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

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Disclosure

Consultant: Alnylam (Hypertension); Blue Earth Diagnostics; Corcept; Eli Lilly (SURPASS-CVOT); Idorsia (Hypertension); Mineralys; Novo Nordisk; 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:

1. Know How to Properly Take BP Accurately in the office.
2. Be able to teach patients how to Self-Measure their own BP at home.
3. Understand that Home (Self Measured) or Out of Office BP is a better predictor of CV events than office BP.
4. Be familiar with the most recent meta-analysis suggesting that Home BP is as good as 24-hr ABPM in predicting clinical events.
5. Be familiar with the proper initial laboratory w/up of HTN with some new additions.
6. Be familiar 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. Be familiar with the Lifestyle Changes (Non-Pharmacologic Therapies) that are evidence-based for reducing BP and some of the new suggestions in made in 2025.
8. Understand how to use the new PREVENT™ risk estimator in evaluating the patient with hypertension and what it might mean to our patients.
9. Be familiar with the recommendations for initial antihypertensive drug therapy in addition to Lifestyle Modification in patients with hypertension.
10. Be familiar when to use single-pill fixed-dose combination therapy as initial treatment in patients requiring drug therapy for BP control as a Class I indication.

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American Heart Association.

AMERICAN COLLEGE of CARDIOLOGY

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 Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by American Academy of Physician Associates; American Association of Nurse Practitioners; American College of Clinical Pharmacy; American College of Preventive Medicine; American Geriatrics Society; American Medical Association; American Society of Preventive Cardiology; Association of Black Cardiologists; National Medical Association; Preventive Cardiovascular Nurses Association; and the Society of General Internal Medicine.

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 Journal of the American College of Cardiology, published online ahead of print August 14, 2025. J Am Coll Cardiol. https://www.jacc.org/doi/10.1016/j.jacc.2025.05.007

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Why Are We Committed to Controlling BP?

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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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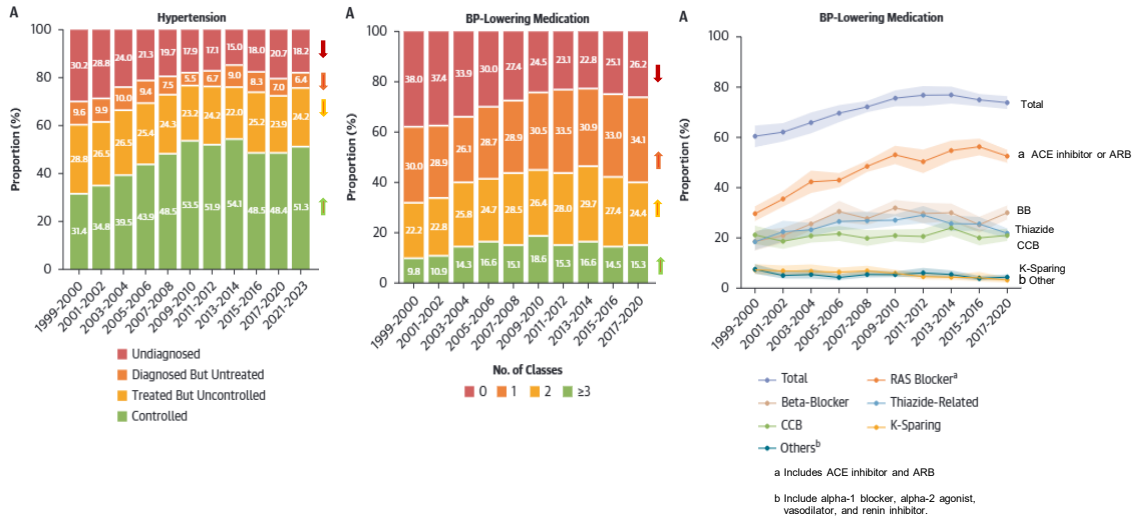
Trends in Prevalence, Rx, and Control of Cardiometabolic Risk Factors Among Adults with HTN in the US, 1999-2023



Lee H-H. et al. Jnl. of the Am. Coll. of Cardiol. Vol 86. No 25, Dec 23/30 2025:2577-2593.

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Patient Case

- 58 year old AA male who feels well comes for his first office visit.
- History: Hypertension for at least 20 years that has always been poorly controlled. Presently on no BP medications.
- He has been tried on several medications but never refills them.
- No hx of smoking, occasional use of alcohol, doesn't abuse the salt shaker but never reads food labels.
- College graduate, he is a middle-school teacher.
- Family history of hypertension but no family or personal hx of premature ASCVD, heart disease, or kidney disease.
- Married with an 18 year old step-son.
- Office BP: 142/92 mm Hg (average of 3), BMI 29 kg/m^2, WC = 39".

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CLINICAL PEARL #1

Make Sure The BP Measured Is Accurate

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"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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Accurate Measurement of BP in the Office

COR	LOE	Recommendation for Accurate Measurement of BP in the Office
I	C-EO	When diagnosing and managing high BP in adults, standardized methods are recommended for the accurate measurement and documentation of in-office BP (Figure 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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American Heart Association.

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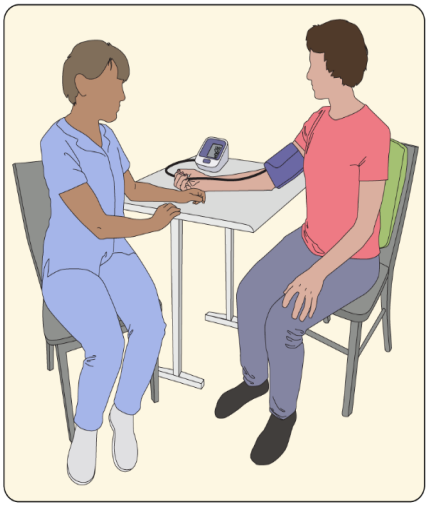
Checklist for Accurate Office Blood Pressure Measurement



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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CLINICAL PEARL #1

Make Sure the BP Measured in the Office Is Accurate

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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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Original Investigation
February 4, 2019
Comparing Automated Office Blood Pressure Readings (AOBP) with Other Methods of Blood Pressure Measurement for Identifying Patients with Possible Hypertension
A Systematic Review and Meta-analysis of 31 articles in 9,279 men and women

- AOBP readings should now be the preferred method for recording BP in routine clinical office practice in the adult to identify patients with possible hypertension, with the diagnosis to be confirmed by 24-hour ABPM or home BP[1, 2]

1. Michael Roerecke, PhD; Janusz Kaczorowski, PhD; Martin G. Myers, MD, FRCPC *JAMA Intern Med.* Published online February 4, 2019. doi:10.1001/jamainternmed.2018.6551
2. Muntner P, Shimbo D, Carey RM et al. Hypertension. 2019 Mar 4 [Epub ahead of print]. Doi:10. 1161/HYP .0000000000000087.

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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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The Promise of Automated Office Blood Pressure (Oscillometric) Monitors

- Upper Arm Reading
- Counts down 5 minutes before the first measurement
- Up to 3 automated sequential stored readings (1 minute apart).
- 'Hide' function that reduces anxiety of patient
- Averages out 2-3 readings.
- Can be performed either unattended or attended
- Used in SPRINT and ACCORD Trials

White, W. B. and Y. A. Anwar (2001). Blood Press Monit 6(2): 107-110.

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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 (Ambulatory or Home-Self measurement) 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 and Home Blood Pressure Monitoring

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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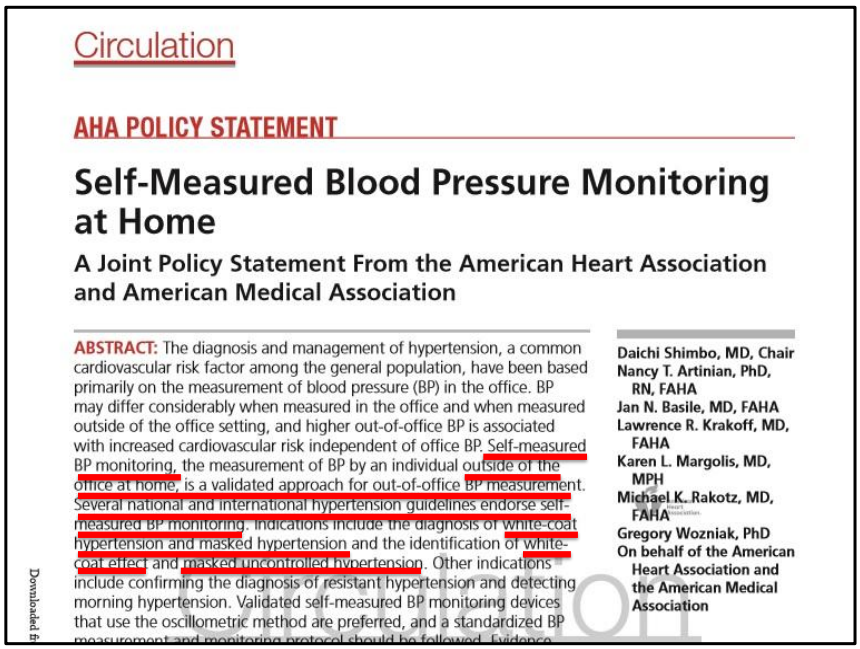
www.validatebp.org for approved home BP devices



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
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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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BP Phenotypes According to Office and Ambulatory (SELF) BP

Phenotype	Office BP	Ambulatory BP (Home BP)
Normotensive	Normal	Normal
White-coat hypertension	Hypertensive	Normal
Ambulatory hypertension	Hypertensive	Hypertensive
Masked hypertension	Normal	Hypertensive

Garovic V. et al. *Hypertension* Feb 2022; *Vol 79 Issue 2;pg e21-e41, Supp S1.*

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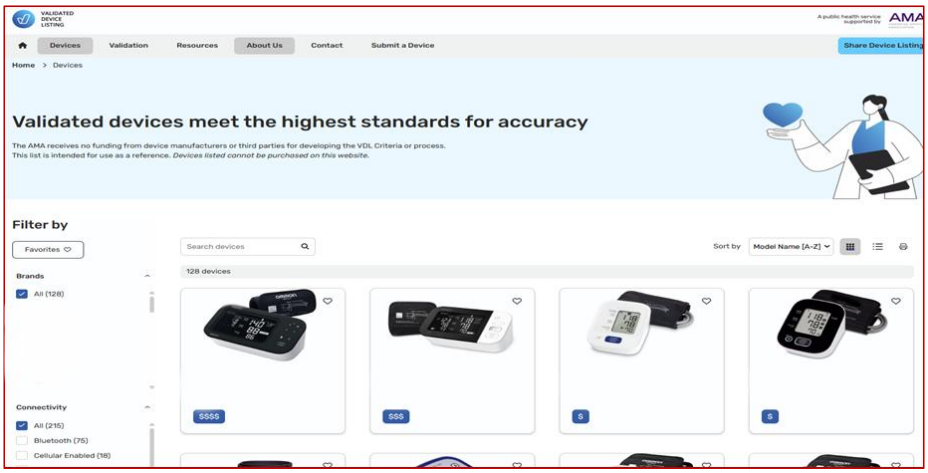
Use a Validated Device!

- https://www.validatebp.org/devices



Jones D et al. Hypertension. 2025.PMID: 40811516.

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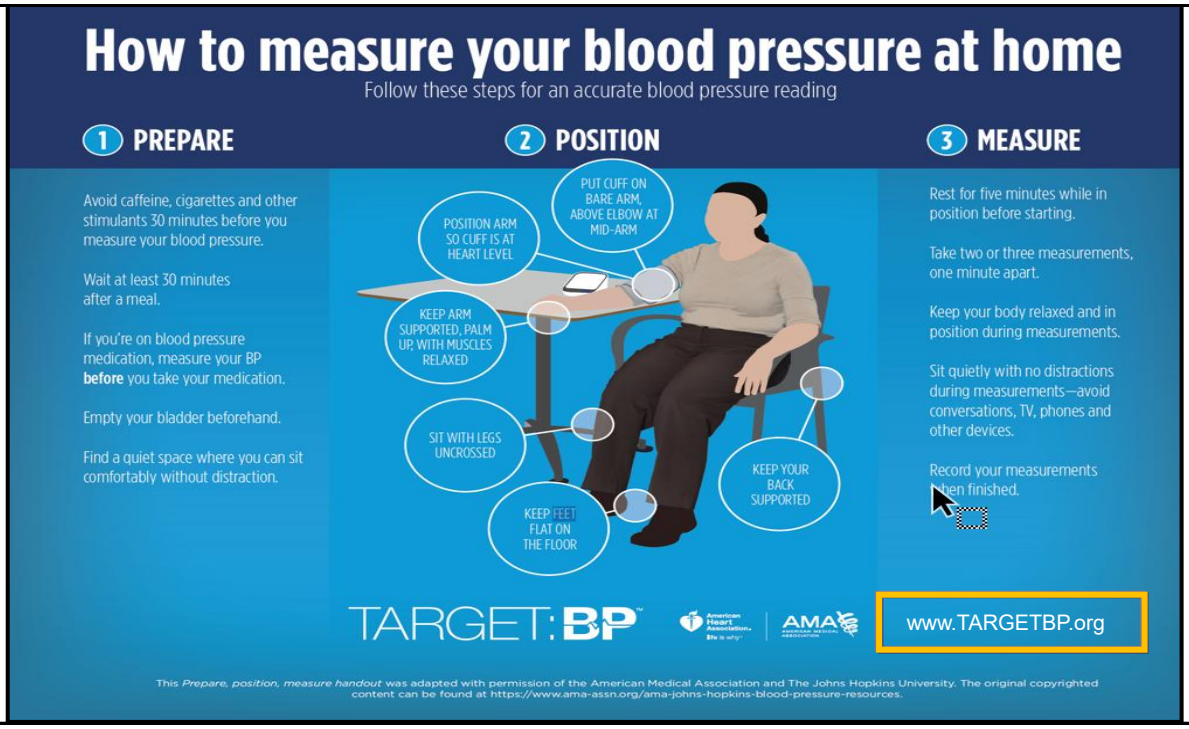

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Centers for Medicare and Medicaid Services (CMS) Incentives for using SMBP (Self or Home Measured BP):

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)

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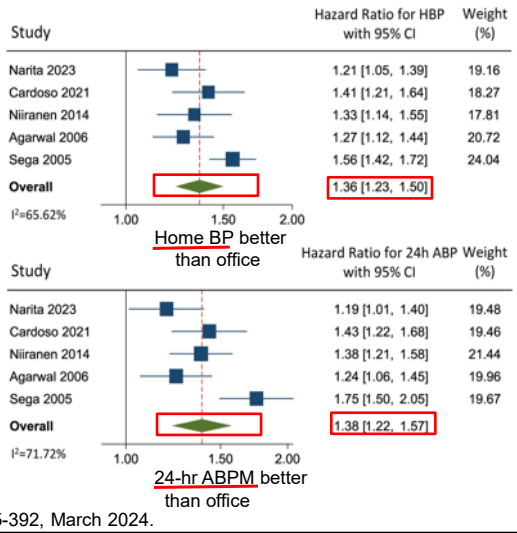
Prognostic Ability of Home BP vs 24-hr ABPM Measurement: *A Systematic Review and Meta-Analysis of Outcome Studies*

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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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

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 the patient.

Will increase the use of telehealth in BP control.

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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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ARS Question # 1

When Seen, Which of the Following Lab Tests Should Not Be Drawn As an Initial Test for Our Patient with HTN?

A. CBC.
B. Basic Metabolic Panel including sodium, potassium, calcium.
C. Total Chol, Trig, HDL-C (Lipid panel).
D. u/a, urine albumin/creatinine, and serum creatinine.
E. Fasting glucose or A1c and TSH.
F. All should be drawn as part of the initial workup.

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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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Basic and Optional Laboratory Tests for Primary Hypertension
2017 ACC-AHA Guideline

Basic testing	Fasting blood glucose* A1C
	Complete blood count
	Lipid profile
	Serum creatinine with eGFR**
	Serum sodium, potassium, calcium*
	Thyroid-stimulating hormone
2025	Urinalysis (used for protein)
	Electrocardiogram
Optional testing	Echocardiogram
	Uric acid
	Urinary alb to creatinine ratio***

* Usually part of a Basic Metabolic Panel although Calcium often ordered separately

** Estimated glomerular filtration rate

*** Cost and lack of insurance coverage in non-diabetics makes this optional

2017 ACC-AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults; *Hypertension; JACC* Nov 2017.

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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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Case (Cont.)

His Labs and EKG at that 2 week appt:

EKG-NSR, LVH, otherwise unremarkable.

Labs-Na++ 136, K+ 4.2, CO2-26, Creatinine 0.9, eGFR 82,
LDL-C 92, Total-C 170, HDL-C 42, TG-180,
urine for microalbumin 14 mg/g creatinine, A1C 5.2%,TSH 1.8,
Ca++ 9.6, AST-18, ALT-16, platelets 220,00, Fib-4=1.19

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Non-invasive Advanced Fibrosis Assessment

Serologic fibrosis risk scores
Fibrosis-4 Index (FIB-4)

$$\text{FIB-4} = \frac{\text{Age (years)} \times \text{AST Level (U/L)}}{\text{Platelet Count } (10^9/L) \times \sqrt{\text{ALT (U/L)}}}$$

FIB-4 ≥ 1.3, needs confirmatory assessment.

If age ≥ 65, then FIB-4 ≥ 2.0 needs confirmatory assessment.

A FIB-4 score < 1.3 has a very high Negative Predictive Value (NPV), often around **90-99%**, effectively ruling out advanced liver fibrosis (F4), with some studies showing NPVs over 98% for this age group using the <1.3 cutoff.

This score indicates a low probability of significant scarring (Stage F3/F4), allowing primary care physicians to avoid specialist referrals, though persistently abnormal liver enzymes might warrant further evaluation.

Rinella et al. *Hepatology*. 77(5):1797-1835, May 2023.

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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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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
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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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In 2025 Blood Pressure Should Be Characterized As:

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg
Severe HTN*	≥180 mm Hg	or	≥120 mm Hg

*** 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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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

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

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

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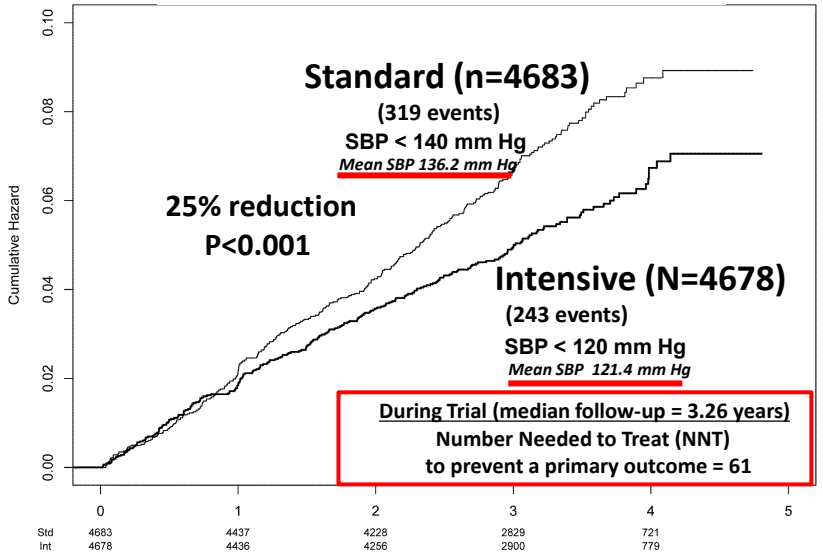
SPRINT Primary Outcome (CVD)

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

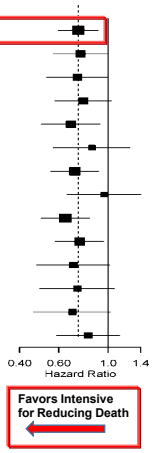
The SPRINT Research Group. N Engl J Med. 2015;373:2103-16

45

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)	

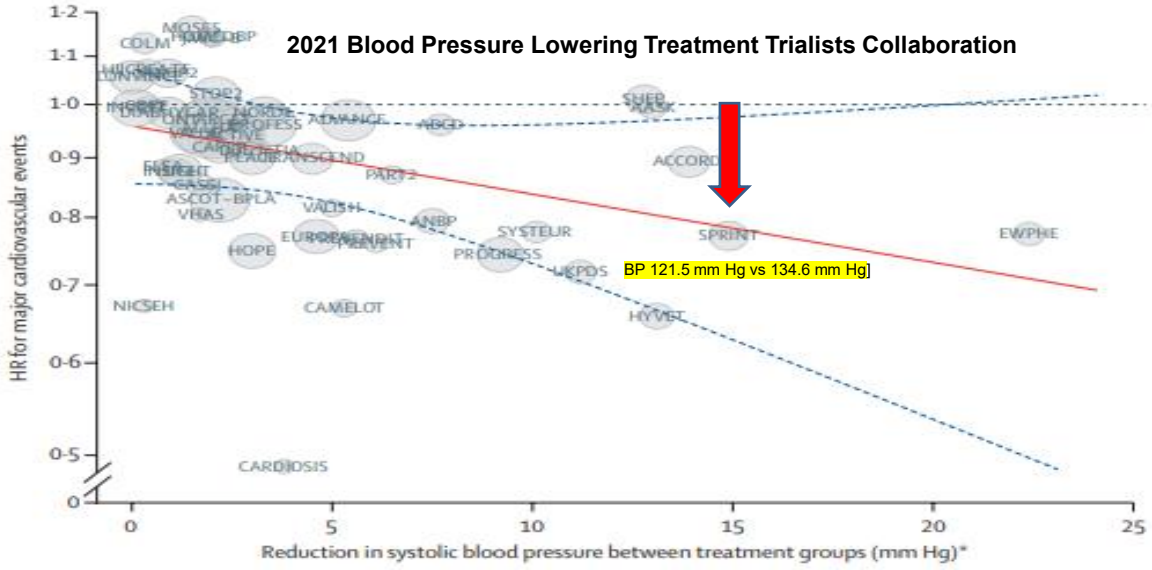


*p=0.34, after Hommel adjustment for multiple comparisons

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

46

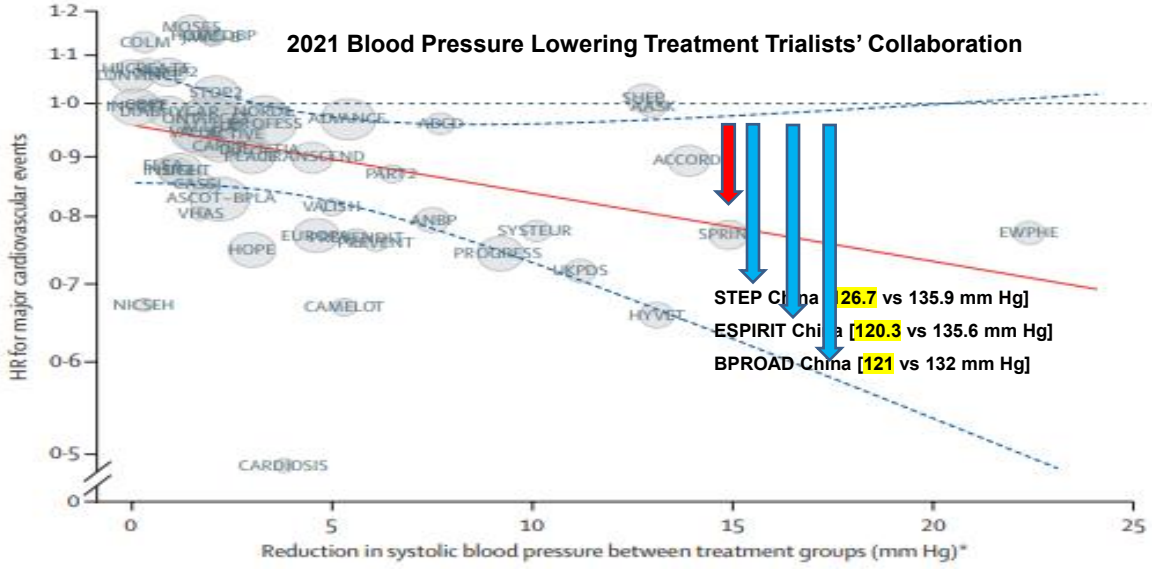
Association Between Intensity of BP Reduction and Relative Rx Effects for Prevention of Major CV Events



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

47

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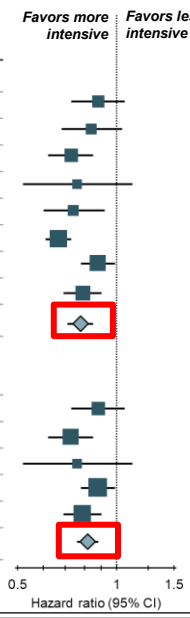
Major CVD Events, Randomization to More vs Less Intensive SBP Lowering

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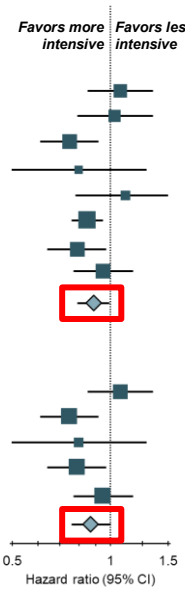
All-Cause Mortality, Randomization to More vs Less Intensive SBP Lowering

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 Guideline:

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.
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.
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	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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Patient Case

- After reviewing his lab tests and EKG and with a shared-decision he agrees to try and lower his Systolic BP to < 130 mm Hg.
- He understands that this will involve both lifestyle modification and antihypertensive medications.

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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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Treatment Starts with Non-Pharmacologic (Lifestyle) Management Each with a 1A Level Of Evidence-2017 ACC/AHA Update

Goal	Nonpharmacological Interventions	Dose	Systolic BP Impact in Hypertension	Systolic BP Impact in Normotension
Weight loss	Weight/ body fat	• Best goal is ideal body weight • Expect about 1 mm Hg for every 1 kg reduction in body weight	-5 mm Hg	-2/3 mm Hg
Healthy diet	DASH [Dietary Approach to Stop Htn] Diet	• Consume a diet rich in fruits, vegetables, whole grains and low-fat dairy products with reduced content of saturated and total fat	-11 mm Hg	-3 mm Hg
Reduced intake of dietary sodium	Dietary sodium	• Optimal goal is <1500 mg/day, most Americans 3400 mg/day • Aim for at least a 1000 mg/day reduction in most adults	-5/6 mm Hg	-2/3 mm Hg
Enhanced intake of dietary potassium	Dietary potassium	• Aim for 3500-5000 mg/day, preferably by consumption of a diet rich in potassium	-4/5 mm Hg	-2 mm Hg
Physical activity	Aerobic	• 90-150 min/week • 65%-75% heart rate reserve	-5/8 mm Hg	-2/4 mm Hg
Physical activity	Dynamic Resistance	• 90-150 min/week; 50%-80% 1 rep maximum • 6 exercises, 3 sets/exercise, 10 repetitions/set	-4 mm Hg	-2 mm Hg
Physical activity	Isometric Resistance	• 4 x 2 min (hand grip), 1 min rest between exercises, 30%-40% maximum voluntary contraction, 3 sessions/week; 8-10 weeks	-5 mm Hg	-4 mm Hg
Moderation of alcohol intake	Alcohol Consumption	• ≤1 drink daily for women Drink= 5 oz of wine, 12 oz of beer • ≤2 drinks daily for men 1 oz 100 proof or 1.5 oz of 70 proof	-4 mm Hg	-3 mm Hg

A

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Treatment Starts with Non-Pharmacologic (Lifestyle) Management Each with a 1A Level Of Evidence-2017 ACC/AHA Update

Goal	Nonpharmacological Interventions	Dose	Systolic BP Impact in Hypertension	Systolic BP Impact in Normotension
Weight loss	Weight/ body fat	• Best goal is ideal body weight • Expect about 1 mm Hg for every 1 kg reduction in body weight	-5 mm Hg	-2/3 mm Hg
Healthy diet	DASH [Dietary Approach to Stop Htn] Diet	• Consume a diet rich in fruits, vegetables, whole grains and low-fat dairy products with reduced content of saturated and total fat	-11 mm Hg	-3 mm Hg
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Physical activity	Aerobic	• 90-150 min/week • 65%-75% heart rate reserve	-5/8 mm Hg	-2/4 mm Hg
Physical activity	Dynamic Resistance	• 90-150 min/week; 50%-80% 1 rep maximum • 6 exercises, 3 sets/exercise, 10 repetitions/set	-4 mm Hg	-2 mm Hg
Physical activity	Isometric Resistance	• 4 x 2 min (hand grip), 1 min rest between exercises, 30%-40% maximum voluntary contraction, 3 sessions/week, 8-10 weeks	-5 mm Hg	-4 mm Hg
Moderation of alcohol intake	Alcohol Consumption	• ≤1 drink daily for women • ≤2 drinks daily for men Drink= 5 oz of wine, 12 oz of beer 1 oz 100 proof or 1.5 oz of 70 proof	-4 mm Hg	-3 mm Hg

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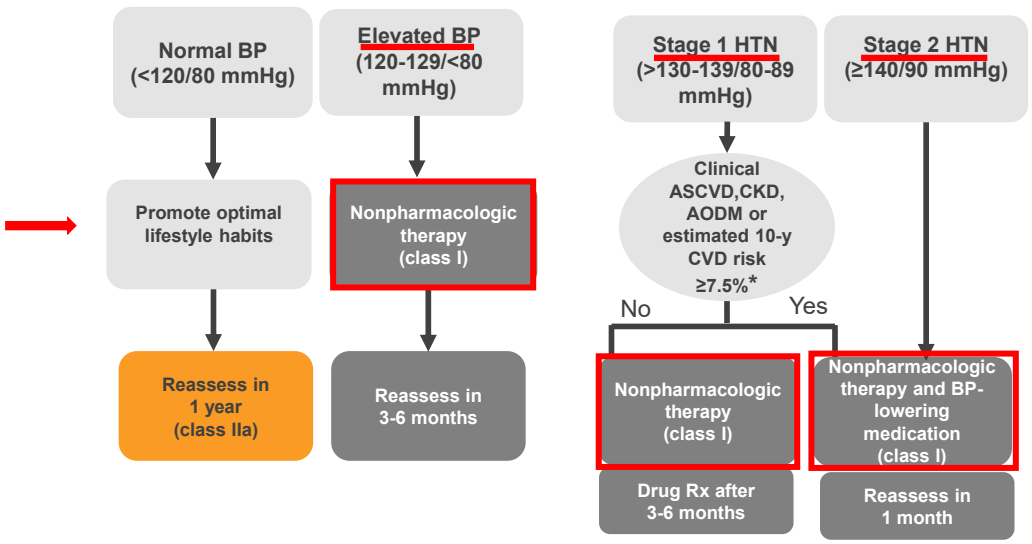
Algorithm 2025: BP Thresholds and Recommendations for Treatment and Follow-Up



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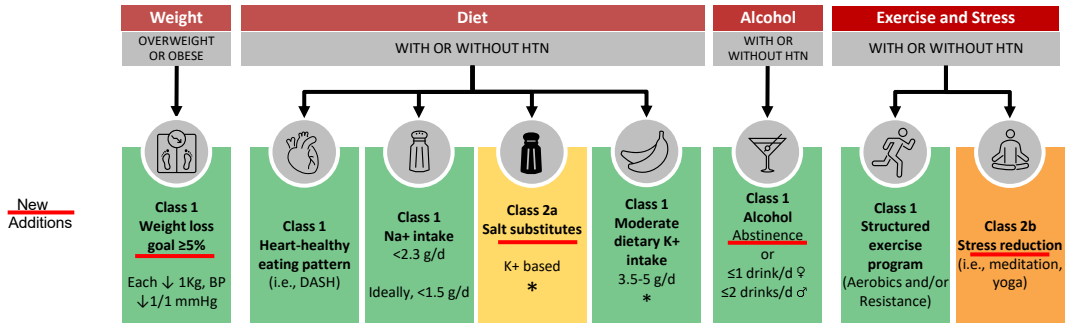
Treatment Starts with Non-Pharmacologic (Lifestyle) and Psychosocial Approaches

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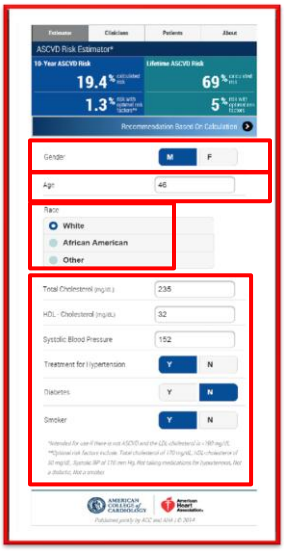
2013 ACC/AHA ASCVD Risk Estimator Based on the Pooled Cohort Equation

Optimal risk factors
- → *Age, sex, race,*
- → *TC*
- → *HDL-C*
- → *LDL-C*
- → *Systolic BP mmHg*
- → *Diastolic BP mm Hg*
- → *Not taking medications for HTN*
- → *Not a diabetic*
- → *Not a smoker*
- → *On a statin, on ASA*



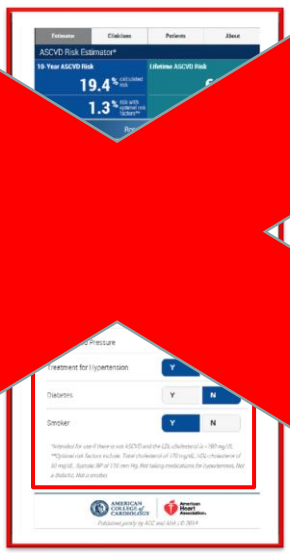
10-year risk of non-fatal MI, coronary heart disease death, and fatal and non-fatal stroke

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

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

59

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



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

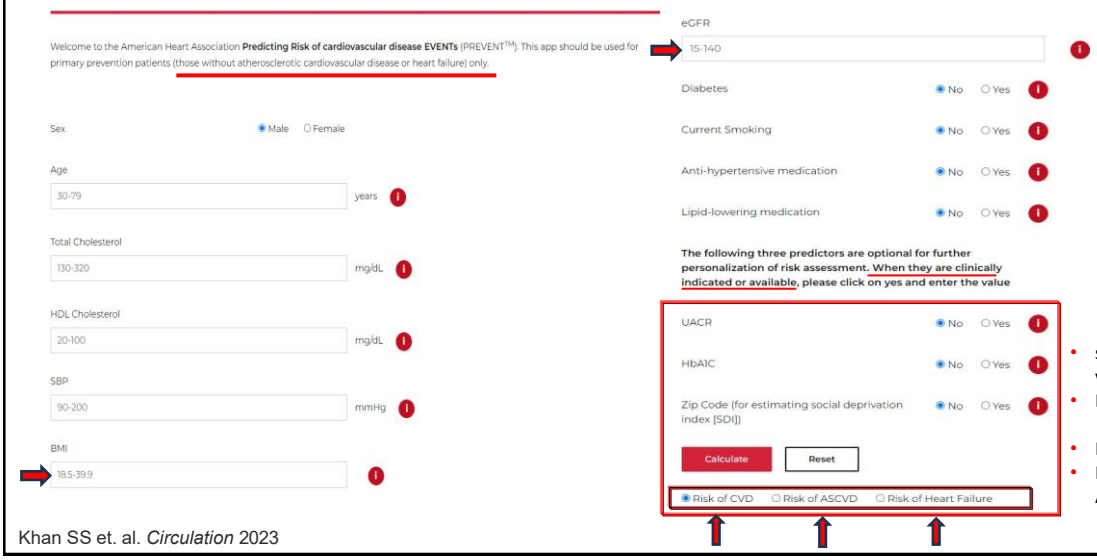
Goff DC, et al. *J Am Coll Cardiol* 2014;63:2935-59

60

NEW PARADIGM FOR CVD RISK: PREVENT™

https://professional.heart.org/prev

AHA Predicting Risk of cvd EVENTs Calculator



Differences PREVENT (2023) vs PCE (2013)

- separate 10- and 30-year risk estimates
- Broader age range: 30-79 vs 40-79
- Race neutral
- Few Hispanic and Asian

Khan SS et. al. *Circulation* 2023

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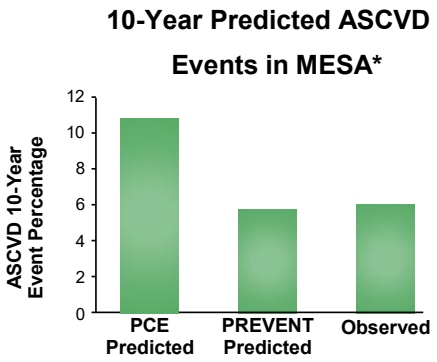
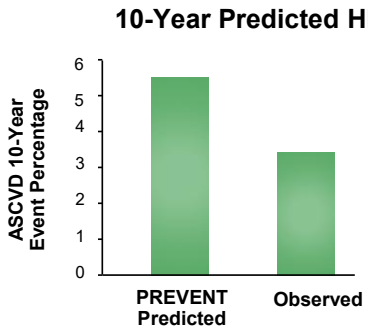
PREVENT (2023) vs Pooled-Cohort Equation (PCE-2013)





*MESA-Multi-Ethnic Study of Atherosclerosis

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

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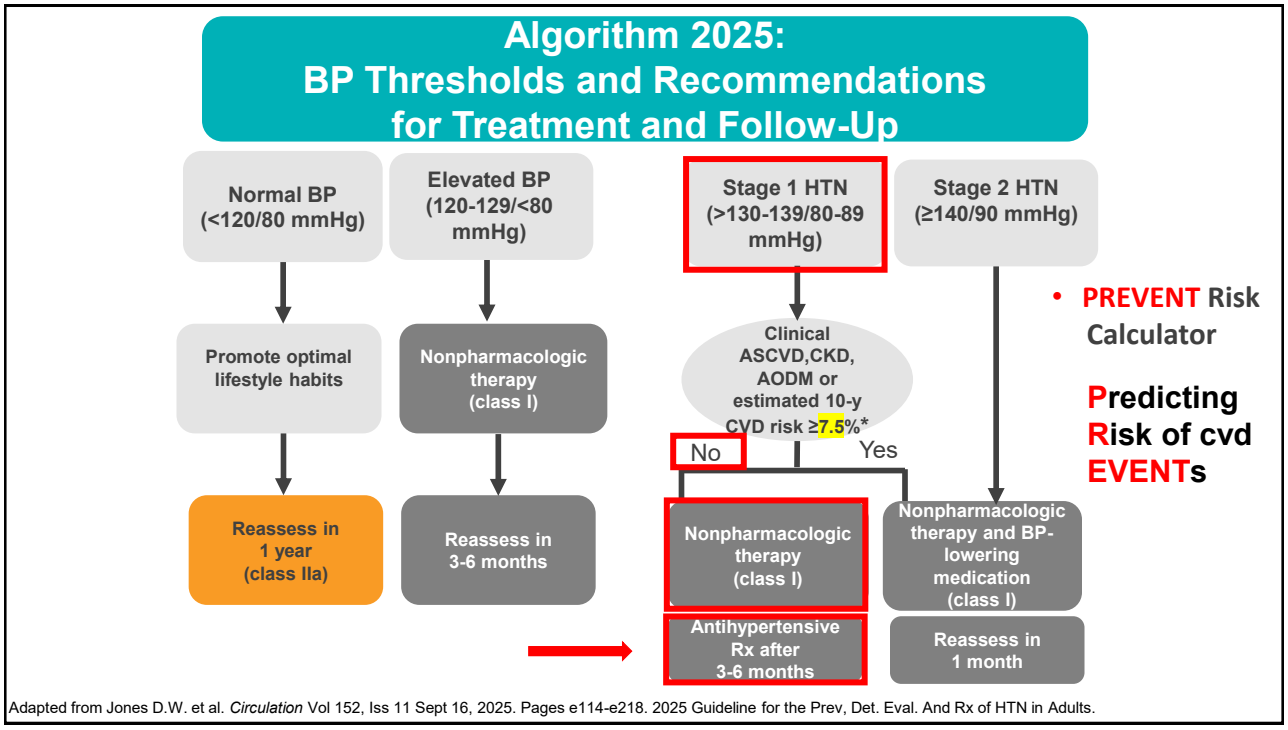

Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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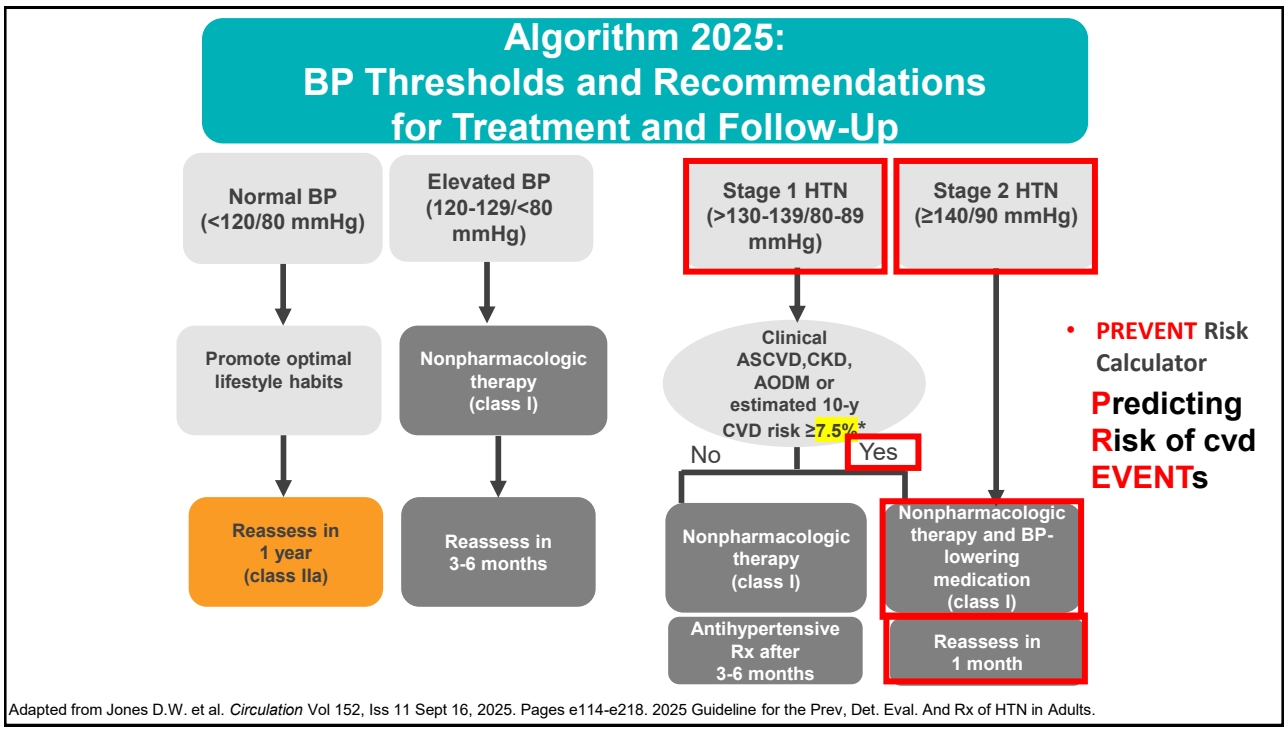

Adapted from Jones D.W. et al. *Circulation* Vol 152, Iss 11 Sept 16, 2025. Pages e114-e218. 2025 Guideline for the Prev, Det. Eval. And Rx of HTN in Adults.

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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 ACE or an ARB but not both to prevent CVD.

65

Initial Medication Selection for Treatment of Primary Hypertension

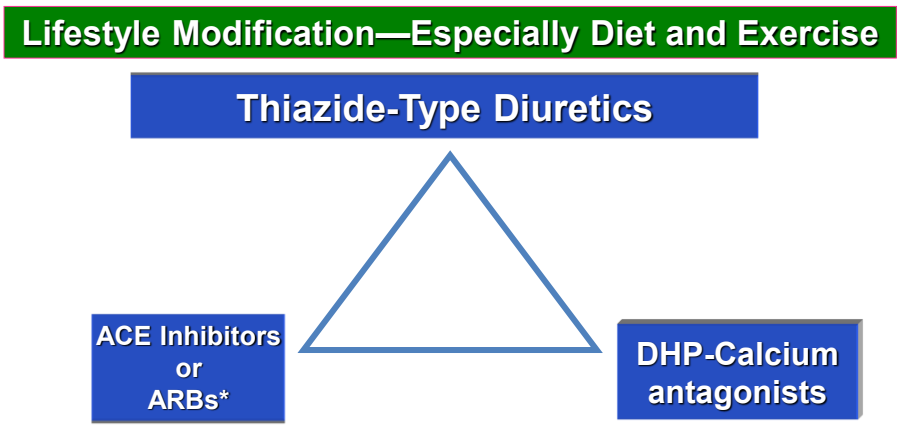
Recommendation for Initial Medication Selection for Treatment of Primary Hypertension

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.

66

Initial Medications for the Management of Hypertension



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

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Patient Case (Cont.)

- At that 2 week visit, his home BP's were taken twice, a minute apart, in the am and pm for the week before his appt, with the first day not averaged
- His BPs showed no difference between BP's after first getting up and BP's at bedtime. BP weekly average = 144/96 mm Hg.
- Meds: still on none.
- Exam-unremarkable except for arteriolar narrowing on his eyeground exam.
- He is reminded of non-pharmacologic measures (read labels, low sodium, increase fruits and vegetables, stop alcohol.

ARS Question # 2
What Would You Do About Antihypertensive Medication at This Time?

A. Just continue with Lifestyle Modification (LM) for at least another month.
B. Continue LM and add Hctz 12.5 mg qam.
C. Continue LM and add Chlorthalidone 12.5 mg qam.
D. Continue LM and add Amlodipine 5 mg qam.
E. Continue LM and add Telmisartan 40 mg qam.
F. Continue LM and add Benazepril 20/amlodipine 5 (generic Lotrel).

CONTINUING EDUCATION COMPANY

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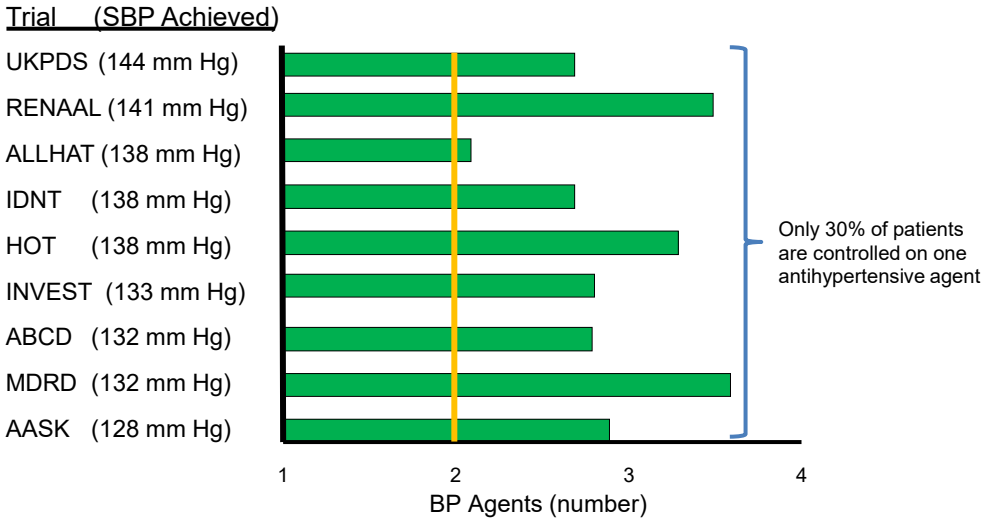
CLINICAL PEARL #10

-Fixed-dose, single-pill combination antihypertensive agents are strongly encouraged as initial therapy in those with Stage 2 Hypertension (> 140/90 mm Hg)-[COR I].

70

Combination Therapy Is Often Needed to Achieve Target SBP Goals



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

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Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

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	B-R	1. In adults with stage 2 hypertension (SBP ≥140 mm Hg and DBP ≥90 mm Hg), initiation of antihypertensive drug therapy with 2 first-line agents of different classes, ideally in a single-pill combination (SPC), is recommended to improve BP control and adherence.
2a	C-EO	2. In adults with stage 1 hypertension (SBP 130 to 139 mm Hg and DBP 80 to 89 mm Hg), initiation of antihypertensive drug therapy with a single first-line antihypertensive drug is reasonable, with dosage titration and sequential addition of other agents as needed to achieve BP control.

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Jones D.W. et al. 2025 AHA/ACC Guideline for the Prevention, Detection, Evaluation, and Management of High BP in Adults. Circulation Vol 152, Issue 11 Sept 16, 2025. Pages e114-e218.

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Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

You will use 2 or More Antihypertensive Agents in Most Patients Anyway

Stage 1 HTN*

SBP 130-139 mmHg
DBP 80-89 mmHg

Initiation of a single 1st line agent is reasonable.

Dosing titration and sequential addition of other agents as needed.

Some high-risk patients with stage 1 HTN*.

***-Non-Hispanic black adults**
-ASCVD Risk > 7.5% by PREVENT

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

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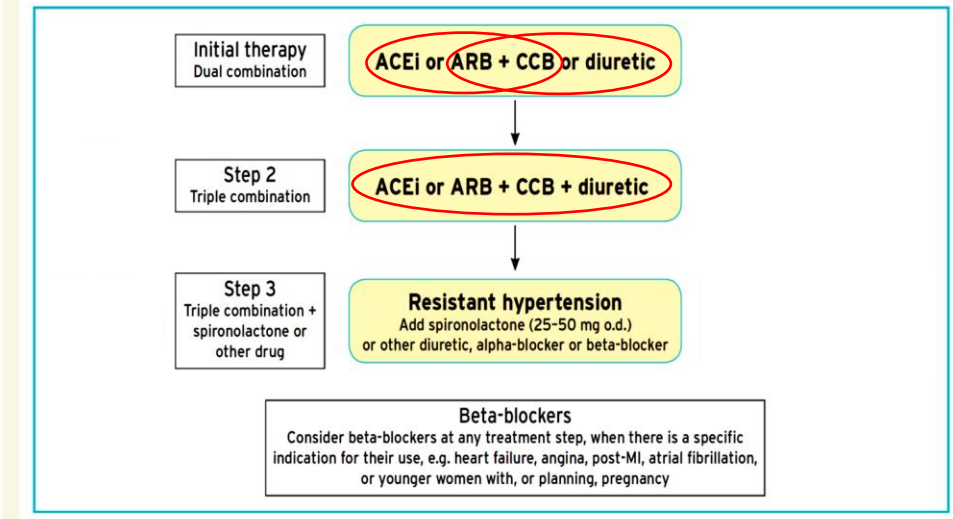
Ideal Triple Coverage-ESC/ESH 2018 and ESC 2024



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

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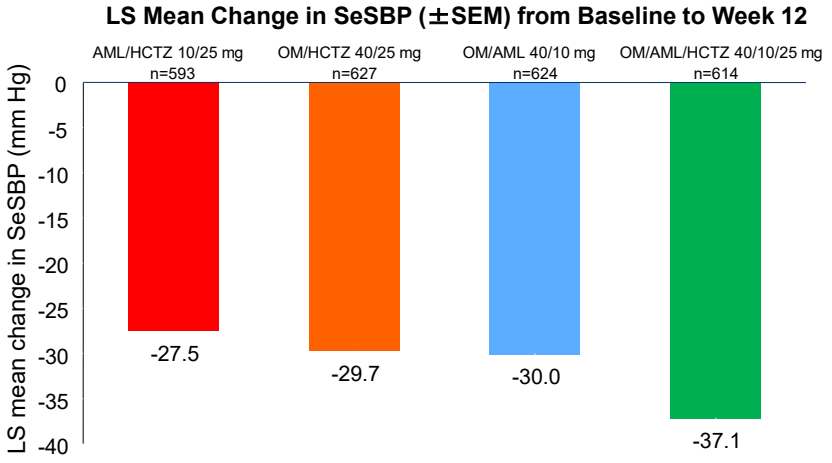
Dual vs Triple Fixed-Dose Combination in Lowering SBP



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.

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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

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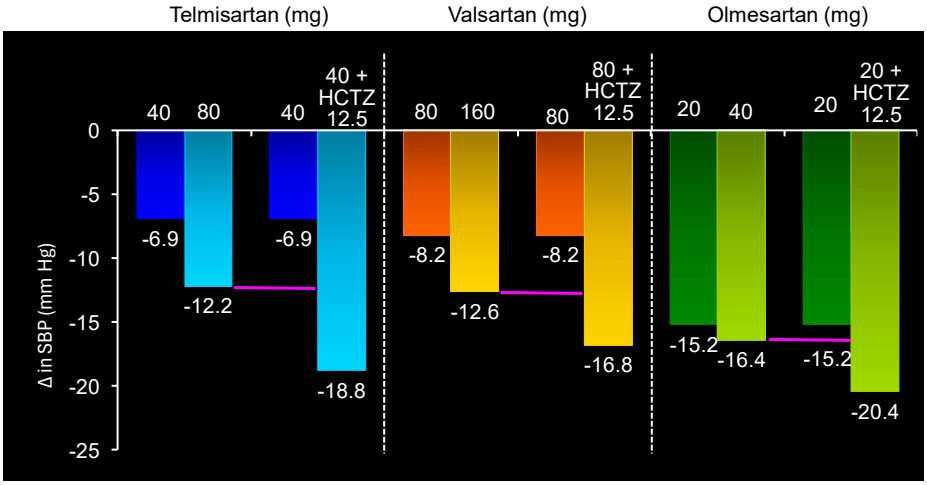
Efficacy: Up-Titration of ARB vs ARB/HCTZ



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.

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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

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Using Single-pill Combination Medications vs A Stepped Care Approach as Initial Rx

Starting with SPCM (Preferred Approach)					
Dual SPCM		**Switch to Triple SPCM**		**Add New Medication**	
2 medications x 1/2 standard dose		3 medications x 1/2 standard dose		4 medications x 1/2 standard dose	
SBP reduction	**CVD risk reduction**	**SBP reduction**	**CVD risk reduction**	**SBP reduction**	**CVD risk reduction**
13.3 mmHg	26%	19.9 mmHg	36%	25.5 mmHg	43%

Step 1 BP ≥130/80 mmHg → **Step 2** If BP remains ≥130/80 mmHg → **Step 3** If BP remains ≥130/80 mmHg

Stepped-Care (Alternative Approach)					
Monotherapy		**Titrate Dose**		**Add New Medication**	
1 medication x 1/2 standard dose		1 medication x standard dose		1 medication x 1/2 standard dose + 1 medication x standard dose	
SBP reduction	**CVD risk reduction**	**SBP reduction**	**CVD risk reduction**	**SBP reduction**	**CVD risk reduction**
6.7 mmHg	14%	8.7 mmHg	18%	15.4 mmHg	29%

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

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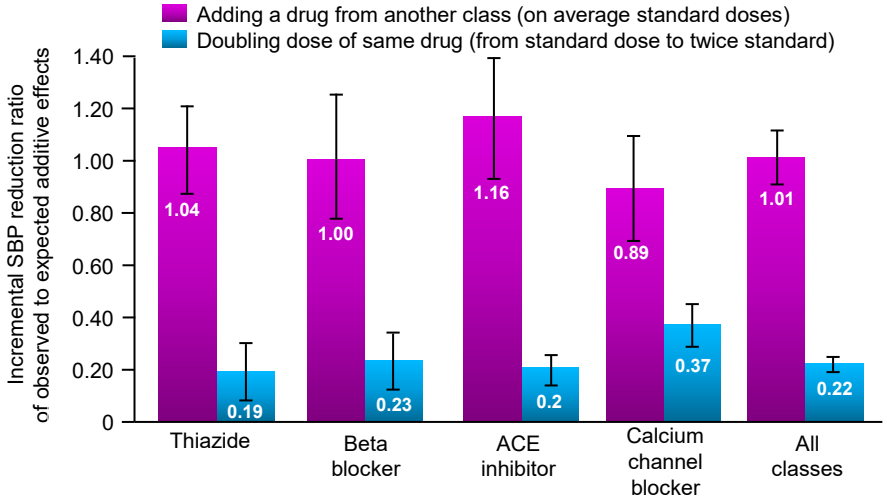
Combining Drugs from Different Classes Is Approximately 5 Times More Effective in Lowering BP than Doubling the Dose of 1 Drug



Wald DS et al. *Am J Med.* 2009;122:290-300.

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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 9/30/25

"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

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 9/30//25, Sam's Club

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Available Single-Pill Antihypertensive Combinations in Canada and Associated Costs

Single-pill combinations	Cost for 30 days of combination pills, $Can*	Cost for 30 days of the individual drug equivalents, $Can*
ARB + thiazide or thiazide-like diuretic		
Irbesartan–hydrochlorothiazide	6.55	7.31
Telmisartan–hydrochlorothiazide	6.29	6.95
Olmesartan–hydrochlorothiazide	8.12	8.76
Candesartan–hydrochlorothiazide	7.33	7.25
ACEI + thiazide or thiazide-like diuretic		
Lisinopril–hydrochlorothiazide	7.51	6.31
Perindopril–indapamide	8.58	12.04
ARB + long-acting dihydropyridine CCB		
Telmisartan–amlodipine	16.42	12.47

Note: ACEI = angiotensin-converting enzyme inhibitor, ARB = angiotensin II receptor blocker, CCB = calcium channel blocker.
*Drug costs obtained from https://www.ramq.gouv.qc.ca/fr, https://www.formulary.health.gov.on.ca/formulary/, and https://pharmacareformularysearch.gov.bc.ca/ (accessed 2025 Feb. 5).

Goupil R. et al. Canadian Medical Assoc Journal 2025 May 26;197:E549-564.doi:10.1403/cmaj.241770

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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.)

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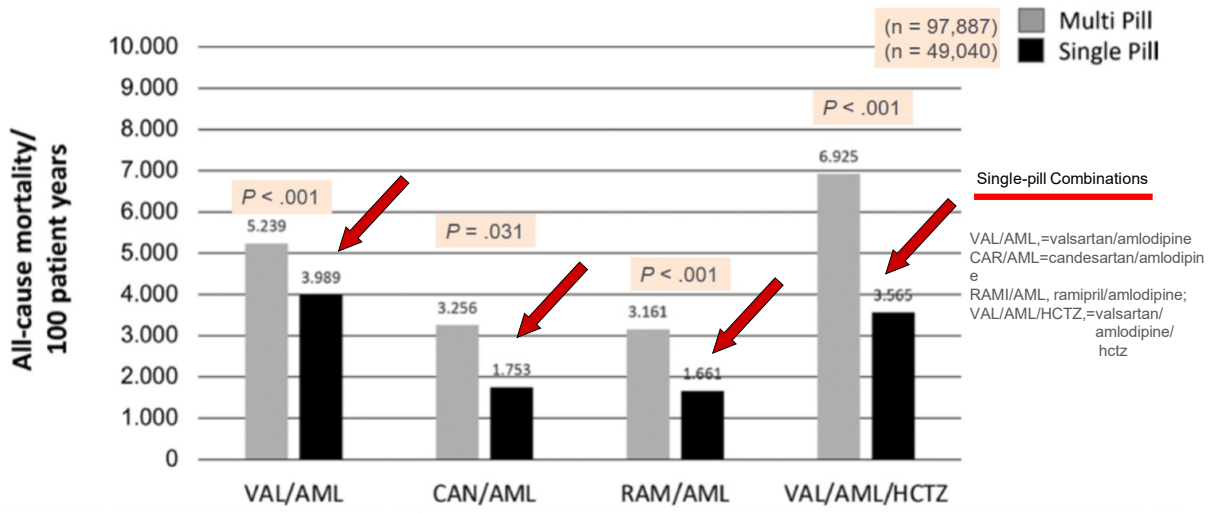
All-Cause Mortality in Single-Pill Combination vs Same Meds in Multi-pill Combination Groups: The START Study

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.

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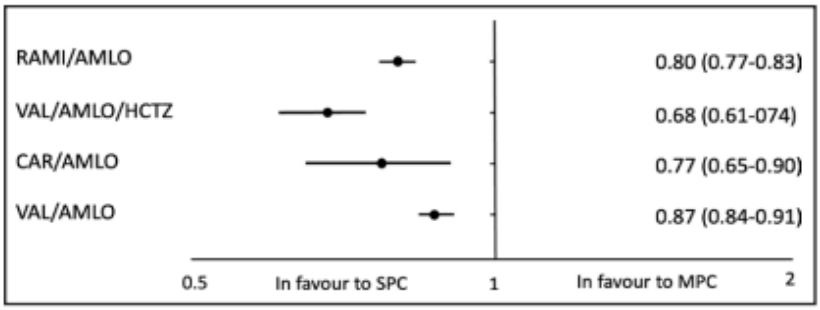
Reduced All-Cause Hospitalization and All-Cause Mortality in the SPC vs MPC Groups in Patients w HTN

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.

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Case (Cont.)

- He returns in 1 month for follow-up.
- Meds: He brings his benazepril/hctz bottle which he states he is taking.
- Home BPs taken for the week before his return now average 128/82 mm Hg.
- We are happy with his BP and he is instructed to call the office if his home BPs are not < 130/80 until his appt in 3 months.
- Based on his BPs at home over the next 2 months we may increase his single pill fixed-dose combination agent to 40/25 mg in an effort to get closer to < 120/80 mm Hg or continue what he is doing at 20 benazepril/12.5 amlodipine mg daily in a shared – decision between the patient and myself.

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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.
- Out of Office (Home or Self) measurement should be used to both confirm the diagnosis of hypertension and for decisions on how best to treat hypertension, not office BP.
- 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.

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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 ACE or ARB but not both, and in no specific order.**
- ***B*-blockers do not protect against stroke and are not recommended as one of the first 3 drug classes to reduce CVD for the control of BP unless there is a specific indication for a *B*-Blocker.**
- **Fixed-dose, single-pill combination antihypertensive agents are strongly encouraged as initial drug therapy in high-risk stage 1 patients (Prevent Risk Score ≥ 7.5%) and initially in all patients with Stage 2 HTN (≥ 140/90 mm Hg).**