

The New Hypertension Guidelines

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Disclosure

- Joseph Saseen reports no conflicts of interest

Learning Objectives

- Compare guidelines the 2017 ACC-AHA hypertension guidelines with the ADA Standards of Medical Care
- Evaluate recent evidence that influences the selection of BP goals for individual patients.
- Recommend appropriate treatment regimens for hypertension on current guidelines.

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High Blood Pressure in Adults: Guideline For the Prevention, Detection, Evaluation and Management

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<https://www.acc.org/guidelines/hub/high-blood-pressure>

2017 ACC-AHA Hypertension Guideline

Class of Recommendation (COR) - Strength

Class I (Strong) • Is recommended, is indicated, should be performed	Benefit >>> Risk
Class IIa (Moderate) • Is reasonable, can be useful	Benefit >> Risk
Class IIb (Weak) • May/might be reasonable/considered, effectiveness unknown	Benefit ≥ Risk
Class III: No Benefit (Moderate) • Is not recommended, is not useful	Benefit = Risk
Class III: Harm (Strong) • Potentially harmful, causes harm	Benefit < Risk

Level of Evidence (LOE) - Quality

Level A • High-quality evidence from > one randomized clinical trial (RCT) • Meta-analyses of high-quality RCTs	
Level B-R (Randomized) • Moderate-quality evidence from > one RCT • Meta-analyses of moderate-quality RCTs	
Level B-NR (Nonrandomized) • Moderate-quality from nonrandomized studies, observational, registry	
Level C-D (Limited Data)	
Level C-EO (Expert Opinion)	

Whelton PK, et al. Hypertension. 2017 [Epub ahead of print].

2017 ACC-AHA: BP Categories

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

If SBP and DBP in 2 different categories, apply the higher category. Based on an average of ≥2 properly measured values obtained on ≥2 occasions.
DBP, diastolic blood pressure; and SBP, systolic blood pressure.

Whelton PK, et al. Hypertension. 2017 [Epub ahead of print].

2017 ACC-AHA: BP Measurements

COR	LOE	Accurate Measurement of BP
I	C-EO	For diagnosis and management, proper methods are recommended for accurate measurement and documentation of BP
COR	LOE	Out-of-Office and Self-Monitoring of BP
I	A ^{SR}	Out-of-office BP measurements to confirm diagnosis and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

A 44-year-old man with type 2 diabetes has his BP is measured in clinic as 144/90 mm Hg. When repeated 1 minute later is it about the same. He states that is always been in the 120's/70's. Which of the following are possible reasons for a falsely elevated clinic measurement?

- A. The patient sat for only 2 minutes before the measurement
- B. The cuff was placed on his bare skin
- C. The cuff size was too large for his arm
- D. The patient had a full bladder (urine) during measurement
- E. The patients arm was rested on a table during measurement

Accurate Measurement of BP

Step 1: Properly prepare the patient	<ul style="list-style-type: none"> • Have patient relax, sitting (feet on floor, back supported) for >5 min • Patient should avoid caffeine, exercise, and smoking for at least 30 min • Ensure patient has emptied his/her bladder • Neither patient nor observer should talk during rest period or measurement • Remove all clothing covering the location of cuff placement • Measurements while patient sitting/lying on examining table do not fulfill criteria
Step 2: Use proper technique	<ul style="list-style-type: none"> • Use a validated device and ensure that the device is calibrated periodically • Support the patient's arm • Middle of the cuff on upper arm at the level of the right atrium (midpoint) • Use the correct cuff size • Either the stethoscope diaphragm or bell may be used for auscultatory readings

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

2017 ACC-AHA Hypertension Guideline

Goal BP of <130/80 mm Hg for most

- Different evidence-based rankings based on ASCVD risk and/or presence of other comorbidities
- Applies to healthier older patients ≥ 65 yr

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

How evidence-based is this?

Systolic Blood Pressure Intervention Trial (SPRINT)

- Multicenter, randomized, controlled trial
- 9,361 patients with hypertension randomized open-label to:
 - Intensive treatment: SBP <120 mm Hg
 - Standard treatment: SBP <140 mm Hg
- Primary outcome: first the occurrence of a MI, acute coronary syndrome, stroke, heart failure, or CV disease death

Ambrosius WT, et al. Clin Trials. 2014;11(5):532-546.

SPRINT: Study Criteria

Inclusion

- ≥ 50 years old
- SBP 130–180 mm Hg
- Increased risk for ASCVD based on additional criteria

Exclusion

- Secondary hypertension
- Diabetes, previous stroke, or CV event within 3 months
- Symptomatic heart failure within 6 months or EF < 35%
- Proteinuria (> 1 g/day), polycystic kidney disease, glomerulonephritis, eGFR < 20 mL/min/1.73m² or end-stage renal disease

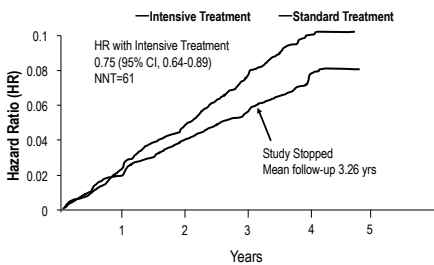
Ambrosius WT, et al. Clin Trials. 2014;11(5):532-546.

SPRINT: Patient Characteristics

	Intensive Treatment N=4678	Standard Treatment N=4683
Baseline Characteristics		
• Mean SBP (mm Hg)	139.7	139.7
• Women (%)	36.0	35.2
• Mean Age (yr)	67.9	67.9
• Age ≥75 yr (%)	28.2	28.2
• CKD (%)	28.5	28.1
• Black/Hispanic	29.5/10.8	30.4/10.3
Results:		
• Mean SBP at 1 year (mm Hg)	121.4	136.2
• Mean no. BP medications	2.8	1.8

Sprint Research Group, et al. N Engl J Med. 2015;373(22):2103-2106.

SPRINT: Primary Endpoint Result



The SPRINT Research Group. N Engl J Med. 2015;373(22):2103-2106.

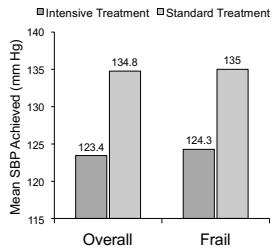
SPRINT Safety Outcomes

Outcome	Intensive Treatment N=4678; no. (%)	Standard Treatment N=4683; no. (%)	Hazard Ratio (P-Value)
Serious Adverse Event ‡	1793 (38.3)	1736 (37.1)	1.04 (0.25)
Individual Serious Adverse Event			
• Hypotension	110 (2.4)	66 (1.4)	1.67 (0.001)
• Syncope	107 (2.3)	80 (1.7)	1.33 (0.05)
• Electrolyte abnormality	144 (3.1)	107 (2.3)	1.35 (0.02)
• Injurious fall	105 (2.2)	110 (2.3)	0.95 (0.71)
• Acute kidney injury/acute renal failure	191 (4.3)	117 (2.5)	1.66 (<0.001)
Emergency department visit or SAE			
• Hypotension	158 (3.4)	93 (2.0)	1.70 (<0.001)
• Syncope	163 (3.5)	113 (2.4)	1.44 (0.003)
• Electrolyte abnormality	177 (3.8)	129 (2.8)	1.38 (0.006)
• Injurious fall	334 (7.1)	332 (7.1)	1.00 (0.97)
• Acute kidney injury/acute renal failure	204 (4.4)	120 (2.6)	1.71 (<0.001)

‡ Serious adverse event defined as fatal or life-threatening or that resulted in clinically significant or persistent disability

SPRINT Research Group, et al. *N Engl J Med*. 2015;373(22):2103-2106.

SPRINT-Senior: Results



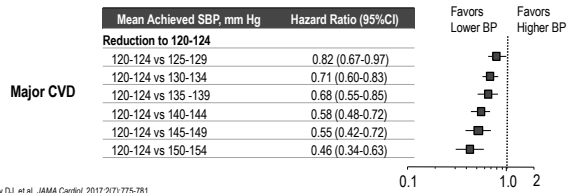
Outcome	Intensive Treatment N=1317 no. (%)	Standard Treatment N=1319 no. (%)	Hazard Ratio (95% CI)
CVD Primary Outcome	102 (7.7)	148 (11.2)	0.66 (0.51-0.85)
All-Cause Mortality	73 (5.5)	107 (8.1)	0.67 (0.49-0.91)
Primary Outcome or Death	144 (10.9)	205 (15.5)	0.68 (0.54-0.84)

Williamson JD, et al. *JAMA* 2016;315(24):2673-82.

Other data supporting lower BP goals?

SBP Reduction and Risk of CVD and Mortality A Systematic Review and Network Meta-Analysis

- Network meta-analysis of 42 trials (N=144,220)
 - 30 trials included patients with type 2 diabetes



Bundy DJ, et al. JAMA Cardiol. 2017;2(7):775-781.

2017 ACC-AHA: BP Goals

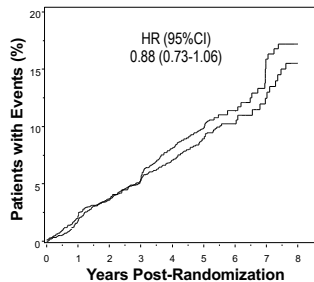
COR	LOE	Patients With Hypertension
I	SBP: B-R ^{SR}	Known CVD, diabetes, CKD, or 10-year ASCVD event risk of ≥10% a BP target <130/80 mm Hg
	DBP: C-EO	
IIb	SBP: B-NR	Without additional markers of increased CVD risk, a BP target <130/80 mm Hg may be reasonable.
	DBP: C-EO	

COR	LOE	Older Persons
I	A	SBP treatment goal <130 mm Hg for non-institutionalized ambulatory community-dwelling adults ≥65 yr
IIa	C-EO	≥65 yr with high burden of comorbidity and limited life expectancy, clinical judgment, patient preference, and a team-based approach to assess risk/benefit for decisions regarding intensity of treatment

Whelton PK, et al. Hypertension. 2017 [Epub ahead of print].

Action to Control CV Risk in Diabetes Blood Pressure Trial (ACCORD)

- Randomized, open-label trial in 4733 patients with hypertension and stable type 2 diabetes:
 - 40-79 yr if established CVD;
 - 55-79 yr if ≥ 2 CV risks or subclinical CVD
- Intensive (SBP <120 mmHg) vs. standard (SBP <140 mmHg) treatment for a mean 4.7 yr follow-up
- Primary Outcome:
 - nonfatal MI/stroke or CV death



Cushman WC, et al. N Engl J Med. 2010;362:1375-85.

Action to Control CV Risk in Diabetes Blood Pressure Trial (ACCORD)

	Intensive Events (%/yrs)	Standard Events (%/yrs)	HR (95% CI)
Primary Outcome	208 (1.87)	237 (2.09)	0.88 (0.73-1.06)
Pre-specified Secondary Outcomes			
• Total Mortality	150 (1.28)	144 (1.19)	1.07 (0.85-1.35)
• CV Death	60 (0.52)	58 (0.49)	1.06 (0.74-1.52)
• Nonfatal MI	126 (1.13)	146 (1.28)	0.87 (0.68-1.10)
• Nonfatal Stroke	34 (0.30)	55 (0.47)	0.63 (0.41-0.96)
• Total Stroke	36 (0.32)	62 (0.53)	0.59 (0.39-0.89)

Cushman WC, et al. N Engl J Med 2010;362:1575-85

Reconciling ACCORD-BP with SPRINT

- ACCORD underpowered
 - 1/2 the size of SPRINT and 1/2 anticipated events in standard BP group (2% vs. 4%)
- Younger patients in ACCORD (62 vs. 68 years)
- Factorial study design used in ACCORD
- 95% CI in ACCORD included possibility of 27% lower risk
- Secondary analysis in combined standard glycemia and BP treatments, intensive BP treatment alone ↓ risk 26%

The SPRINT Research Group. N Engl J Med. 2015;373(22):2103-2106.

SPRINT Eligible Participants of ACCORD-BP

- Post-hoc, multivariate, subgroup analysis of ACCORD patients in the standard glucose control arm with SPRINT required additional CVD risk factors
- Results: Intensive vs Standard BP control
 - Framingham 10-yr risk: 14.5 and 14.8%; p=ns
 - Mean SBP values: 120 and 134 mmHg; p<0.001
 - SPRINT primary endpoint: HR 0.79 (0.65–0.96); p= 0.02
 - ACCORD primary endpoint: HR 0.69 (0.51–0.93); p= 0.01

Effect of BP control on CVD events same regardless of diabetes (p>0.62)

Buckley JF, et al. Diabetes Care. 2017;40:1733-1738

American Diabetes Association

- Most patients with diabetes and hypertension should be treated to BP goal of <140/90 mmHg **A**
- Lower BP targets, such as 130/80 mmHg, may be appropriate for individuals at high risk of CVD, if they can be achieved without undue treatment burden. **C**

American Diabetes Association. Diabetes Care 2018;41(Suppl. 1):S86-S104

Case BD

- 65-year-old white woman with hypertension, type 2 diabetes
- Current medications:
 - Lisinopril 10 mg PO daily,
 - metformin, liraglutide, atorvastatin
- Smoke 1 pack/day; exercises three times/week (aerobic); somewhat follows her diabetes diet
- Vitals/other parameters:
 - BP 144/86, 142/86 mm Hg (140/84 mm Hg average at home)
 - BMI 29.4 kg/m²
- Laboratory values (fasting)
 - Total cholesterol 150 mg/dL
 - HDL-cholesterol 40 mg/dL
 - LDL-cholesterol 70 mg/dL
 - Triglycerides 200 mg/dL
 - A1C 6.9%
 - eGFR 78 mL/min/1.73m²
 - Persistent albuminuria
 - All other labs are normal

10-year ASCVD Risk is 29.1%

Which of the following lifestyle modifications should you recommended for BD to specifically lower her BP?

- A. Smoking cessation
- B. Weight loss
- C. Dietary potassium reduction
- D. A. and B
- E. A. B. and C.

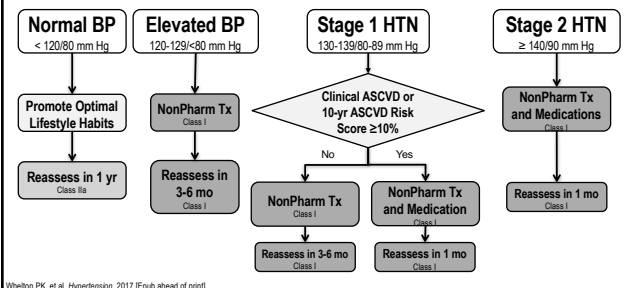
2017 ACC-AHA: Lifestyle Changes

COR	LOE	Nonpharmacological Interventions
I	A	Weight loss in adults who are overweight or obese
I	A	Healthy diet (e.g., DASH) that facilitates achieving desirable weight
I	A	Sodium reduction
I	A	Potassium supplementation (preferably diet) unless contraindicated
I	A	Increased physical activity with a structured exercise program
I	A	Drink no more than 2 (men) or 1 (women) standard drinks/day

DASH = Dietary Approaches to Stop Hypertension

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

2017 ACC/AHA: Treatment Algorithm



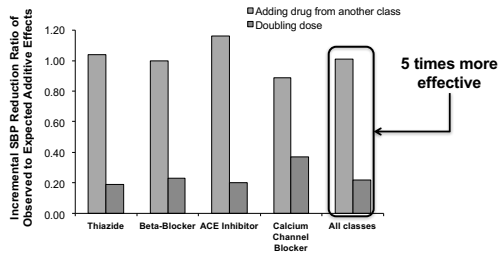
Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

2017 ACC-AHA: Medication Selection

COR	LOE	Initial Medication
I	A ^{SR}	First-line: thiazide diuretics, CCBs, and ACE inhibitors or ARBs
COR	LOE	Initial Monotherapy Versus Combination Therapy
I	C-E0	2 first-line agents of different classes in stage 2 hypertension and BP > 20/10 mm Hg above goal
COR	LOE	Race and Ethnicity
I	B-R	Black patients without HF or CKD (with or without diabetes), initial treatment should include a thiazide diuretic or CCB
I	C-LD	2+ medications are recommended to achieve a BP <130/80 mm Hg in most adults, especially in black patients

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

Adding a Second Medication vs. Doubling the Dose



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

2017 ACC-AHA: Compelling Indications

Co-morbidity	1 st Line Agent(s)
Diabetes	Thiazide, CCB, ACE-I or ARB
Diabetes with albuminuria	ACE-I or ARB
Chronic kidney disease	ACE-I or ARB
Heart failure with reduced ejection fraction (EF)	Beta-blocker, ACE-I or ARB, mineralocorticoid receptor antagonist
Heart failure with preserved EF	Beta-blocker, ACE-I or ARB
Stable ischemic heart disease	Beta-blocker, ACE-I or ARB, CCB (if angina)
Secondary stroke prevention	Thiazide, ACE-I or ARB

NOTE: Use either an ACE-I or ARB, avoid using these two together

Whelton PK, et al. *Hypertension*. 2017. Epub ahead of print.

Case BD

- 65-year-old white woman with hypertension, type 2 diabetes
- Current medications:
 - Lisinopril 10 mg PO daily,
 - metformin, liraglutide, atorvastatin
- Smoke 1 pack/day; exercises three times/week (aerobic); somewhat follows her diabetes diet
- Vitals/other parameters:
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 - BMI 29.4 kg/m²
- Laboratory values (fasting)
 - Total cholesterol 150 mg/dL
 - HDL-cholesterol 40 mg/dL
 - LDL-cholesterol 70 mg/dL
 - Triglycerides 200 mg/dL
 - A1C 6.9%
 - eGFR 78 mL/min/1.73m²
 - Persistent albuminuria
 - All other labs are normal

10-year ASCVD Risk is 29.1%

In addition to enhancing her lifestyle modifications, which of the following changes to her antihypertensive is the most appropriate for her hypertension?

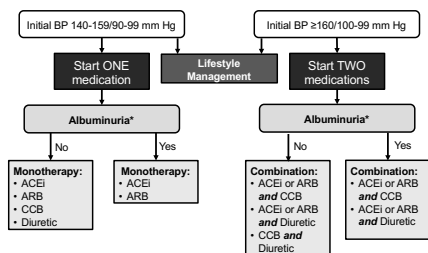
- A. Increase lisinopril to 20 mg daily
- B. Add hydrochlorothiazide 25 mg daily
- C. Add amlodipine 5 mg daily
- D. Replace lisinopril with irbesartan 150 mg daily

2017 ACC-AHA: Hypertension in Diabetes

COR	LOE	Adults with Hypertension and Diabetes
I	SBP: B-R ^{SR}	Antihypertensive drug treatment should be initiated at a BP of $\geq 130/80$ mm Hg; Treatment goal of $< 130/80$ mm Hg
	DBP: C-EO	
I	A ^{SR}	All first-line classes (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective
IIb	B-NR	ACE inhibitors or ARBs may be considered in the presence of albuminuria

Whelton PK, et al. Hypertension. 2017. Epub ahead of print.

American Diabetes Association



*ACEi or ARB at **maximum tolerated dose** if urine albumin-to-creatinine 30–299 mg/g; strongly recommended if ≥ 300 mg/g

American Diabetes Association. Diabetes Care 2018;41(Suppl. 1):S86-S104

Follow-Up, Monitoring, Adherence

COR	LOE	Follow-Up After Initiating Drug Therapy
I	B-R	Follow-up evaluation of adherence and response to treatment at monthly intervals until control is achieved.
COR	LOE	Monitoring Strategies to Improve Control of BP
I	A	Follow-up and monitoring should include systematic strategies including HBPM, team-based care, and telehealth strategies.
COR	LOE	Medication Adherence Strategies
I	B-R	Dosing medication once daily rather than multiple times daily is beneficial to improve adherence.
Ia	B-NR	Combination pills rather than free individual components can be useful to improve adherence.

Whelton PK, et al. Hypertension. 2017;Epub ahead of print.

Concluding Statements

- <130/80 mm Hg is the BP goal for most patients according to ACC-AHA guidelines with ADA reserving lower BP goals for higher risk patients with diabetes
- Evidence demonstrates lower SBP goals are better and overall well tolerated, even in older patients
 - Lower goals are better in higher CV risk patients with diabetes
- First-line antihypertensive agents include ACEi, ARB, CCB and thiazides
 - An ACEi or ARB are preferred in diabetes with proteinuria
