD stage 3–5 with hypertension. J Clin Hypertens.
10. Iqbal, F., Shuja, M. H., Azam, L., et al. (2024). Effect of SGLT2 inhibitors on 24-hour ambulatory blood pressure. Endocr Pract.

11. Tanaka, M., & Itoh, H. (2025). Mechanisms of GLP-1 receptor agonists on blood pressure beyond weight loss. *Hypertens Res*.
12. Ribeiro-Silva, J. C., Tavares, C. A. M., & Girardi, A. C. C. (2023). Blood pressure–lowering effects of GLP-1 receptor agonists. *Curr Opin Pharmacol*.
13. Neal B, Wu Y, Feng X, et al. (2021). Effect of salt substitution on cardiovascular events and death. *N Engl J Med*.
14. Cohen, J. B., Lotito, M. J., Trivedi, U. K., et al. (2019). Cardiovascular events and mortality in white coat hypertension. *Ann Intern Med*.
15. Carey, R. M., Muntner, P., Bosworth, H. B., & Whelton, P. K. (2018). Prevention and control of hypertension. *JACC*
16. Brown JM, Siddiqui M, Calhoun DA, et al. (2020). The unrecognized prevalence of primary aldosteronism: a cross-sectional study. *Ann Intern Med*
17. Macedo, T. A., Pedrosa, R. P., Costa-Hong, V., Kajita, L. J., Morais, G. R., de Lima, J. J. G., et al. (2013). Renal artery stenosis predicts coronary artery disease in patients with hypertension. *PLoS One*
18. Cowie, M.A. et al. (2021). Sleep disordered breathing and cardiovascular disease: JACC State-of-the-Art Review. *JACC*
19. Javaheri, S. et al. (2024). Interactions of OSA with pathophysiology of cardiovascular disease: JACC State-of-the-art Review. *JACC*
20. Shang, W., Zhang, Y. Liu, L. et al. (2022). Benefits of continuous positive airway pressure on blood pressure in patients with hypertension and OSA: a meta-analysis. *Hyperten Res*
21. Haentjens, P. et al. (2007). The impact of CPAP on blood pressure in patients with OSA syndrome: evidence from a meta-analysis of placebo-controlled randomized trials. *Arr Intern Med*
22. Cluett, J. L., Blazek, O., Brown, A. L., et al. (2024). Renal denervation for the treatment of hypertension: A scientific statement from the American Heart Association. *Hypertension*
23. Adler, G.K. et al. (2025). Primary Aldosteronism: An Endocrine Society Clinical Practice Guideline, *The Journal of Clinical Endocrinology & Metabolism*