What's New in Outpatient Hypertension:
Clinical Pearls from the New Hypertension Guideline

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Disclosure

Consultant: Alnylam (Hypertension); AstraZeneca; Blue Earth Diagnostics; Corcept; Eli Lilly (SURPASS-CVOT); Idorsia (Hypertension); Mineralys; Novo Nordisk (Diabetes & Obesity); ReCor; UpToDate (Hypertension Section)

Research Grant: Corcept; Eli Lilly (TRIUMPH); Sonivie – THRIVE Study

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Objectives

At the conclusion of this presentation the participant will know:

1. How to Properly Take BP Accurately in the office.
2. To teach patients how to Self-Measure their own BP at home.
3. That Home (Self Measured) BP is a better predictor of CV events than office BP.
4. That Home BP is as good as 24-hr ABPM in predicting clinical events with some caveats.
5. The proper initial laboratory w/up of HTN have some new additions.
6. The AHA/ACC definition of HTN and the target for BP control of < 130/80 mm Hg, with encouragement to achieve < 120/80 in patients at increased risk for CVD.
7. The Lifestyle Changes (Non-Pharmacologic Therapies) and the new suggestions in 2025.
8. The new PREVENT™ risk estimator in evaluating the patient with hypertension.
9. The recommendations for initial antihypertensive drug therapy in addition to Lifestyle Modification in patients with hypertension and diabetes.
10. That single-pill, fixed-dose combination therapy is a Class I indication as initial Rx in patients with Stage 2 hypertension (≥ 140/90 mm Hg).
11. That achieving a BP of < 130/80 mm Hg to reduce dementia in those with hypertension is a Class I recommendation and we should start BP control earlier than later in life.

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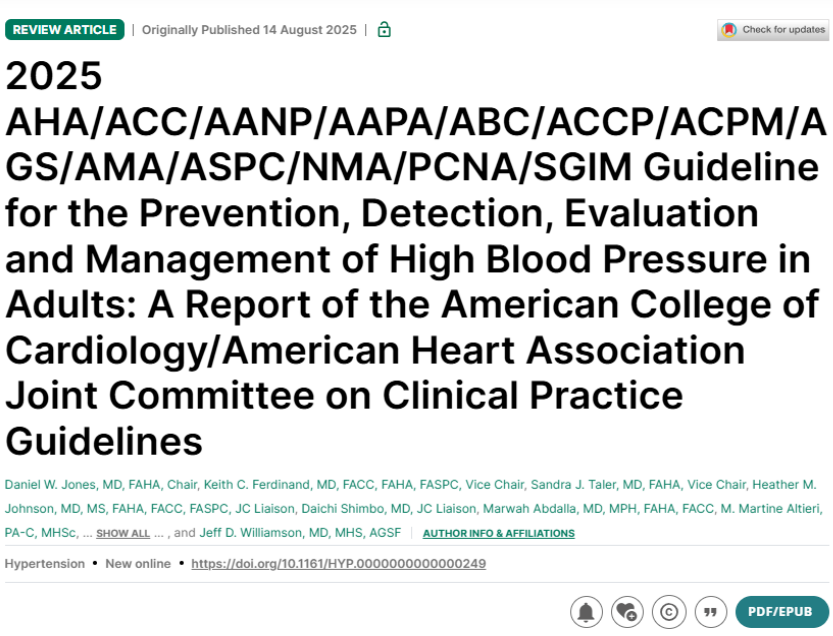
REVIEW ARTICLE | Originally Published 14 August 2025 | Check for updates

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: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Daniel W. Jones, MD, FAHA, Chair, Keith C. Ferdinand, MD, FACC, FAHA, FASPC, Vice Chair, Sandra J. Taler, MD, FAHA, Vice Chair, Heather M. Johnson, MD, MS, FAHA, FACC, FASPC, JC Liaison, Daichi Shimbo, MD, JC Liaison, Marwah Abdalla, MD, MPH, FAHA, FACC, M. Martine Altieri, PA-C, MHSc, ... SHOW ALL ... , and Jeff D. Williamson, MD, MHS, AGSF | AUTHOR INFO & AFFILIATIONS

Hypertension • New online • https://doi.org/10.1161/HYP.0000000000000249

PDF/EPUB

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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Why Are We Committed to Controlling BP?

5

Uncontrolled HTN Is Responsible for More Worldwide Death and DALYs than Any Other CV Risk Factor

High SBP # 1 Worldwide

Rank	Cause of Death	No. of Deaths in 2021 (95% UI)	No. of DALYs (95% UI)
1	High SBP	10,800,000 (9,150,000, 12,100,000)	209,000,000 (172,000,000, 236,000,000)
2	Dietary risks	6,580,000 (2,270,000, 9,520,000)	142,000,000 (45,300,000, 200,000,000)
3	High LDL-C	3,810,000 (2,170,000, 5,420,000)	86,300,000 (54,100,000, 115,000,000)
4	Ambient particulate matter pollution	3,130,000 (2,310,000, 3,930,000)	62,500,000 (45,700,000, 78,400,000)
5	Smoking	2,370,000 (498,000, 4,410,000)	59,600,000 (13,100,000, 107,000,000)
6	High fasting plasma glucose	2,300,000 (2,030,000, 2,650,000)	41,200,000 (36,600,000, 47,600,000)
7	High BMI	1,950,000 (1,120,000, 2,910,000)	43,900,000 (23,800,000, 65,400,000)
8	Kidney dysfunction	1,870,000 (1,440,000, 2,340,000)	38,200,000 (30,700,000, 45,900,000)
9	Household air pollution from solid fuels	1,610,000 (904,000, 2,820,000)	36,200,000 (21,200,000, 61,100,000)
10	Lead exposure	1,570,000 (−139,000, 3,170,000)	29,700,000 (−2,780,000, 61,200,000)
11	Low temperature	1,020,000 (915,000, 1,100,000)	17,700,000 (15,900,000, 19,200,000)
12	Secondhand smoke	743,000 (297,000, 1,070,000)	16,700,000 (6,870,000, 24,300,000)
13	High alcohol use	407,000 (179,000, 708,000)	9,260,000 (3,830,000, 16,300,000)
14	Low physical activity	397,000 (122,000, 684,000)	7,220,000 (2,870,000, 11,500,000)
15	High temperature	164,000 (114,000, 205,000)	3,440,000 (2,370,000, 4,300,000)

BMI, body mass index; CV, cardiovascular; DALY, disability-adjusted life-year; HTN, hypertension; LDL-C, low-density lipoprotein cholesterol; SBP, systolic blood pressure; UI, uncertainty interval.

Vaduganathan M, et al. J Am Coll Cardiol. 2022;80:2361-2371.

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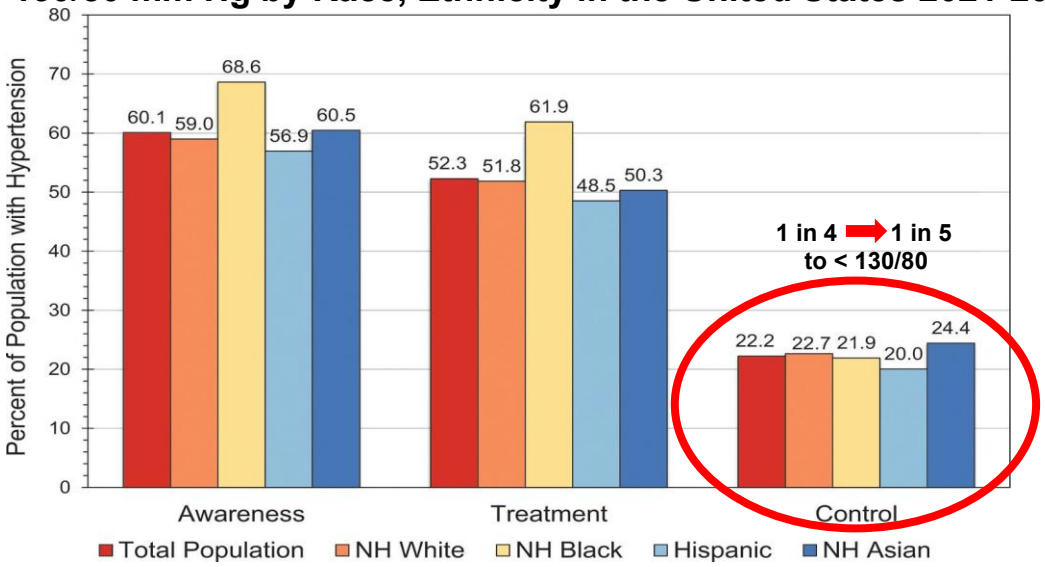
Extent of Awareness, Treatment, and Control of HBP to < 130/80 mm Hg by Race, Ethnicity in the United States 2021-2023



1.Chart 9-3. Palaniappan, L.P. et al. 2026 Heart Disease and Stroke Statistics: A Report of US and Global Data From the American Heart Association Circulation Vol 153, Issue 9, March 3 2026, pgs e275-e906. https://doi.org/10.1161/CIR.0000000000001412.
2. Hardy S.T. et al. JAMA 2026;335:816

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CLINICAL PEARL #1

Make Sure the BP Measured Is Accurate

8

"The measurement of BP is likely the clinical procedure of greatest importance that is performed in the sloppiest manner."

—*Norman Kaplan, MD*
Lancet. 2007;370:591

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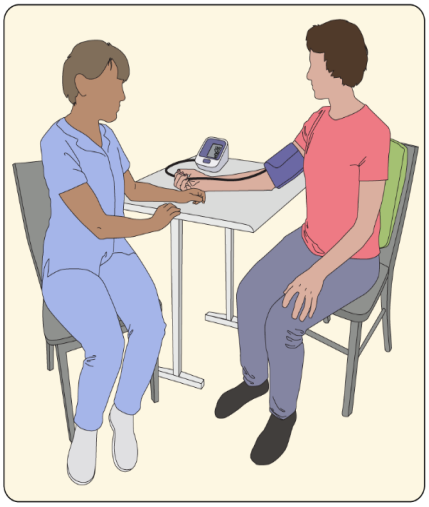
Checklist for Accurate Office Blood Pressure Measurement-COR I-EO



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. No talking, No 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. At least 2 measurements 1 min apart

Fig 3. Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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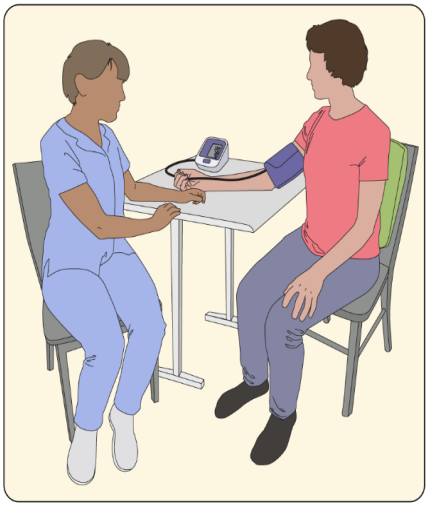

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Fig 3. Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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All Guidelines Stress Proper Cuff Sizes Be Used

ACC/AHA Selection Criteria for BP Cuff Size for Measurement of BP in Adults

Mid-Arm Circumference	Usual Cuff Size
22–26 cm	Small adult
27–34 cm	Adult
35–44 cm	Large adult
45–52 cm	Adult thigh

Whelton et al.. *Hypertension* 2018; 71:e13-e115.

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CLINICAL PEARL #2

Automated Office Blood Pressure (AOBP) Readings with an oscillometric device should now be the preferred method for recording BP in routine adult clinical office practice.

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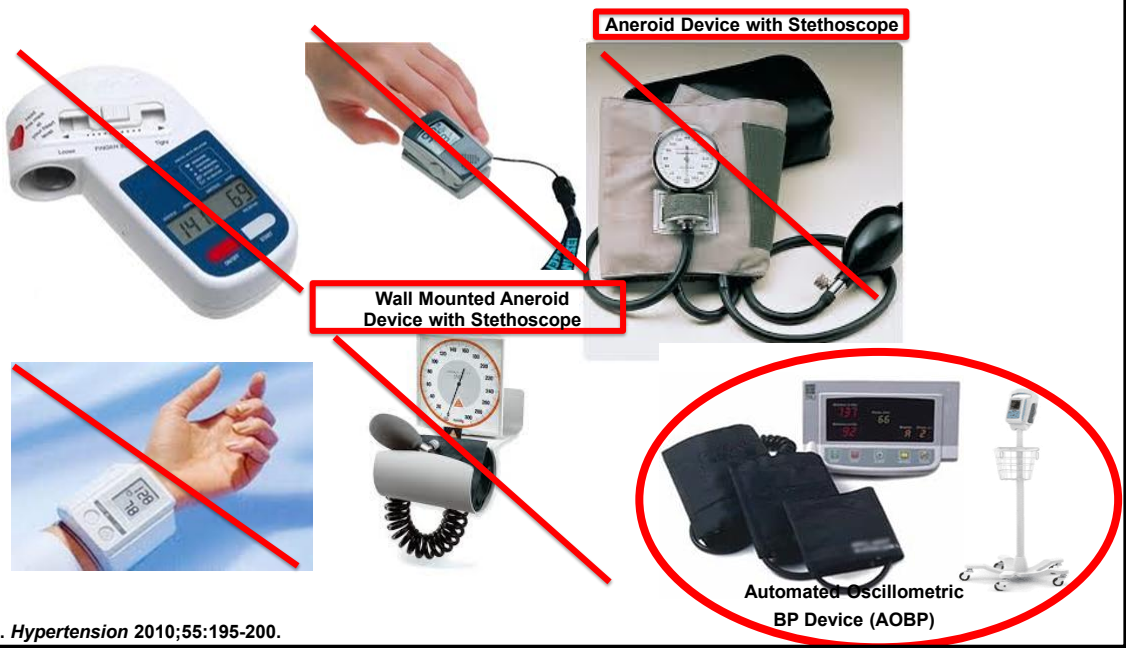
Devices



Myers MG. et al. *Hypertension* 2010;55:195-200.

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Accurate Measurement of In-Office Blood Pressure

Recommendations for Accurate Measurement of In-Office Blood Pressure

1: Strong (Benefit >>> Risk)

2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective

2b: Weak (Benefit ≥ Risk), may/might be ~~considered, may/might be reasonable~~

COR	LOE	Recommendations
2a	C-EO	2. When measuring in-office BP in adults, it is reasonable to use the oscillometric method with an automated device over the auscultatory method.

Not True in Pediatrics where the auscultatory method is still used.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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Cuffless Blood Pressure Devices

Recommendation for Cuffless Blood Pressure Devices

COR	LOE	Recommendation
3: No Benefit	C-LD	1. In adults, the use of cuffless BP devices is not recommended for the diagnosis or management of high BP.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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CLINICAL PEARL #3

Office Blood Pressure (OBP) measurement should solely be used as a screening method to suggest the diagnosis of hypertension and Out-Of-Office BP measurement (Ambulatory or Home-Self) should be used as a diagnostic method to confirm the diagnosis of hypertension.

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Ambulatory Blood Pressure Monitoring and Home (SELF) Blood Pressure Monitoring

1: Strong (Benefit >>> Risk)

2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective

2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Recommendations for Ambulatory Blood Pressure Monitoring (ABPM) and Home Blood Pressure Monitoring (HBPM)

Referenced studies that support the recommendations are summarized in the evidence table.

COR	LOE	Recommendations
1	A	1. In adults with suspected hypertension, out-of-office BP measurements by either ABPM or HBPM are recommended to confirm the diagnosis of hypertension.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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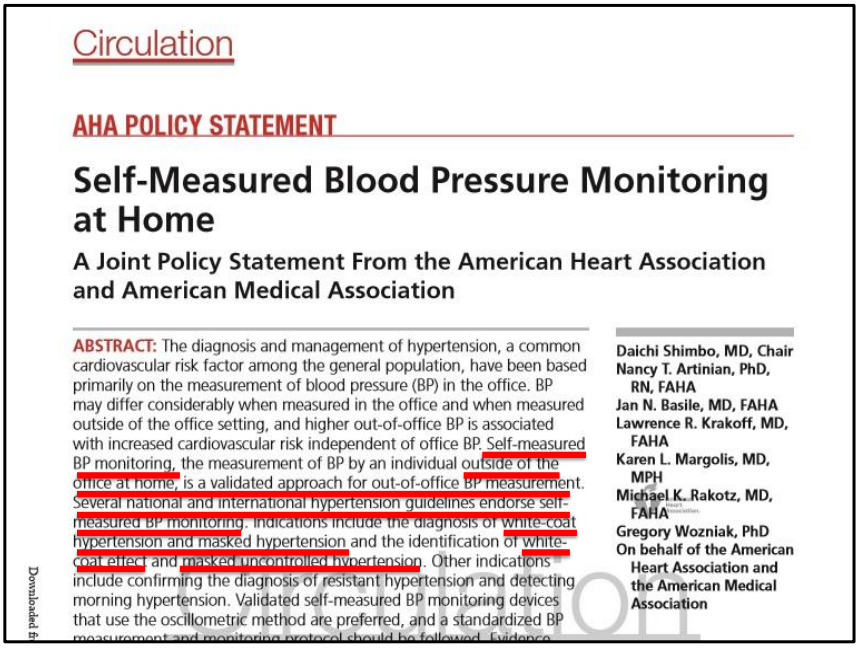
www.validatebp.org for approved home BP devices



Circulation

AHA POLICY STATEMENT

Self-Measured Blood Pressure Monitoring at Home

A Joint Policy Statement From the American Heart Association and American Medical Association

ABSTRACT: The diagnosis and management of hypertension, a common cardiovascular risk factor among the general population, have been based primarily on the measurement of blood pressure (BP) in the office. BP may differ considerably when measured in the office and when measured outside of the office setting, and higher out-of-office BP is associated with increased cardiovascular risk independent of office BP. Self-measured BP monitoring, the measurement of BP by an individual outside of the office at home, is a validated approach for out-of-office BP measurement. Several national and international hypertension guidelines endorse self-measured BP monitoring. Indications include the diagnosis of white-coat hypertension and masked hypertension and the identification of white-coat effect and masked uncontrolled hypertension. Other indications include confirming the diagnosis of resistant hypertension and detecting morning hypertension. Validated self-measured BP monitoring devices that use the oscillometric method are preferred, and a standardized BP measurement and monitoring protocol should be followed. Evidence

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Nancy T. Artinian, PhD, RN, FAHA
Jan N. Basile, MD, FAHA
Lawrence R. Krakoff, MD, FAHA
Karen L. Margolis, MD, MPH
Michael K. Rakotz, MD, FAHA
Gregory Wozniak, PhD
On behalf of the American Heart Association and the American Medical Association

Shimbo D., Artinian N, Basile J. et al. *Circulation* 2020; 142:e42-e63. July 28, 2020.

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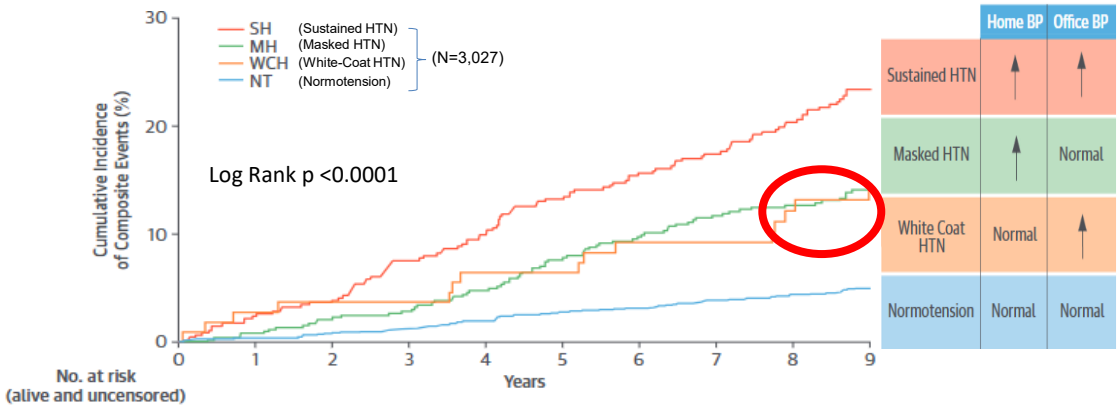
Composite CV Events Associated with Masked and White-Coat vs Sustained and Normotension:

The Dallas Heart Study

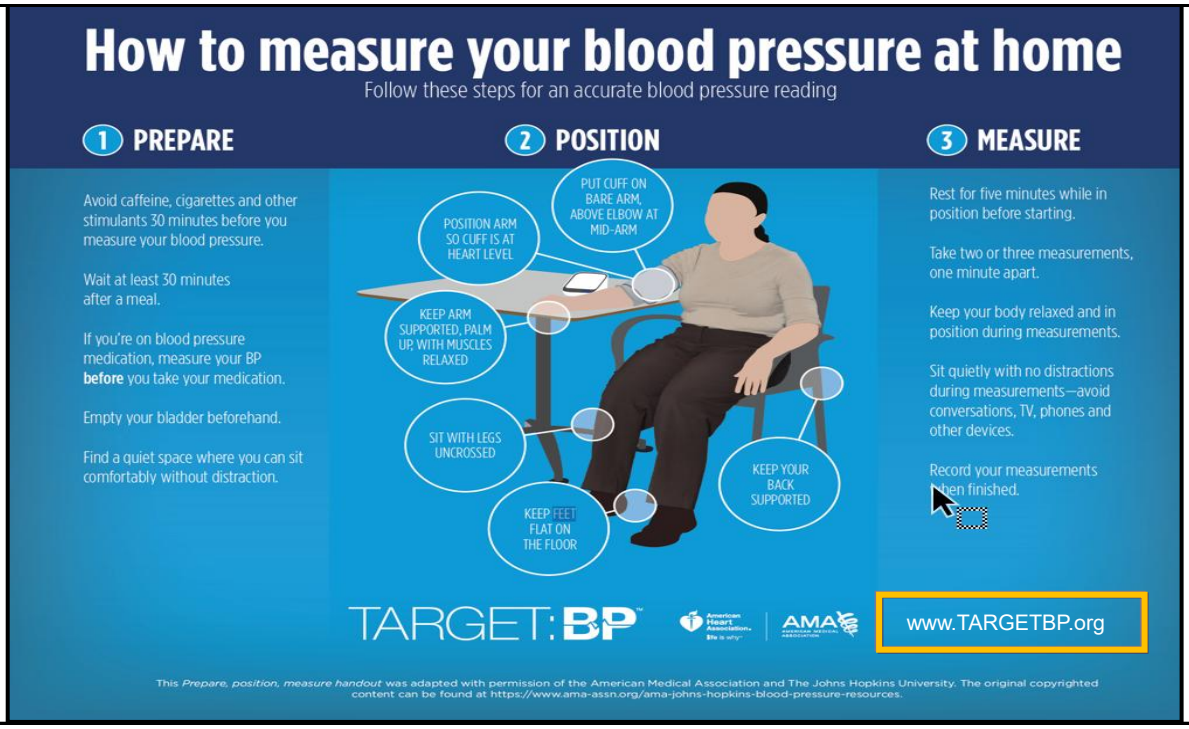


No. at risk (alive and uncensored)

SH	465	454	447	426	413	395	379	367	351	212
WCH	109	106	105	105	102	101	97	93	90	56
MH	529	525	517	512	499	480	466	452	445	256
NT	1627	1621	1612	1597	1581	1558	1544	1522	1509	865

Tientcheu. D. et al. *J Am Coll. Cardiol.* 2015; *Vol 66 Issue 20;pg 2159-2169..*

20



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Centers for Medicare and Medicaid Services (CMS) Incentives for Using SMBP (Self or Home Measured BP):

Coverage & Reimbursement

2020 CPT codes for Self or Home Measured BP

- Medicare has coverage for Self or Home Measured BP in the proposed 2020 fee schedule

99473: Education/Training

SMBP using a device validated for clinical accuracy; patient education/training and device calibration
- Can be submitted once
- Staff time = $11.19 for patient education (in 2024)

99474: Monthly Patient Use

SMBP using a device validated for clinical accuracy; separate self-measurements of two readings, one minute apart, twice daily over a 30-day period (minimum of 12 readings), collection of data reported by the patient and/or caregiver to the physician or other qualified health care professional, with report of average systolic and diastolic pressures and subsequent communication of a treatment plan to the patient
- Can be submitted monthly
- Provider = $15.16 monthly for data entered/treatment plan communicated to patient. **Will increase the use of telehealth in BP control**.

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Home or Self BP Measurement: Proper Elements for Monitoring of Home BP

Element	Comments	Basile's Approach
Frequency of BP readings	At least 2, measured 30-60 seconds apart	2 readings. 1-minute apart
Time of day	AM before medications and eating PM before medications, either before dinner or before bedtime	Twice- 1) When first rising 2) Before getting in bed to sleep
Minimum readings if BP uncontrolled	At least 12 readings over 3-7 days Some suggest discarding first day	1 week/month Discard first day
Goal	Average BP <130/<80	
Type of device	Validated upper arm oscillometric device preferred Wrist devices only in settings of large arm circumferences	upper arm device www.validatebp.org

Table 3. Cluett J. L. and William J.H. Am J Kidney Dis. 84(3):374-387. Published online July 24, 2024.

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CLINICAL PEARL #4

Out Of Office (Home or Self) BP Measurement Is a Better Predictor of CV Events Than Office BP and at least as good a predictor of risk as 24-hr ABPM which is not often available in many practices

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Ambulatory Blood Pressure Monitoring and Home (SELF) Blood Pressure Monitoring

Recommendations for Ambulatory Blood Pressure Monitoring and Home Blood Pressure Monitoring Referenced studies that support the recommendations are summarized in the evidence table.		
COR	**LOE**	**Recommendations**
1	A	2. In adults who are taking antihypertensive medication, HBPM is recommended for monitoring the titration of BP-lowering medication, along with cointerventions such as patient education, telehealth counseling, and clinical interventions.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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Prognostic Significance of Home BP and Developing CV Disease

- 4,939 patients with HTN
- Age: 70 ± 6 yrs
- Data: baseline office and 4-day home BP (2 readings/day) taken with Omron 705 CP
- Follow-up: Mean 3.2 yrs

O=office; H=Home; (-)=normal; (+)=high

	O-/H-	O+/H+	O-/H+	O +/H-
RR	1.00	1.96	2.06	1.18

- Home BP is more strongly related to target organ damage and CV outcomes than is office BP

Bobrie G et al. *Arch Intern Med.* 2001;161:2205.
Bobrie G et al. *JAMA.* 2004;291:1342.

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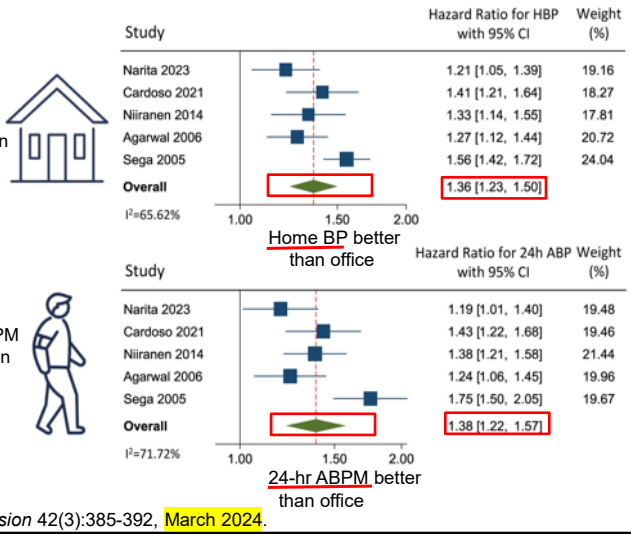
Prognostic Ability of Home BP vs 24-hr ABPM Measurement: *A Systematic Review and Meta-Analysis of Outcome Studies*

Hazard Ratios per 10 mmHg increase in Systolic Home BP (1.36) and 24-hr ABPM (1.38) for the Primary CV Endpoint in Each Study

- Meta-analysis of 5 studies (n=4439)
- Mean age 57
- 52% men
- 68% HTN
- 15% Diabetes
- 11% CV Disease
- For each 10 mm Hg increase in SBP no Difference in Outcomes between Home vs 24-hr ABPM

Home BP better than Office BP



24-hr ABPM Better than Office BP

Conclusion:

Home and 24-hr ambulatory BP have similar ability in predicting CV outcome and both were superior to Office BP.

Fig 1. Kolias A. et al. *Journal of Hypertension* 42(3):385-392, March 2024.

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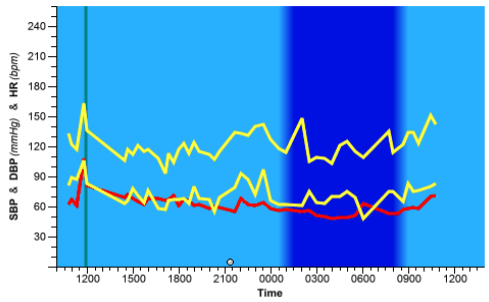
Subj 1009 2 Month

Oldest Previous

27 Jun 2023

This is the most recent of 2 ABPMs.



ABPM Results Summary

24-hour	121 / 71	130/80	White-Coat Window	133 / 91	
Standard Daytime	120 / 71	125/75	Standard Night-Time	121 / 69	110/65
Dipping Status	Non-dipper				
Valid Readings	Total 45 (76%) Standard Daytime 29 (71%) Standard Night-time 15 (94%)				
ABPM Duration	24 h (10:49 27 Jun 2023 to 10:49 28 Jun 2023)				

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Out-of-Office (Self) Blood Pressure Measurement

- **Provides a better risk prediction than office-based monitoring**
- **Correlates better with the cardiac (LVH) and renal (albuminuria) consequences of hypertension than office readings**

Use and Advantages:

- **Helps identify WCH and Masked Hypertension**
- **Improves patient adherence**
- **Reduces costs**

Pickering TG, White W. *J Clin Hypertens*. 2008;10:850–855;
Izzo JL, Sica DA, Black HR, eds, and the Council for High Blood Pressure Research (American Heart Association). *Hypertension Primer: The Essentials of High Blood Pressure*. 4th ed. Philadelphia; 2008:339–342.

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CLINICAL PEARL #5

Be Familiar with the Initial Laboratory Tests in the W/Up of the New Patient Diagnosed with Hypertension

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Routine 2025 Laboratory Testing for New Diagnosis of HTN

Diagnostic Tests
Complete blood count
Serum sodium, potassium, calcium
Serum creatinine with estimation of glomerular filtration rate (based on the 2021 CKD-EPI Creatinine Equation)
Lipid profile
Fasting blood glucose or Hgb A1C
Thyroid-stimulating hormone
Urinalysis
Urine albumin-to-creatinine ratio;urine protein-to-creatinine ratio
ECG

=new test in 2025

ECG indicates electrocardiogram.

Table 6. Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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Monitoring Disease Progression in Chronic Kidney Disease: 2026 ADA Standards of Care

- Low risk (if no other markers of kidney disease, no CKD)
- Moderately increased risk
- High risk
- Very high risk

CKD is classified based on:
- GFR (G)
- Albuminuria (A)

GFR categories (mL/min/1.73 m²) Description and range				Albuminuria categories Description and range A1 Normal to mildly increased <30 mg/g <3 mg/mmol	A2 Moderately increased 30-299 mg/g 3-29 mg/mmol	A3 Severely increased ≥300 mg/g ≥30 mg/mmol
	G1	Normal or high	≥90	Screen 1	Treat 1	Treat and refer 2
	G2	Mildly decreased	60-89	Screen 1	Treat 1	Treat and refer 2
	G3a	Mildly to moderately decreased	45-59	Treat 1	Treat 2	Treat and refer 3
	G3b	Moderately to severely decreased	30-44	Treat 2	Treat and refer 3	Treat and refer 3
	G4	Severely decreased	15-29	Treat and refer 3	Treat and refer 3	Treat and refer 4+
	G5	Kidney failure	<15	Treat and refer 4+	Treat and refer 4+	Treat and refer 4+

Increasing CKD & CV Risk

Numbers indicate guide to the frequency of monitoring (# of times per year)

Increasing CV and CKD Risk

- Recognize that small fluctuations in GFR are common and are not necessarily indicative of progression.
- Repeated measurements over 3-6 months are needed to properly follow changes in UACR

Figure 11.1Diabetes Care. 2026;49(Supplement_1):S246-S260. doi:10.2337/dc26-S011

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CAUSES OF SECONDARY HYPERTENSION

Relatively Common	% of ALL with Hypertension
•Primary aldosteronism	10-15% (up to 25% in resistant HT)
•Renal vascular hypertension	~3%
•Renal parenchymal disease	~1%
•Drug or alcohol-induced	~1%
•Sleep Apnea	common but rarely responsible alone for a significant degree of BP elevation
Rare	**<1%**
•Pheochromocytoma	
•Cushing's syndrome	??
•Hypo- or hyper-thyroidism	
•Primary hyperparathyroidism	
•Acromegaly	
•Apparent mineralocorticoid excess/11β-OHase deficiency	
•Hyperdeoxycorticosteronism (congenital adrenal hyperplasia, primary cortisol resistance, DOC-producing tumor)	

Remaining ~ 87% have primary (essential) hypertension.

Adapted from Carey R M et.al. Hypertension 2018; 72:e53-e90. November 2018

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Screening for Features Suggesting Secondary HTN (Fig. 5)

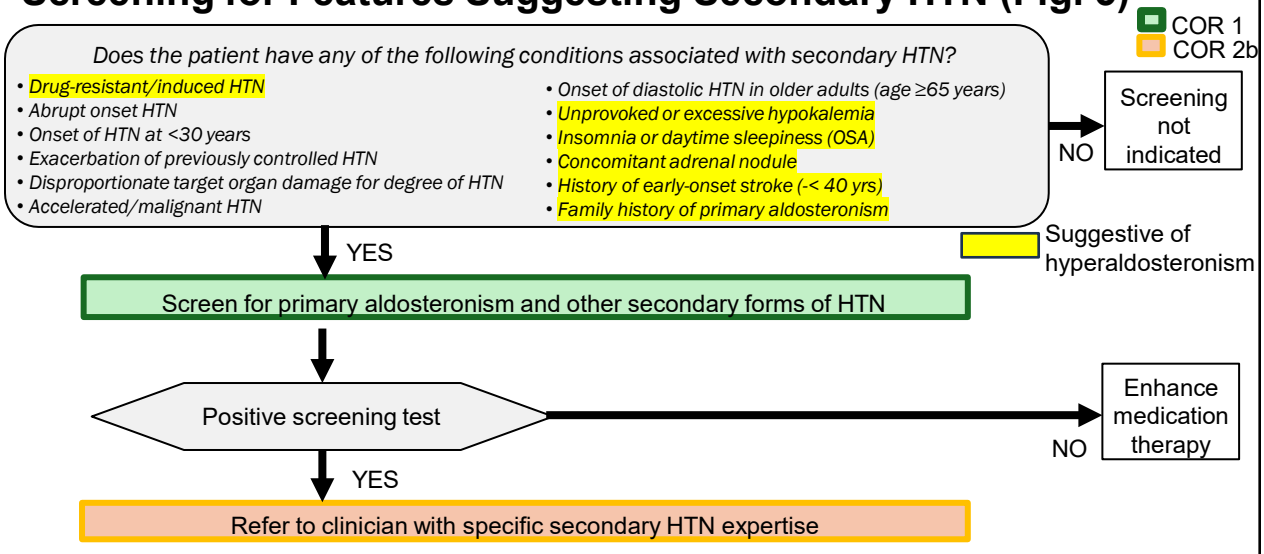

Fig 5. Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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2024 ESC Guidelines for Managing Elevated BP and HTN

This Is New

- **Renin and aldosterone should be measured in all patients with HTN:**

McEvoy JW, et al; ESC Scientific Document Group. Eur Heart J. 2024:ehae178.

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The Endocrine Society 2025: Screen All with Hypertension for Primary Aldosteronism

1. PA screening is suggested in all individuals with hypertension.

Adler, G.K.et al. Endocrine Society Guideline *Journal Clin. Endocrine and Metab*. July 14 2025; https://doi.org/10.1210/clinem/dgaf284.

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2025 AHA/ACC Guideline: Screening for Primary Aldosteronism

1: Strong (Benefit >>> Risk)

2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective

2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

COR	LOE	Recommendations
1	C-EO	1. In adults with hypertension, screening for primary aldosteronism is recommended in the presence of any of the following conditions to increase rates of detection, diagnosis, and specific targeted therapy: resistant hypertension (regardless of whether hypokalemia is present), hypokalemia (spontaneous or diuretic induced), OSA, incidentally discovered adrenal mass, family history of early-onset hypertension, or stroke at a young age (<40 years).

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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2025 AHA/ACC Guideline: Screening for Primary Aldosteronism

1: Strong (Benefit >>> Risk)

2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective

2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Recommendations for Primary Aldosteronism		
2b	C-EO	2. In adults with stage 2 hypertension, screening for primary aldosteronism may be considered to increase rates of detection, diagnosis, and specific targeted therapy.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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CLINICAL PEARL #6

The Definition of Hypertension Should begin at 130/80 mmHg and the Target for Control Should be < 130 mm Hg, with encouragement in those at increased risk for CVD to achieve a SBP <120 mm Hg to reduce the risk of cardiovascular events and total mortality.

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2025 Blood Pressure Categories

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (top/upper number)		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
w/o acute sxs SEVERE HYPERTENSION (If you don't have symptoms, call your health care professional)	HIGHER THAN 180	and/or	HIGHER THAN 120
→ HYPERTENSIVE EMERGENCY (If you have any 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

*** We have abandoned the term Hypertensive Urgency**

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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2025 AHA/ACC HTN Guideline: What's New

- **Severe HTN without evidence of acute TOD**

  No longer called a hypertensive urgency

  - Requires a good hx, physical examination, and labs to be sure.

  - There should not be aggressive BP lowering in the short-term.

  - Instead, the clinician should just reinstitute previously used oral HTN medications or add additional HTN medications, preferably in the outpatient setting to get BP better controlled. No Clonidine, No ER visit.

  - Requires follow-up in 24-48 hours.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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What Should the BP Target Be?

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BONUS DIGITAL CONTENT

Practice Guidelines

Blood Pressure Targets in Adults With Hypertension: A Clinical Practice Guideline From the AAFP

Sarah Coles, MD, FAAFP, Colorado Plateau Family and Community Medicine Residency Program, North County HealthCare, Flagstaff, Arizona; University of Arizona College of Medicine, Phoenix, Arizona
Lynn Fisher, MD, FAAFP, University of Kansas School of Medicine, Wichita, Kansas
Kenneth W. Lin, MD, MPH, Lancaster General Hospital Family Medicine Residency Program, Lancaster, Pennsylvania
Corey Lyon, DO, FAAFP, University of Colorado School of Medicine, Denver, Colorado
Alexis A. Vosooney, MD, Allina Health Group, West Saint Paul, Minnesota
Melanie D. Bird, PhD, MSAM, American Academy of Family Physicians, Leawood, Kansas

Am Fam Physician. 2022;106(6):721-722

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TABLE 4

Comparison of Recommended Blood Pressure Targets in Recent Guidelines

Guideline	18 to 59 years of age (mm Hg)	60 to 69 years of age (mm Hg)	70 to 79 years of age (mm Hg)	Older than 80 years (mm Hg)
2022 American Academy of Family Physicians*	< 140/90	< 140/90	< 140/90	< 140/90
2022 National Institute for Health and Care Excellence[13]	< 140/90	< 140/90	< 140/90	< 150/90
2021 European Society of Hypertension Council[14]	< 130/80†	< 130/80†	< 140/80	< 140/80
2020 International Society of Hypertension‡[44]	< 130/80	< 140/90§	< 140/90	< 140/90
2020 U.S. Department of Veterans Affairs/U.S. Department of Defense‖[15]	< 130/90¶	< 150/90	< 150/90	< 150/90
2017 American College of Cardiology/American Heart Association*[16]	< 130/80	< 130/80	< 130/80	< 130/80
2017 American College of Physicians and American Academy of Family Physicians[11]	—	< 150/90	< 150/90	< 150/90
2014 Eighth Joint National Committee[10]	< 140/90	< 150/90	< 150/90	< 150/90

*—Lower targets are reasonable based on clinical judgment and patient preferences or values.
†—A target of less than 140/90 mm Hg is recommended for patients with chronic kidney disease.
‡—Recommendation is to treat all patients to less than 140/90 mm Hg but states it is optimal to treat persons younger than 65 years and people with coronary artery disease, chronic kidney disease, heart failure, previous stroke, chronic obstructive pulmonary disease, or diabetes mellitus to less than 130/80 mm Hg (less than 140/80 mm Hg in older patients).
§—Recommendation is to transition from target of 130/80 mm Hg to 140/90 mm Hg at 65 years of age.
‖—A target of less than 140/90 mm Hg is recommended in patients with diabetes.
¶—Recommendation is to treat all patients 18 to 59 years of age (including those with diabetes) to a systolic blood pressure target of less than 130 mm Hg. For patients 30 years and older, a diastolic blood pressure target of less than 90 mm Hg is recommended.

Information from references 10, 11, 13-16, and 44.

Am Fam Physician. 2022;106(6):721-722

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

9,361 pts
Mean 68 yrs old
~30% > age 75
16.7% Clinical CVD
26% with CKD
No Diabetes, No stroke

Primary Outcome: MI, ACS HF, Stroke, CV Death

Intensive Group < 120 mm Hg
Standard Group < 140 mm Hg

*N Engl J Med 2015;373:2103-16.

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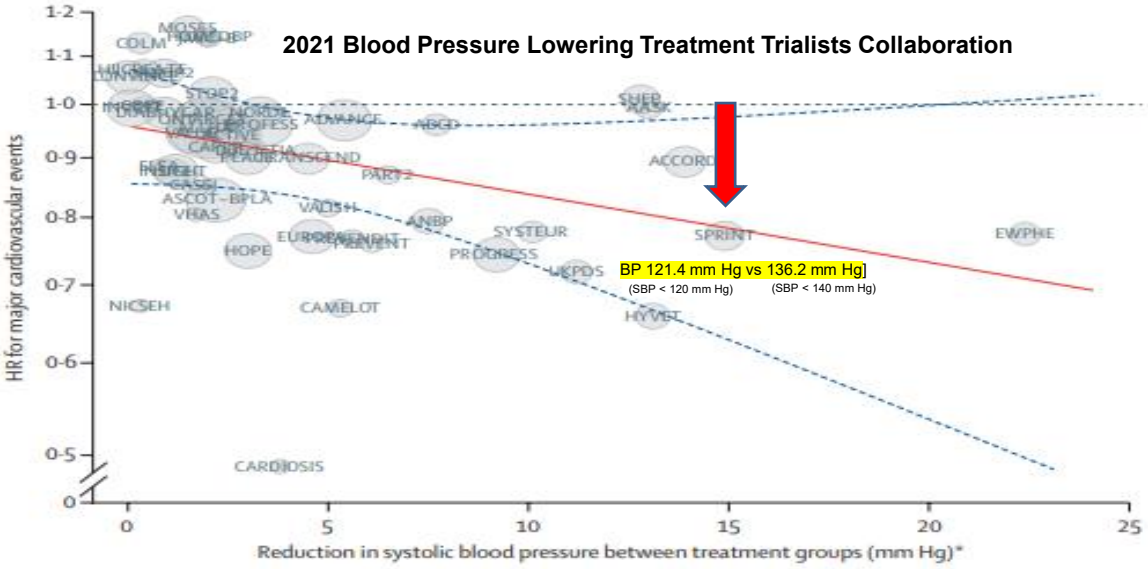
Association Between Intensity of BP Reduction and Relative Rx Effects for Prevention of Major CV Events



Rahimi K et al. *Lancet* 2021:397(10285):1625-1638.Blood Pressure Lowering Treatment Trialists Collaboration

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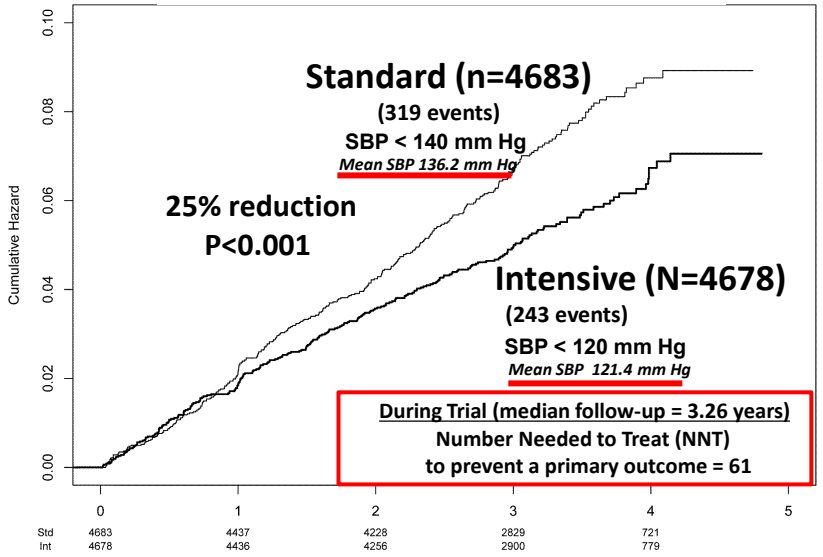
SPRINT Primary Outcome (CVD)

Cumulative Hazard

Hazard Ratio = 0.75 (95% CI: 0.64 to 0.89)



	Hazard Ratio	P value
Primary Outcome	0.75	<0.001
Components		
All MI	0.83	0.19
Non-MI ACS	1.00	0.99
All Stroke	0.89	0.50
All HF	0.62	0.002
CVD Death	0.57	0.005

The SPRINT Research Group. N Engl J Med. 2015;373:2103-16

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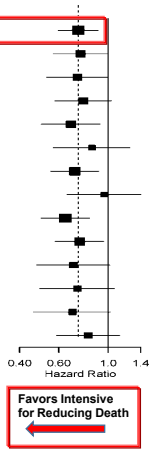
All Cause Mortality Experience in the Six Pre-Specified Subgroups of Interest

Figure 4: All-Cause Mortality

Subgroup	Intensive	Standard	HR	Int P
Overall	155/4678 (3.31)	210/4683 (4.48)	0.73 (0.60,0.90)	
No Prior CKD	85/3348 (2.54)	115/3367 (3.42)	0.75 (0.57,1.00)	0.76
Prior CKD	70/1330 (5.26)	95/1316 (7.22)	0.73 (0.53,1.00)	
Age < 75	82/3361 (2.44)	104/3364 (3.09)	0.77 (0.58,1.03)	0.58
Age ≥ 75	73/1317 (5.54)	106/1319 (8.04)	0.68 (0.50,0.92)	
Female	46/1684 (2.73)	54/1648 (3.28)	0.85 (0.57,1.26)	0.49
Male	109/2994 (3.64)	156/3035 (5.14)	0.71 (0.55,0.91)	*
African-American	53/1454 (3.65)	55/1493 (3.68)	0.96 (0.65,1.40)	0.06
Non African-American	102/3224 (3.16)	155/3190 (4.86)	0.64 (0.50,0.82)	
No Prior CVD	106/3738 (2.84)	140/3746 (3.74)	0.75 (0.58,0.96)	0.78
Prior CVD	49/940 (5.21)	70/937 (7.47)	0.70 (0.48,1.02)	
SBP ≤ 132	46/1583 (2.91)	64/1553 (4.12)	0.73 (0.49,1.07)	0.70
132 < SBP < 145	41/1489 (2.75)	63/1549 (4.07)	0.69 (0.46,1.03)	
SBP ≥ 145	68/1606 (4.23)	83/1581 (5.25)	0.81 (0.59,1.13)	

6 pre-specified groups

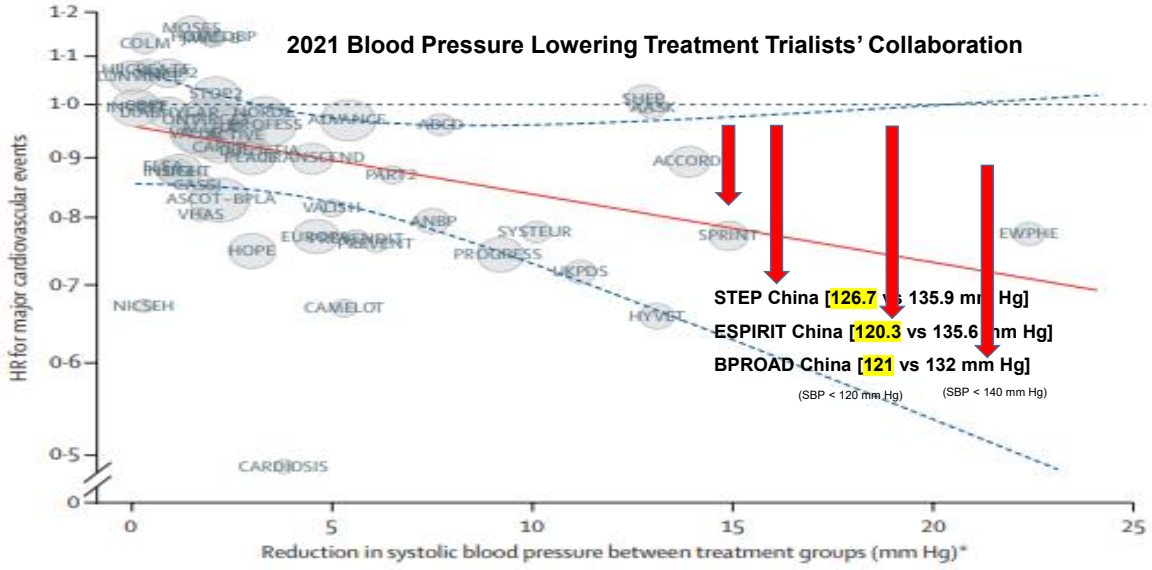
*p=0.34, after Hommel adjustment for multiple comparisons



SPRINT Research Group. *N Engl J Med*. 2015;373:2103-2116.

48

Association Between Intensity of BP Reduction and Relative Rx Effects for Prevention of Major CV Events



Rahimi K et al. *Lancet* 2021:397(10285):1625-1638.Blood Pressure Lowering Treatment Trialists' Collaboration

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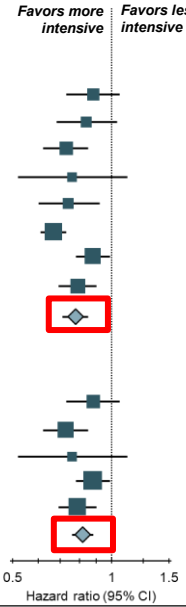
Major CVD Events, Randomization to More vs Less Intensive SBP Lowering

(Stroke, CHD, HF, CVD mortality) *RCT pooling using Random effects model*

High quality for BP and CVD outcomes assessment

Source	No. of events/total No. of participants: More Intensive	Less Intensive	Hazard ratio (95% CI)	Weight, %
Randomization to an SBP <130 mm Hg vs ≥130 mm Hg				
ACCORD, 2010	208/2362	237/2371	0.88 (0.73-1.06)	11.5
SPS3, 2013	160/1501	188/1519	0.84 (0.68-1.04)	10.0
SPRINT, 2015/2021	264/4678	354/4683	0.73 (0.62-0.85)	13.6
RESPECT, 2019	46/633	59/630	0.76 (0.52-1.12)	4.4
STEP, 2021	147/4243	196/4268	0.74 (0.60-0.92)	9.9
CRHCP, 2023	808/17407	1127/16588	0.67 (0.61-0.73)	18.8
ESPRIT, 2024	547/5624	623/5631	0.88 (0.78-0.99)	16.4
BPROAD, 2024	393/6414	492/6407	0.79 (0.69-0.90)	15.3
Overall Heterogeneity: I^2 = 59%, P = 0.02			0.78 (0.71-0.85)	100.0
Randomization to an SBP <120 mm Hg vs <140 mm Hg				
ACCORD, 2010	208/2362	237/2371	0.88 (0.73-1.06)	15.1
SPRINT, 2015/2021	264/4678	354/4683	0.73 (0.62-0.85)	20.9
RESPECT, 2019	46/633	59/630	0.76 (0.52-1.12)	3.8
ESPRIT, 2024	547/5624	623/5631	0.88 (0.78-0.99)	32.8
BPROAD, 2024	393/6414	492/6407	0.79 (0.69-0.90)	27.4
Overall Heterogeneity: I^2 = 11%, P = 0.34			0.82 (0.76-0.88)	100.0



22% reduction in CVD

18% reduction in CVD

Adapted from Whelton PK et al. Hypertension. 2024; 81:2329-2339.

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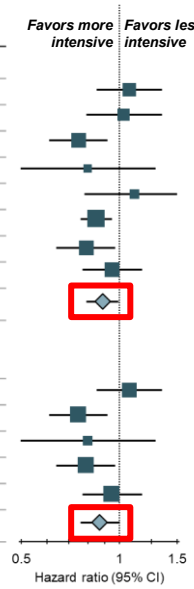
All-Cause Mortality, Randomization to More vs Less Intensive SBP Lowering

RCT pooling using Random effects model

Source	No. of events/total No. More Intensive	Less Intensive	Hazard ratio (95% CI)	Weight, %
Randomization to an SBP <130 mm Hg vs ≥130 mm Hg				
ACCORD, 2010	150/2362	144/2371	1.07 (0.85-1.35)	12.0
SPS3, 2013	106/1501	101/1519	1.03 (0.79-1.35)	9.6
SPRINT, 2015/2021	163/4678	215/4683	0.75 (0.61-0.92)	14.1
RESPECT, 2019	30/633	37/630	0.80 (0.49-1.29)	3.5
STEP, 2021	67/4243	64/4268	1.11 (0.78-1.56)	6.3
CRHCP, 2023	691/17407	776/16588	0.85 (0.76-0.95)	26.7
ESPRIT, 2024	160/5624	203/5631	0.79 (0.64-0.97)	13.9
BPROAD, 2024	169/6414	179/6407	0.95 (0.77-1.17)	13.8
Overall Heterogeneity: I^2 = 31%, P = 0.18			0.89 (0.81-0.98)	100.0
Randomization to an SBP <120 mm Hg vs <140 mm Hg				
ACCORD, 2010	150/2362	144/2371	1.07 (0.85-1.35)	21.2
SPRINT, 2015/2021	163/4678	215/4683	0.75 (0.61-0.92)	24.2
RESPECT, 2019	30/633	37/630	0.80 (0.49-1.29)	7.1
ESPRIT, 2024	160/5624	203/5631	0.79 (0.64-0.97)	23.9
BPROAD, 2024	169/6414	179/6407	0.95 (0.77-1.17)	23.7
Overall Heterogeneity: I^2 = 40%, P = 0.15			0.87 (0.76-1.00)	100.0



11% reduction in mortality

13% reduction in mortality

Adapted from Whelton PK et al. Hypertension. 2024; 81:2329-2339.

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2025 AHA/ACC HTN Guideline:

1: Strong (Benefit >>> Risk)

2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective

2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Blood Pressure Goal for Patients With Hypertension

Recommendations for Blood Pressure Goal for Patients With Hypertension

Referenced studies that support recommendations are summarized in the evidence table.

COR	LOE	Recommendations
1	A	1. In adults with confirmed hypertension who are at increased risk* for CVD, an SBP goal of at least <130 mm Hg, with encouragement to achieve SBP <120 mm Hg, is recommended to reduce the risk of cardiovascular events and total mortality.
1	B-R	3. In adults with confirmed hypertension who are at increased risk* for CVD, a DBP target of <80 mm Hg is recommended to reduce the risk of cardiovascular events and total mortality.
2b	B-NR	2. In adults with confirmed hypertension who are not at increased risk* for CVD, an SBP goal of <130 mm Hg, with encouragement to achieve SBP <120 mm Hg, may be reasonable to reduce risk of further elevation of BP.
2b	B-NR	4. In adults with confirmed hypertension who are not at increased risk* for CVD, a DBP target of <80 mm Hg may be reasonable to reduce the risk of cardiovascular events.

*Increased risk is defined as a 10-year predicted risk for CVD events of ≥7.5% using the PREVENT risk Calculator

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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CLINICAL PEARL #7

All patients with either elevated BP or hypertension, regardless of risk, benefit from Lifestyle Modification, almost all a Class I and Level of Evidence A recommendation.

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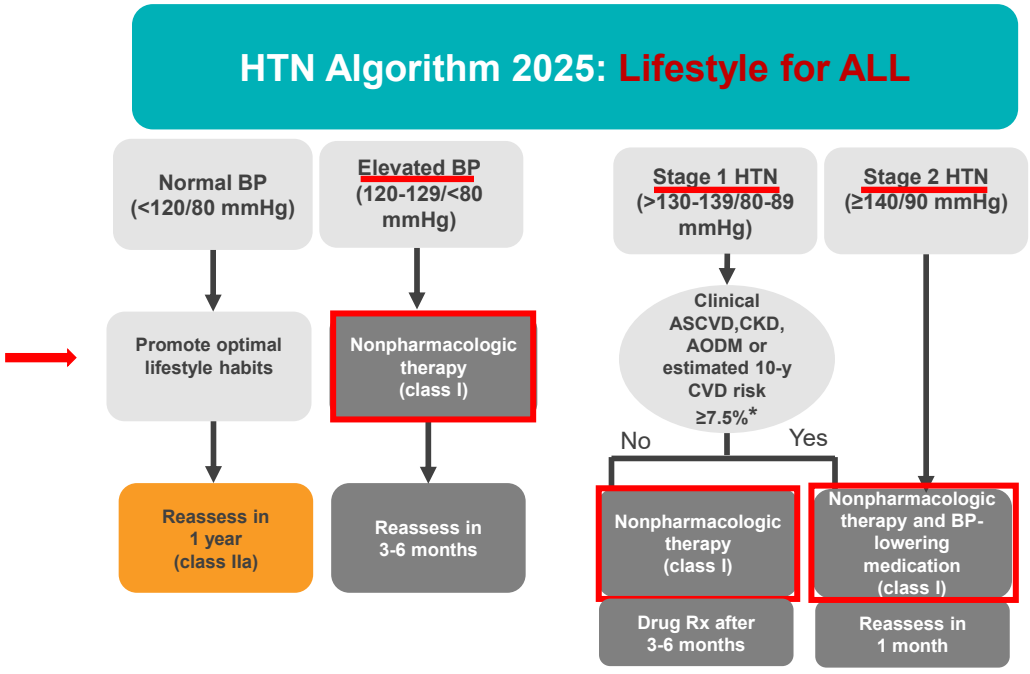
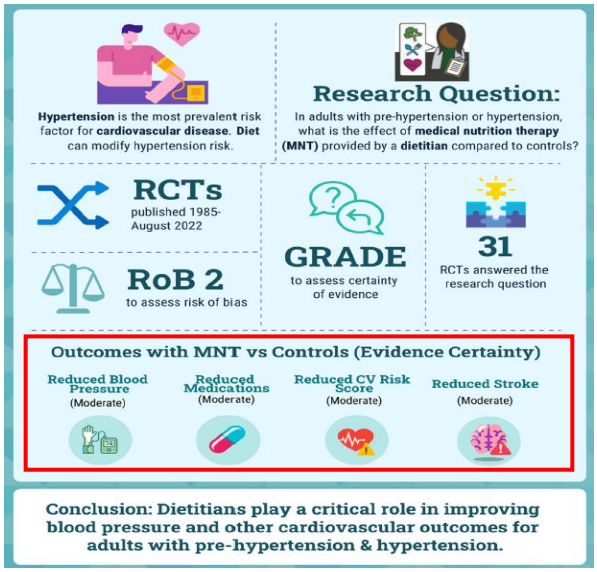


Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

54

Medical Nutrition Therapy Provided by Dieticians for Adults with Pre-Hypertension or Hypertension: A Systematic Review and Meta-Analysis

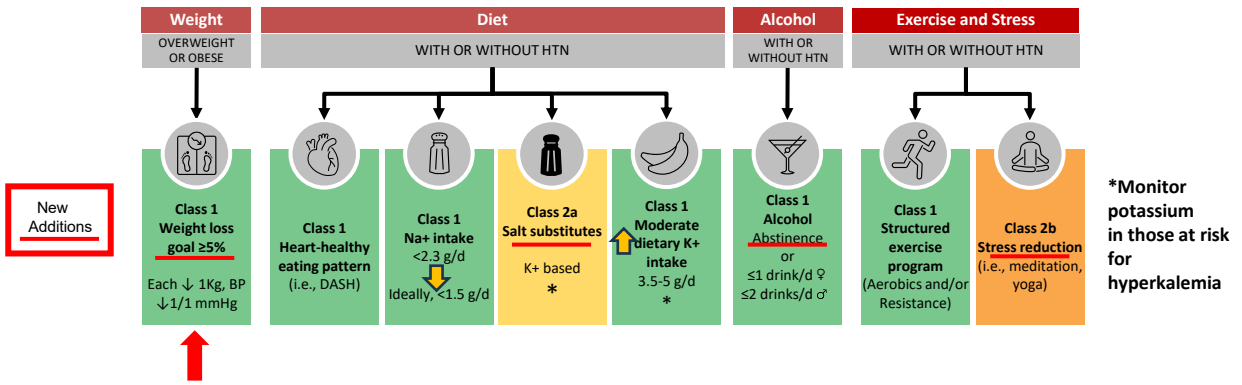


Senkus K.E. et al. *Am Jnl of Clinical Nutrition*. Vol 119, Issue 6, pg 1417-1442.June 2024

55

Treatment Starts with Non-Pharmacologic (Lifestyle) and Psychosocial Approaches

For all adults, lifestyle changes are strongly recommended to prevent or treat elevated blood pressure and hypertension.



Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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2025 AHA/ACC Guideline: Treatment Starts with Non-Pharmacologic (Lifestyle and Stress Reduction) Rx

Recommendations for Lifestyle and Psychosocial Approaches

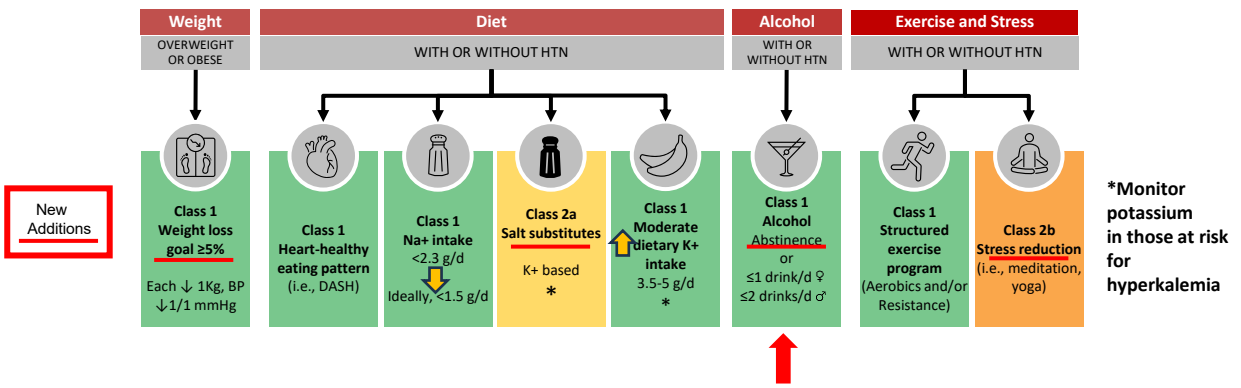
COR	LOE	Recommendations
		Weight
1	A	1. In adults who have overweight or obesity, weight loss is recommended with a goal of at least 5% of body weight reduction to prevent or treat elevated BP and HTN.

Jones D.W. et al. *Circulation* Vol 152, Issue 11 Sept 16, 2025. Pages e114-e218.

57

Treatment Starts with Non-Pharmacologic (Lifestyle) and Psychosocial Approaches

For all adults, lifestyle changes are strongly recommended to prevent or treat elevated blood pressure and hypertension.



Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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What's New in 2025 in Lifestyle Modifications

1: Strong (Benefit >>> Risk)
2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective
2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Class	Level	Alcohol
1	A	6. Adults with or without hypertension who currently consume alcohol should be **advised to pursue a recommended goal of abstinence**, or at least to reduce alcohol intake to ≤1 drink/day for women and ≤2 drinks/day for men **to prevent or treat elevated BP and hypertension**.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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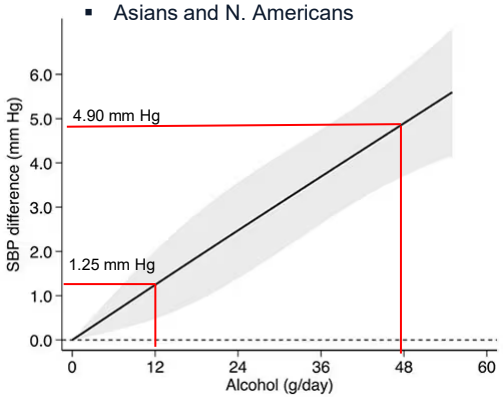
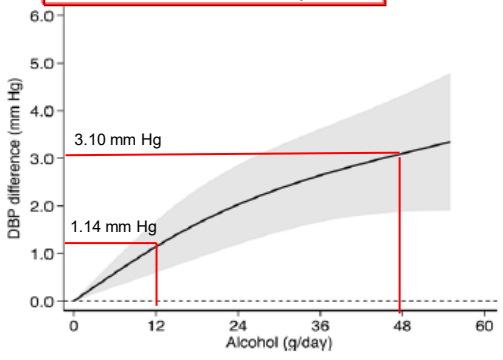
Alcohol Consumption and BP Elevation: A Meta-Analysis

[One Standard Drink = 12 To 14 G Alcohol]

- N=19,548, seven studies
- Median f/up-5.3 yrs
- Asians and N. Americans

1 Drink
- 5 oz of wine,
- 12 oz of beer
- 1 oz of 100 proof or 1.5 oz of 70 proof



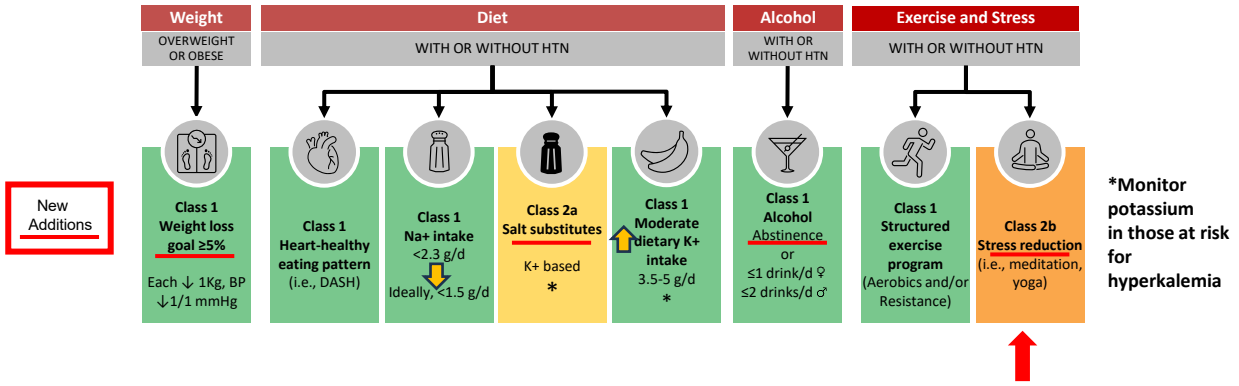


Di Federico et al. *Hypertension 2023;80:1961-1969.*

60

Treatment Starts with Non-Pharmacologic (Lifestyle) and Psychosocial Approaches

For all adults, lifestyle changes are strongly recommended to prevent or treat elevated blood pressure and hypertension.



Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

61

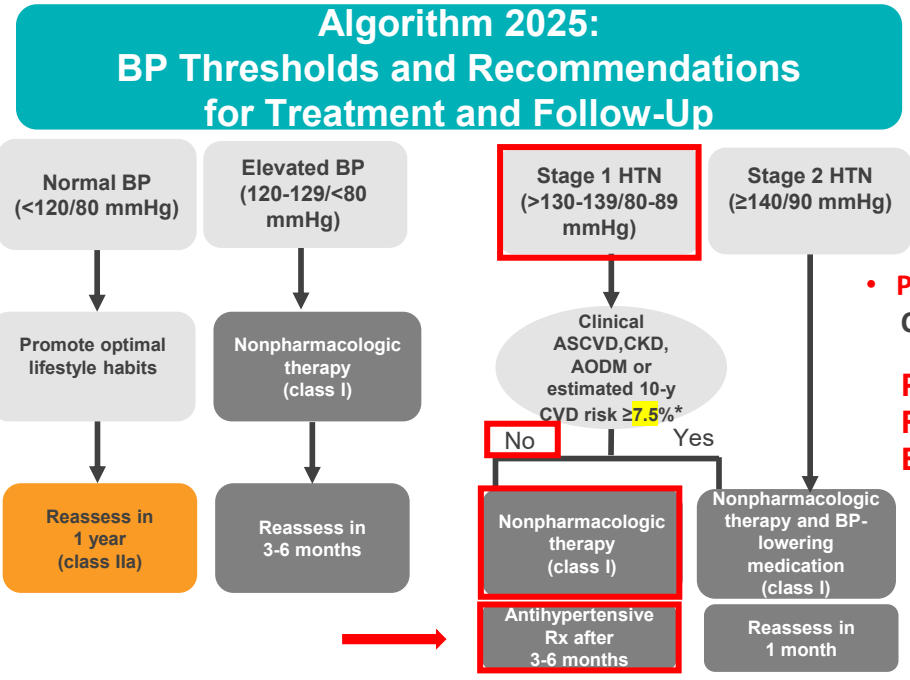
What's New in 2025 in Lifestyle and Psychosocial Modifications

1: Strong (Benefit >>> Risk)
2a: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective
2b: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

COE Class	LOE Level	Stress Reduction
2b	B-R	8. In adults with or without hypertension, stress reduction through transcendental meditation may be reasonable to prevent or treat elevated BP and hypertension, as an adjunct to lifestyle or medication interventions.
2b	B-R	9. In adults with or without hypertension, other forms of stress management, such as breathing control techniques or yoga, may be reasonable to prevent or treat elevated BP and hypertension, as an adjunct to lifestyle or medication interventions.

Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

62



Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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CLINICAL PEARL #8

The PREVENT Risk Estimator should be used in the primary prevention of those hypertensives w/o underlying CVD, diabetes, or CKD to predict their 10-year risk of CV disease. This allows us to decide which patients need lifestyle modification (LM) alone (< 7.5% risk) or LM with antihypertensive medications (any of the above 3 conditions or ≥ 7.5% risk using the PREVENT risk estimator).

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ACC/AHA ASCVD Risk Estimator Based on the 2013 Pooled Cohort Equation

http://tools.acc.org/ASCVD-Risk-Estimator/

Goff DC, et al. *J Am Coll Cardiol* 2014;63:2935-59

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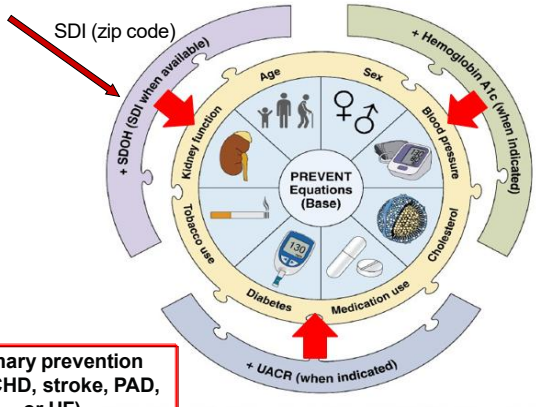
Predicting Risk of CVD EVENTs Calculator

NEW PARADIGM FOR CVD RISK: PREVENT™



Primary prevention (w/o CHD, stroke, PAD, or HF)

Abbreviations: CVD indicates cardiovascular disease; PREVENT, Predicting Risk of CVD Events; SDI, social deprivation index; SDOH, social determinants of health; and UACR urine albumin-to-creatinine ratio.

Khan SS et. al. *Circulation* 2023

Predictors:

- Base: Traditional risk factors (Gender, Age, SBP, Total and HDL cholesterol, diabetes, use of anti-hypertensive and lipid-lowering medication, smoking, eGFR, and BMI
- Add-on: UACR, HbA1c, SDI

Differences PREVENT (2023) vs PCE (2013)

- More contemporary data sets
- separate 10- and 30-year risk estimates
- Broader age range: 30-79 vs 40-79
- Race neutral

◉ Risk of CVD ○ Risk of ASCVD ○ Risk of Heart Failure

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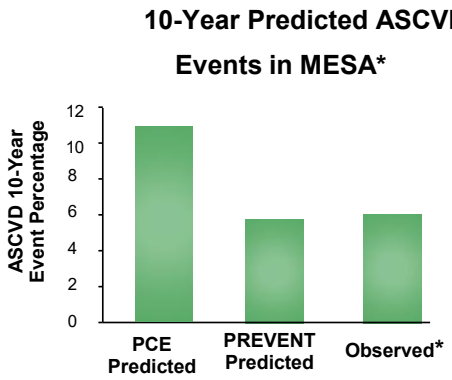
Pooled-Cohort Equation (PCE-2013) vs PREVENT (2023)



*MESA-Multi-Ethnic Study of Atherosclerosis

Murphy B et al. JACC Adv. 2025 Vol 4 No. 6 June 2025:101825 .

67

CLINICAL PEARL #9

For Adults in whom you initiate Antihypertensive Drug Therapy, the first three drug classes chosen to control BP should be a thiazide-type diuretic (D), long-acting dihydropyridine CCB , or an ACEi or an ARB but not both to prevent CVD.

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Drug Classes Used to Treat Hypertension

- **Thiazide-type Diuretics**
- **Calcium Channel Blockers**
- **Angiotensin-converting Enzyme Inhibitors**

or

- **Angiotensin Receptor Blockers**

First 3 Classes

- Mineralocorticoid receptor antagonists
- Potassium Sparing Diuretics
- Loop Diuretics
- Beta-adrenergic Blockers
- Alpha-1 Adrenoreceptor Antagonists
- Alpha/Beta blockers
- Direct-acting Vasodilators
- Central Sympatholytic Drugs
- Renin Inhibitors

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2025 Guideline Initial Medication Selection for Treatment of Primary Hypertension

Recommendation for Initial Medication Selection for Treatment of Primary Hypertension

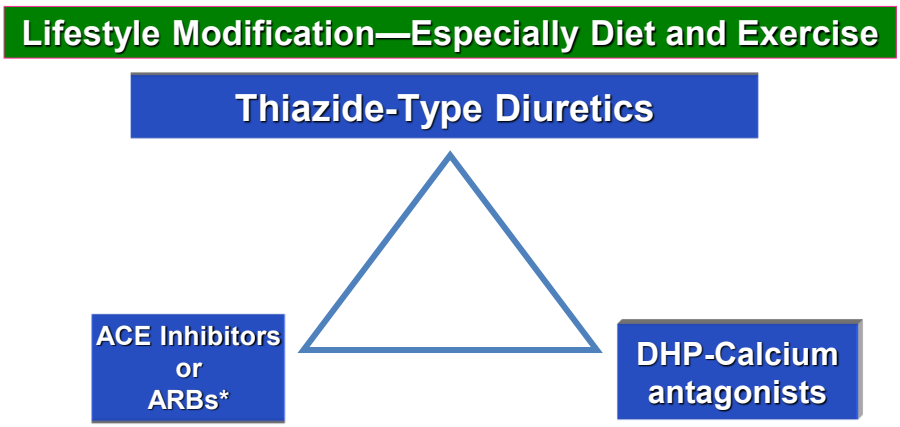
Referenced studies that support the recommendation are summarized in the evidence table.

COR	LOE	Recommendation
1	A	1. For adults initiating antihypertensive drug therapy, thiazide-type diuretics, long-acting dihydropyridine CCB, and ACEi or ARB are recommended as first-line therapy to prevent CVD.

Jones D.W. et al. *Circulation* Vol 152, Issue 11 Sept 16, 2025. Pages e114-e218.

70

Initial Medications for the Management of Hypertension



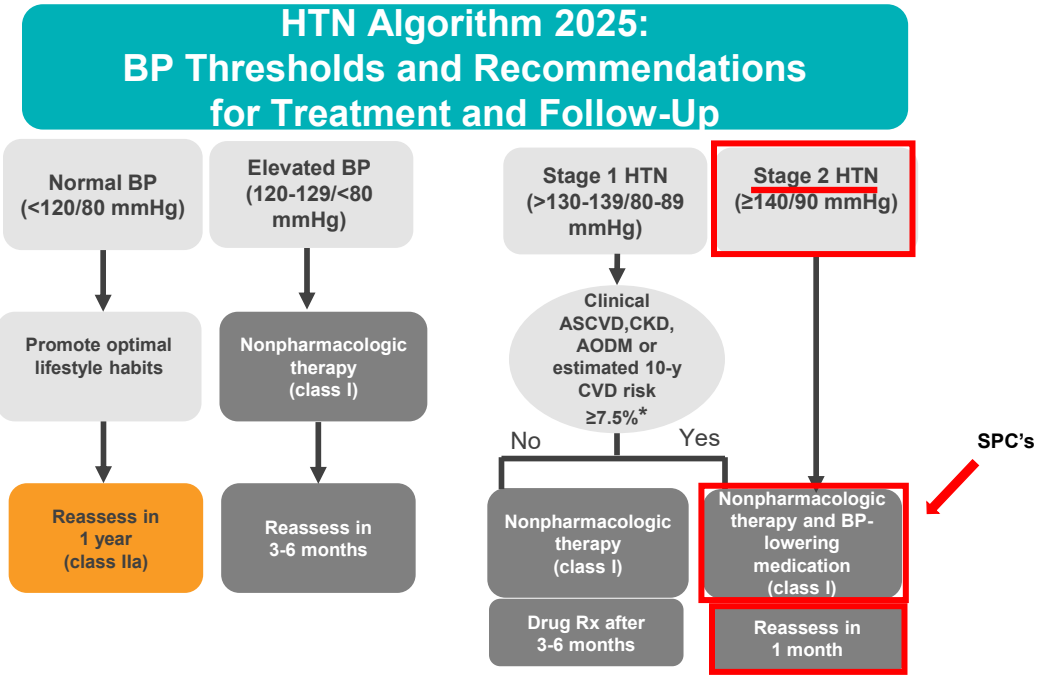
Jones D.W. et al. *Circulation* Vol 152, Issue 11 Sept 16, 2025. Pages e114-e218.

71

CLINICAL PEARL #10

-Fixed-dose, single-pill combination antihypertensive agents are recommended as initial therapy in those with Stage 2 Hypertension (≥ 140/90 mm Hg)-[COR I] to improve BP control and adherence.

72



Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

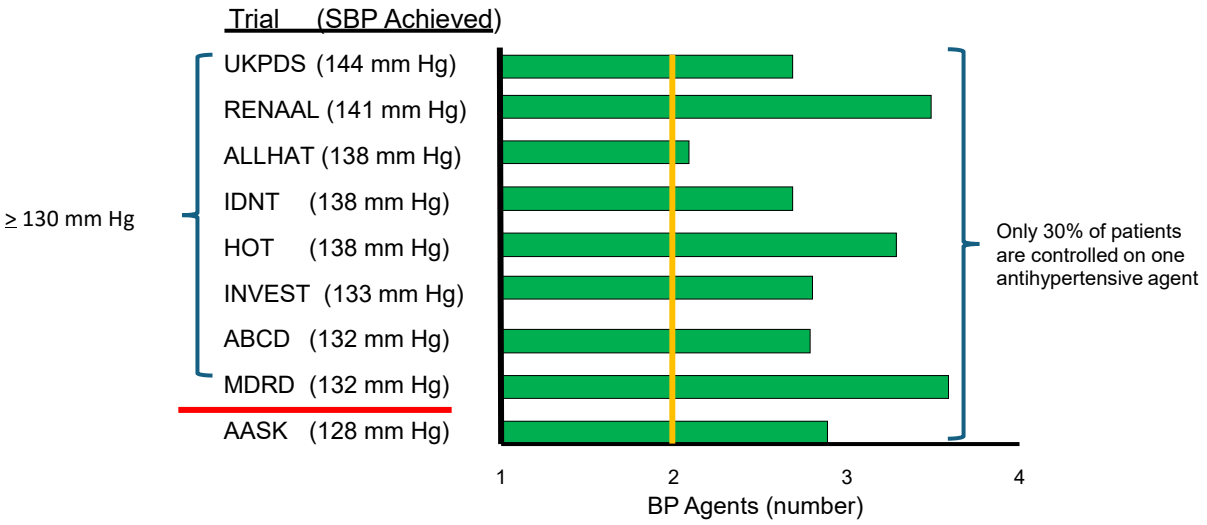
73

Single Pill Combinations (SPCs) for Hypertension

- SPCs are underutilized for HTN in the US despite widespread use in other conditions
  - ➢ Heart failure: sacubitril/valsartan
  - ➢ Infectious disease: (HIV, COVID-19, HCV, TB)
  - ➢ Obesity: phentermine/topiramate ER
  - ➢ Dyslipidemia: bempedoic acid/ezetimibe
- Multiple dual and less common triple pill combinations are available that are generic and usually lower in cost than individual agents

74

Combination Therapy Is Often Needed to Achieve Target SBP Goals When Clinical Trial Target Was ≥ 140/90



Am J Kidney Dis. 2000;36:646-661.

75

Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

You will use 2 or More Antihypertensive Agents in Most Patients

Stage 2 HTN*
Class 1
SBP ≥140 mmHg
DBP ≥90 mmHg

↓

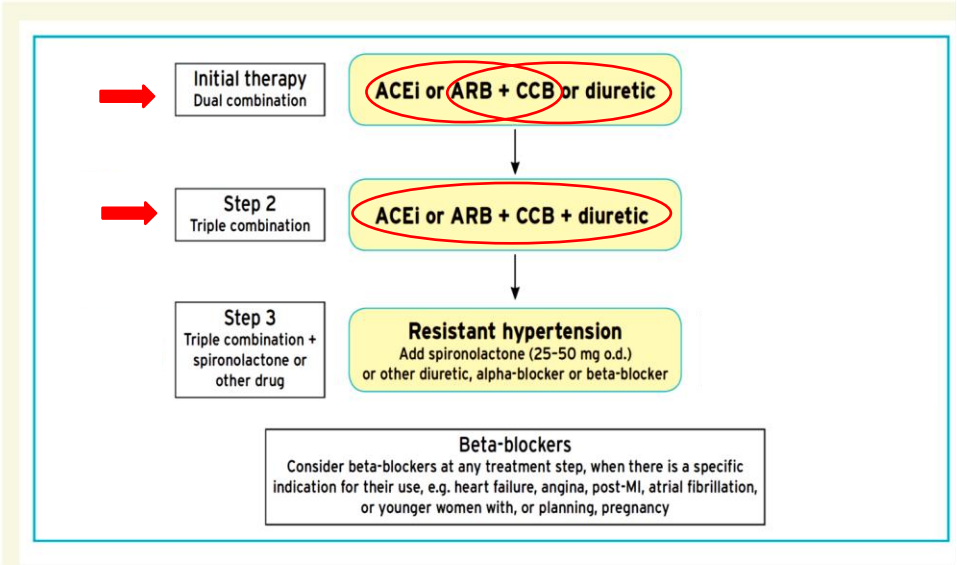
Initiation of two 1st line agents of different classes.

Ideally, in a single combination pill to improve adherence.

Jones D. *et al. Hypertension.* 2025;82:page e39. Section *5.2.4.* Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

76

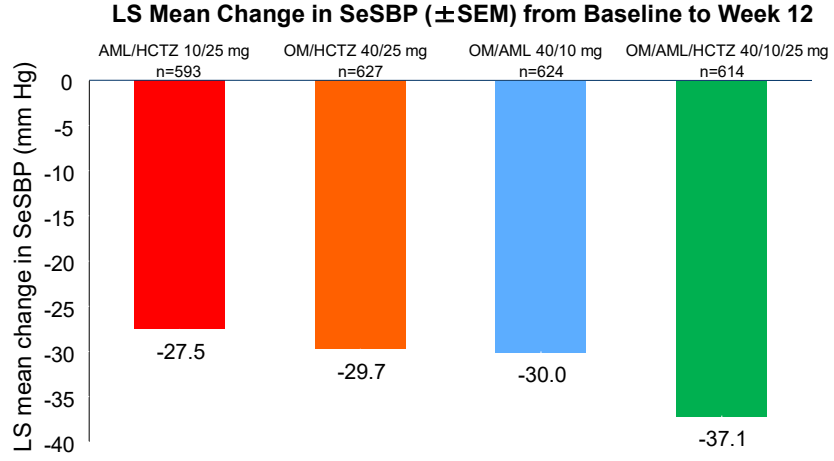
Ideal Triple Coverage-ESC/ESH 2018 and ESC 2024



Williams B et.al. European Heart Journal (2018) 39, 3021–3104.

77

Dual vs Triple Fixed-Dose Combination in Lowering SBP



The Full Analysis Set includes subjects who received at least 1 dose of study medication and had baseline and at least 1 post-dose assessment of Se DBP; Baseline SeSBP = 168.0-169.0 ; P<0.0001 for change from baseline for all groups; P<0.0001 for all dual combinations vs triple combination; LS mean, least squares mean; SEM, standard error of mean

Oparil S. et al. Clinical Therapeutics 2010; 32(7): 1252-1269.

78

Improved Adherence with SPC's

Study*	Design	SPC, N	FEC, N	†PDC SPC vs. FEC, *p*-value
Ah, *et al*	RetroDB	20,175	20,175	80% vs. 70%, $p < 0.01$
Breitscheidel, *et al*	RertroDB	45,511	26,172	78.1% vs. 71.5%, $p < 0.0001$
Degli Esposti, *et al*	RetroCoh	302	791	79.8% vs. 70.9%, $p < 0.01$
Dickson, *et al*	RetroCoh	2336	3368	63.4% vs. 49%, $p < 0.0001$
Hess, *et al*	RetroCoh	7225	7224	76.9% vs. 54.4%, $p < 0.001$
Ho, *et al*	RetroDB	13,176	4392	58% vs 47%, $p < 0.001$
Hsu, *et al*	RetroDB	5725	1623	42.1% vs 32.4%, $p < 0.001$
Jin-Young, *et al*	RetroOB	757	707	MPR $\geq$ 80%: 91.9% vs. 88.9%, NS
Koval, *et al*	RandPG	39	36	87% vs. 61%, $p < 0.05$
Machniki, *et al*	RetroDB	1884	1884	70.0% vs. 60.6%, $p < 0.0001$
Marazzi, *et al*	RanPro	154	152	94% vs. 85%, $p = 0.034$
Schweizer, *et al*	NRPro	197	138	100% vs. 92%, p=NS
Tung, *et al*	RetroDB	1136	4544	PDC $\geq$ 80%: 65.0% vs. 56.9%, $p < 0.001$
Yang, *et al*	RetroDB	382,476	197,375	72.8% vs. 61.3% (11.6% [11.4–11.7])

* Adapted from Parati. et al.Hypertension 2021;77(2):692-705

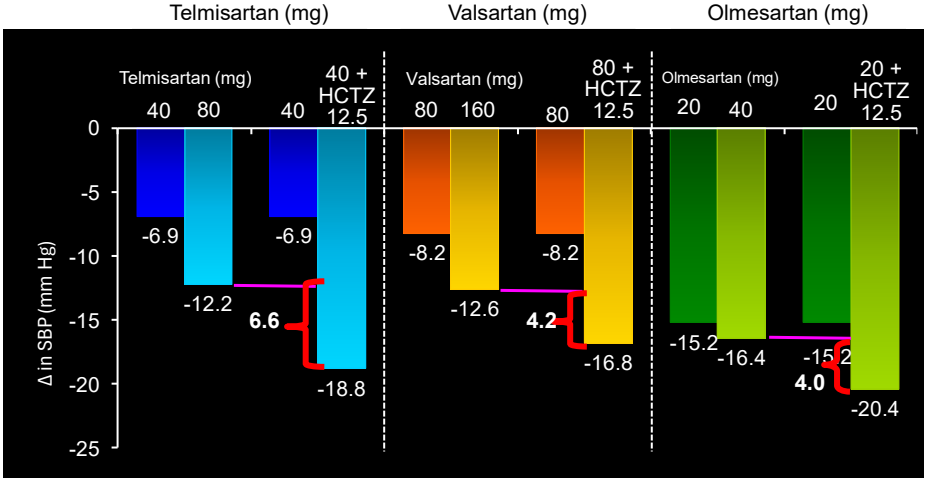
†When only medication possess ratio (MPR) provided, MPR multiplied × 100 and expressed as percent to approximate proportion of days covered (PDC).

SPC: single-pill combinations; FEC: free equivalent combinations; RetroDB: retrospective database design; RetroCor: retrospective cohort; RetroOb: retrospective observational; RanPro: randomised, prospective; NRPro: non-randomised prospective; P = NS: not significant or not provided.

Table 1. Egan, B.M. Et al. Blood Pressure, 31:1, pg 164-168. 2022

79

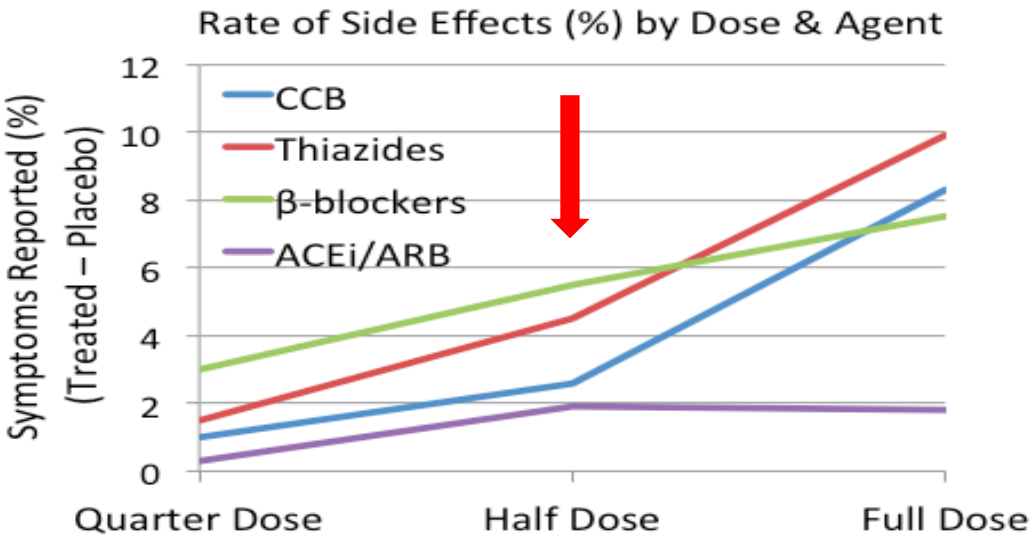
Efficacy: Up-Titration of ARB vs ARB/HCTZ



Conlin PR et al. *Am J Hypertens.* 2000;13:418-426; Weber M et al. *J Hypertens.* 1998;16(suppl 2):S129; McGill JB, Reilly PA. *Clin Cardiol.* 2001;4:66-72; Chrysant SG et al. *Am J Hypertens.* 2004;17:252-259.

80

Value of Low-Dose Combination Therapy



Law MR et al. *BMJ* 2003; 326:1427-35.

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Hypertension

REVIEW ARTICLE | Originally Published 15 December 2025 | Check for updates

Single-Pill Combination Therapy for the Management of Hypertension: A Scientific Statement From the American Heart Association

King J.B. et al. *Hypertension* Pub Dec 15, 2025. https://doi.org/10.1161/HYP.0000000000000258

82

Using Single-Pill Combination Medications vs a Stepped Care Approach as Initial Rx

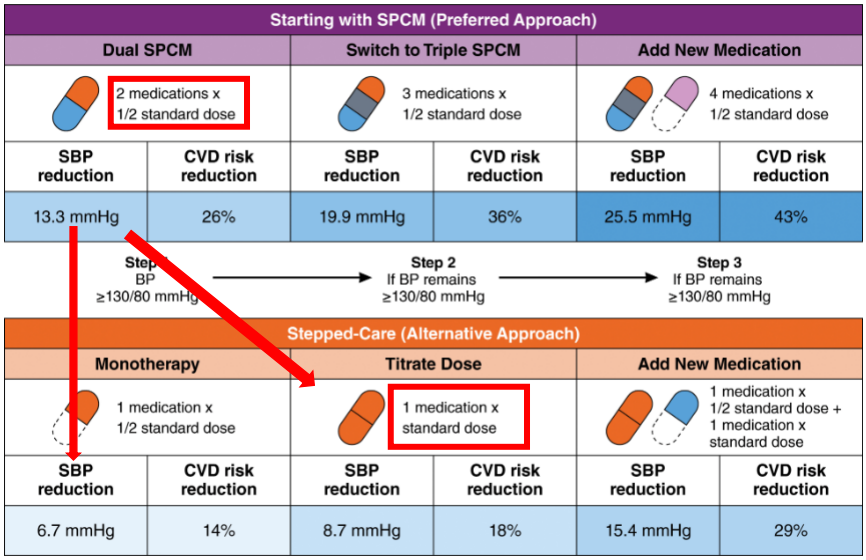

Fig 1.King J.B. et al. Hypertension Pub Dec 15, 2025. https://doi.org/10.1161/HYP.0000000000000258

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DRUG COMBINATIONS IN HYPERTENSION: RECOMMENDATIONS

Preferred

- ACE inhibitor/diuretic*
- ARB/diuretic*
- ACE inhibitor/CCB*
- ARB/CCB*

*Single Pill Combinations available in the US

Acceptable

- Beta blocker/diuretic*
- CCB (dihydropyridine)/β-blocker
- CCB/diuretic
- Direct Renin inhibitor/diuretic
- Direct Renin inhibitor/ARB
- Thiazide diuretics/K+ sparing diuretics*

Unacceptable

- ACE inhibitor/ARB
- ACE inhibitor/β-blocker
- ARB/β-blocker
- CCB (nondihydropyridine)/β-blocker
- Centrally acting agent/β-blocker

*Good Rx 30 days 2/18/26

"Ideal" Combinations Available**

Benazepril 40 mg/Amlodipine 10 mg	$14.48 (30)-Sam's Club
+	
Spironolactone 25/HCTZ 25	$29.23 (30)-Sam's Club
	$16.08 (30)-Walgreens

Gradman AH, Basile JN, Carter BL, Bakris GL; American Society of Hypertension Writing Group. *J Am Soc Hypertens.* 2010;4:42-50.
**Basile Personal Communication-Good Rx site 2/18//26

84

Hypertension

ORIGINAL ARTICLE

Improved Persistence to Medication, Decreased Cardiovascular Events and Reduced All-Cause Mortality in Hypertensive Patients With Use of Single-Pill Combinations: Results From the START-Study

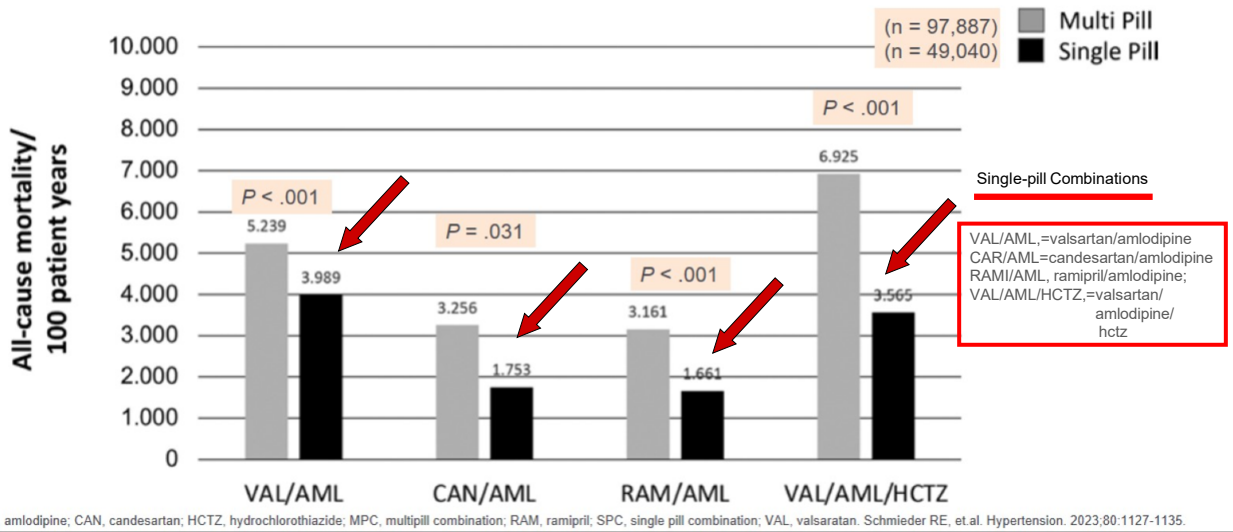
Roland E. Schmieder, Sven Wassmann, Hans-Georg Predel, Burkhard Weisser, Jörg Blettenberg, Anton Gillessen, Olaf Randerath, Antje Mevius, Thomas Wilke, Michael Böhm

(Hypertension. 2023;80:1127–1135. DOI: 10.1161/HYPERTENSIONAHA.122.20810.)

85

All-Cause Mortality in Single-Pill Combination vs Same Meds in Multi-Pill Combination Groups: The START Study

Lower mortality with SPC vs MPC

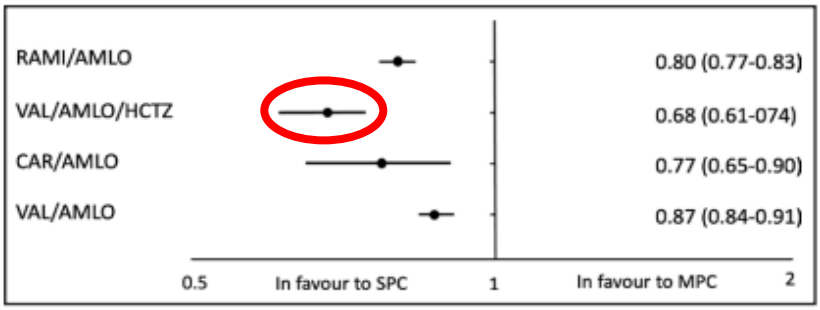


AML, amlodipine; CAN, candesartan; HCTZ, hydrochlorothiazide; MPC, multipill combination; RAM, ramipril; SPC, single pill combination; VAL, valsaratan. Schmieder RE, et.al. Hypertension. 2023;80:1127-1135.

86

Reduced All-Cause Hospitalization and All-Cause Mortality in the SPC vs MPC Groups in Patients with HTN

Results for the composite outcome of All-Cause Hospitalization and All-Cause Death



Comparisons are done between matched SPC (Single-Pill Combinations) versus MPC (Multiple Pill Combinations) cohorts..

RAMI/AMLO, ramipril/amlodipine;
VAL/AMLO/HCTZ,=valsartan/amlodipine/hydrochlorothiazide
CAR/AMLO=candesartan/amlodipine;
VAL/AMLO,=valsartan/amlodipine

Fig 3. Schmieder RE et al. Hypertension May.2023;80:1127–1135.

87

Why Use Combination Antihypertensive Therapy

- Achieve BP control faster
- Synergistic BP effects of two or more medications
- Side effects are often dose related so lower dosages = fewer side effects
- Lower cost if covered by insurance
- Reduced pill burden
- Increased adherence

Messerli et al. *Am J Cardio.* Dec 2000;86(11):1182-1187.

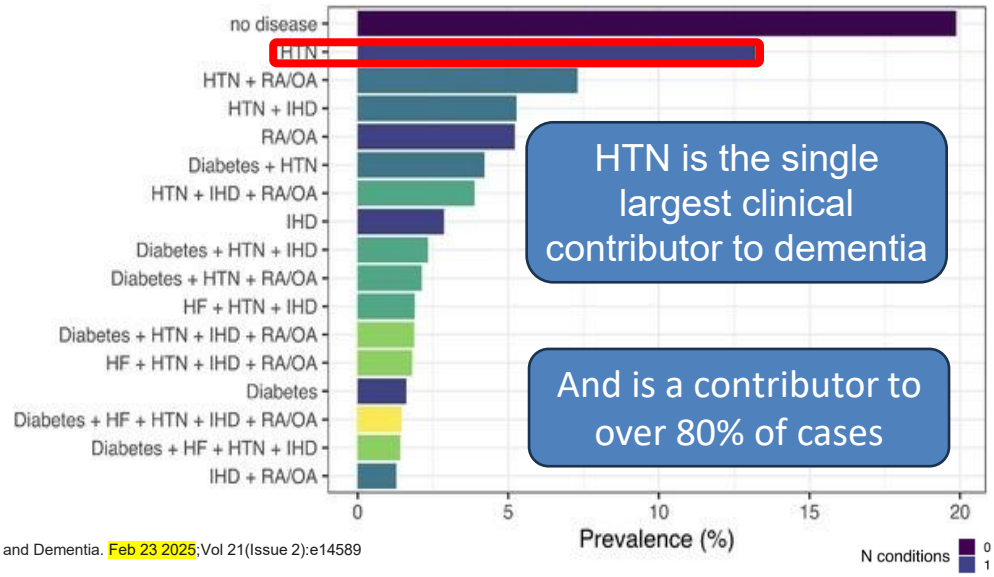
88

CLINICAL PEARL #11

In Adults with Hypertension, a SBP goal of < 130 mm Hg is recommended to prevent cognitive impairment and dementia.

89

9,944 Health and Retirement Study Participants (68–99 Years Old), Without Dementia at Baseline, Followed for 18 Years (1998-2016). Conditions Related to Development of Dementia



Klee et al. Alzheimers and Dementia. Feb 23 2025;Vol 21(Issue 2):e14589

90

Cognitive Decline and Dementia: HTN Guideline 2017

1: Strong (Benefit >>> Risk)
IIa: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective
IIb: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Recommendation for Prevention of Cognitive Decline and Dementia

COR	LOE	Recommendation
IIa	B-R	1. In adults with hypertension, BP lowering is reasonable to prevent cognitive decline and dementia.[S11.3-1–S11.3-6]

2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults, *Hypertension* 2018 Jun;71(6):1269

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SPRINT-MIND: Effect of Intensive vs Standard Blood Pressure Control on Probable Dementia: A Randomized Clinical Trial

Table 2. Incidence of Probable Dementia and Mild Cognitive Impairment by Treatment Group

		Treatment Group					
		Intensive SBP < 120 mm Hg N=4278		Standard SBP < 140 mm Hg N=4285			
	Outcomes	No. With Outcome/Person-Years	Cases per 1000 Person-Years	No. With Outcome/Person-Years	Cases per 1000 Person-Years	Hazard Ratio (95% CI)[a]	P Value
Primary outcome	Probable dementia	149/20 569	7.2	176/20 378	8.6	0.83 (0.67-1.04)	.10
Secondary outcome	Mild cognitive impairment[b]	287/19 690	14.6	353/19 281	18.3	0.81 (0.69-0.95)	.007
Secondary outcome	Composite of mild cognitive impairment or probable dementia	402/19 873	20.2	469/19 488	24.1	0.85 (0.74-0.97)	.01

[a] Intensive treatment group vs standard treatment group based on Cox proportional hazards regression.

[b] Participants adjudicated as having probable dementia at the first follow-up visit (year 2) do not contribute to the analyses of mild cognitive impairment.

Treatment lasted a median of 3 years, and patients were followed for cognitive outcomes over a total of 5 years.

JAMA. Published online January 28, 2019. doi:10.1001/jama.2018.21442

92

What Should the BP Target Be to Prevent Dementia?

93

Effects of Intensive (SBP< 130) Versus Standard (SBP < 145) Ambulatory BP Control on White Matter Hyperintensities and Cerebrovascular Outcomes in 199 Older Age Hypertensives (Mean Age 80.5, F/u 3.5 Years)

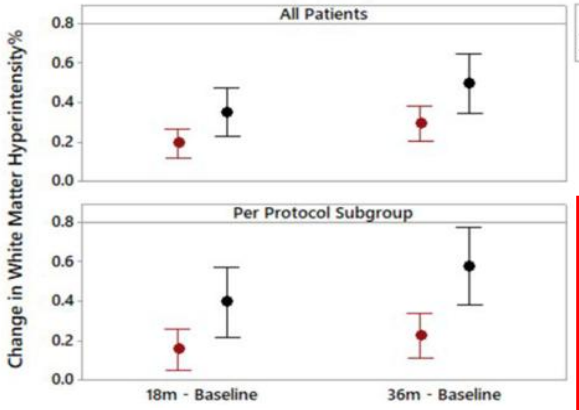


Figure 3. Changes from baseline at 18 and 36 months in white matter hyperintensity volumes corrected for intracranial cavity size by treatment assignment.

Conclusion:

Intensive lowering of ambulatory BP in older patients with hypertension was associated with a reduction in accrual of subcortical white matter disease.
Over periods > 3 years, a reduction in the accumulation of white matter disease may be a factor in conserving cognitive function.

White W.B. et al. *Circulation* Vol 140, Is 20 Nov 12, 2019. pages 1625-1635., 2020

94

nature medicine

Article https://doi.org/10.1038/s41591-025-03616-8

Blood pressure reduction and all-cause dementia in people with uncontrolled hypertension: an open-label, blinded-endpoint, cluster-randomized trial

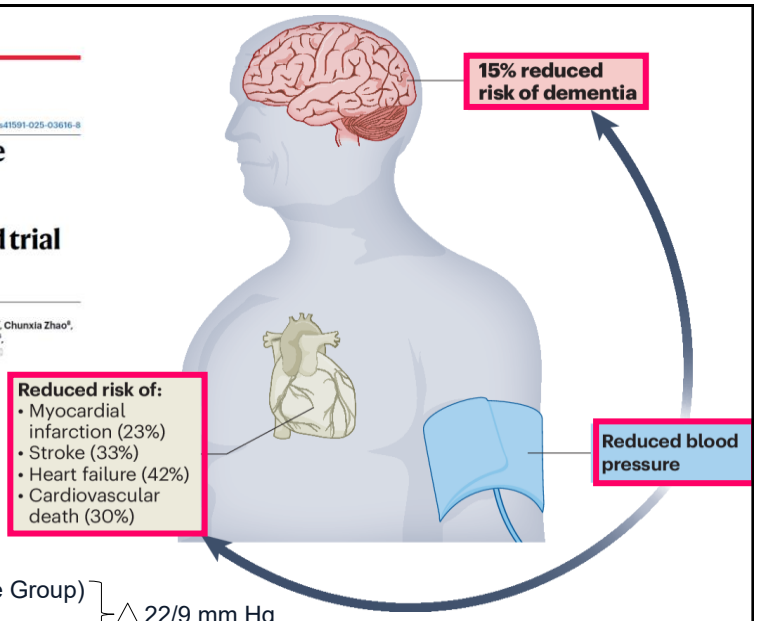
Received: 6 July 2024
Accepted: 26 February 2025
Published online: 21 April 2025

Jiang He[1,2,3,4,11], Chuansheng Zhao[5,11], Shanshan Zhong[5,11], Nanxiang Ouyang[4,11], Guozhe Sun[4,11], Lixia Qiao[4,11], Ruihai Yang[2], Chunxia Zhao[6], Huayan Liu[5], Weiyu Teng[5], Xu Liu[5], Chang Wang[6], Songyue Liu[6], Chung-Shiuan Chen[7], Jeff D. Williamson[10] & Yingxian Sun[4,8]

China Rural Hypertension Control Project Phase-3 (CRHCP-3)

N=33,995 aged ≥40 years, 60% female
Uncontrolled HTN
326 Rural Chinese villages over 4 years

156/88 mm Hg → 149/81 mm Hg (Usual Care Group)
156/88 mm Hg → 127/72 mm Hg (Intervention Group)
△ 22/9 mm Hg



Coresh J., et al; Targeting Blood Pressure to Protect the Brain. Nature Med. 2025 Jun;31(6):1757-1758. (Editorial)
He Jiang, et al; Blood pressure reduction and all-cause dementia in people with uncontrolled hypertension. Nature Med. 2025 Jun;31(6):2054-2061.

95

2025 HTN Guideline: Treating Hypertension Can Prevent Cognitive Impairment and Dementia

1: Strong (Benefit >>> Risk)
IIa: Moderate (Benefit >> Risk) certainty is reasonable/useful/effective
IIb: Weak (Benefit ≥ Risk), may/might be considered, may/might be reasonable

Recommendation for Prevention of Mild Cognitive Impairment and Dementia		
COR	LOE	Recommendation
1	A	In adults with hypertension, a goal of <130 mm Hg SBP is recommended to prevent mild cognitive impairment and dementia.

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. Published ahead of print August 14, 2025, available at: *Circulation*. https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356 And *Jnl of the Am Coll of Card*, https://www.jacc.org/doi/10.1016/j.jacc.2025.05.007

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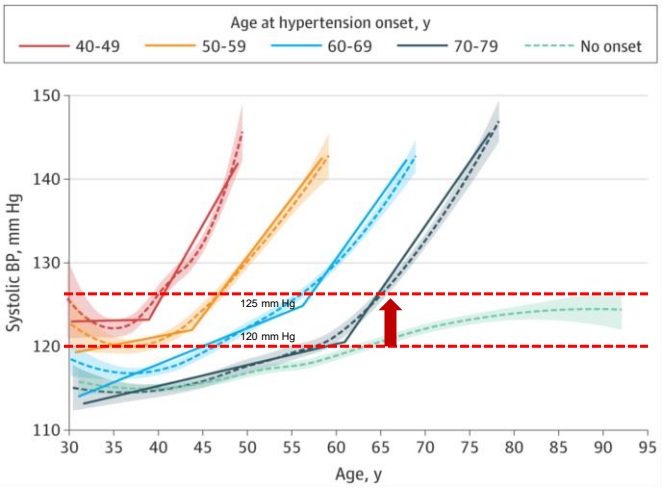
When Should We Begin to Treat HTN to Prevent Vascular Dementia?

97

BP Trajectories and Eventual HTN-Framingham

- Observed BP trajectories preceding development of Hypertension in 1252 (mean age 35, 63% women) participants of the Framingham Heart Study Original Cohort.
- Each participant had 28 serial exams between 1948 and 2005.
- Achieving a SBP of 125 mm Hg before age 65 destines you for HTN.



Niiranen T. et al. *JAMA Cardiol*. 2018 May 1;3(5):427-431.

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Control HTN Sooner than Later to Best Prevent Vascular Dementia?

99

Summary of HTN in 2025

- Proper measurement of BP is important when treating hypertension.
- Automated Oscillometric Blood Pressure Readings (AOBP) should now be the preferred method for recording BP in routine clinical adult office practice.
- Out of office (Home or Self) BP measurement is a better predictor of CV events than office BP, and home BP is at least as good as a 24-hr ABPM in predicting CV risk.
- Do a spot urine alb/creat and A1C in the initial evaluation of the patient with HTN and consider plasma renin /aldosterone levels sooner in the workup.

100

Summary of HTN 2025 (Con't)

- Patients with HTN, regardless of risk, benefit from Lifestyle Modification (LM) and abstaining from alcohol while striving for stress reduction in their lives.
- A transition to using the PREVENT risk calculator should be adopted.
- For low-risk patients whose PREVENT risk is < 7.5% with a BP < 140/90 mm Hg and no evidence of AODM, CKD, or ASCVD, LM for the first 3-6 months is recommended after which antihypertensive drug therapy should be used to lower BP < 130/80 mm Hg.
- In adults with confirmed hypertension who are at increased risk for CVD, a BP goal of at least <130/80 mm Hg, with encouragement to achieve a BP < 120/80 mm Hg is recommended to reduce the risk of CV events and total mortality.

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Summary of HTN 2025 (Con't)

- The first three drug classes chosen to control BP and reduce CVD should be a thiazide-type diuretic (D), a dihydropyridine CCB, or an ACEi or ARB but not both, and in no specific order.
- Fixed-dose, single-pill combination antihypertensive agents are initially recommended in all patients with Stage 2 HTN ($\geq$ 140/90 mm Hg) and strongly encouraged as initial drug therapy in high-risk stage 1 patients (Prevent Risk Score $\geq$ 7.5%).
- Control BP to < 130/80 mm Hg in life sooner than later to prevent vascular dementia.

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