

HYPERTENSION

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Suzanne Oparil, MD

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Other – **(1)** SPRINT (Systolic Blood Pressure Intervention Trial) Role(s): PI, UAB Clinical Center Network; Investigator, SPRINT Site 403 (Calhoun PI); **(2)** Co-chair, JNC 8 Committee, “2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8); and Editor-in-Chief, Current Hypertension Reports (Journal; Publisher – Springer Science Business Media LLC); annual stipend of \$5,000 (Springer); Editor-in-Chief Term until 12/2020.

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Clinical Practice Guideline

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ ASH/ASPC/NMA/PCNA 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 Task Force on Clinical Practice Guidelines

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2017 Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults

- Reclassification of high blood pressure
- BP treatment thresholds and ASCVD risk
- BP treatment goals
- Management of hypertension in patients with comorbidities
- Recommendations for BP management in older adults

2017 Guideline for the Management of Patients with Hypertension



- **BP measurement**
 - **Accuracy, use of averages, and out-of-office measurements**
- New BP classification system
- New approach to hypertension treatment decisions
 - CVD risk estimation in addition to average BP
- Lower targets for BP during treatment of hypertension
- Strategies to improve BP control during treatment of hypertension

BP Measurement: Needs and Goals



OFFICE BPM

- Improve accuracy and reproducibility
 - Number of measurements
 - Personnel training
 - Validated oscillometric devices

ABPM, HBPM

- Enhance ability to diagnose HTN and monitor treatment – should be used in clinical practice.
- Diagnose masked HTN, white coat HTN and nocturnal HTN and relate these phenotypes to CVD outcomes in clinical trials.
- Assess reproducibility of measures.
- Assess practicality and cost of incorporating ABPM into EHR and routine care.

CUFFLESS BPM DEVICES / TELEMEDICINE

- Opportunity for continuous noninvasive BP measurement .
- Assess accuracy, reproducibility, cost, utility.

HOW TO MEASURE BLOOD PRESSURE



Pickering, et al. *Circulation* (2005).
O'Brien, et al. *J Hypertens* (2003).

Office BP Readings: Checklist for Accurate Measurements

Key Points	Specific Instructions
Step 1: Prepare patient	<ul style="list-style-type: none"> -Have patient relax, sitting in a chair (feet on floor, back supported) for >5 min. -Avoid caffeine, exercise, and smoking for ≥ 30 min before measurement. -Ensure bladder emptied. -No talking during rest period or measurement. -Remove clothing covering location of cuff placement. -Measurements while patient sitting/lying on exam table do not fulfill criteria.
Step 2: Use proper technique	<ul style="list-style-type: none"> -Use validated BP measurement device that is calibrated periodically. -Support patient's arm (e.g., resting on a desk). -Position middle of cuff on patient's upper arm at mid-sternum (right atrium). -Use correct cuff size, such that the bladder encircles 80% of the arm. -Either stethoscope diaphragm or bell may be used for auscultatory readings.
Step 3: Take proper measurements	<ul style="list-style-type: none"> -At first visit, record BP in both arms. Subsequently, use arm with higher BP. -Separate repeated measurements by 1–2 min. -For auscultatory readings, estimate SBP by palpation and inflate cuff 20–30 mm Hg above. Deflate 2 mm Hg per second and listen for Korotkoff sounds.
Step 4: Document BP readings	<ul style="list-style-type: none"> -Note time of most recent BP medication before measurements. -Record SBP and DBP.
Step 5: Average readings	<ul style="list-style-type: none"> -Use average of ≥ 2 readings obtained on ≥ 2 occasions to estimate level of BP.
Step 6: Provide readings to patient	<ul style="list-style-type: none"> -Provide patients SBP/DBP readings both verbally and in writing.

Out-of-Office BP Readings

Greater use of out-of-office BP measurements (ABPM or HBPM) for confirmation of office HTN and recognition of White Coat/Masked HTN

In adults not taking antihypertensive medication

Confirmed (Sustained) Hypertension

- Elevated office and out of office average BP
- Substantially higher risk of CVD compared to adults with normal office and out of office BPs
- Require therapy (nonpharmacological or combined nonpharmacological and antihypertensive drug therapy)

White Coat Hypertension (WCH)

- *Office Hypertension not confirmed by out of office BP readings*
- Present in about 10-25% of adults with office hypertension
- CVD risk profile more like adults with normal BP than adults with sustained hypertension
- May not need treatment for hypertension (should be monitored for development of sustained hypertension)

Masked Hypertension (MH)

- Normal office BP but out of office BP hypertension
- Present in about 10-25% of adults with normal office BP
- CVD risk profile more like adults with sustained hypertension than adults without hypertension
- Should be considered for antihypertensive drug therapy

Whelton PK, et al. *J Am Coll Cardiol*. 2018;71(19):e127-e248.

Whelton PK, et al. *Hypertension*. 2018;71(6):e13-e115.

Out-of-Office and Self-Monitoring of BP

COR	LOE	Recommendation for Out-of-Office and Self-Monitoring of BP
I	A ^{SR}	Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions.

SR indicates systematic review.

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BP Classification (JNC 7 and ACC/AHA Guidelines)

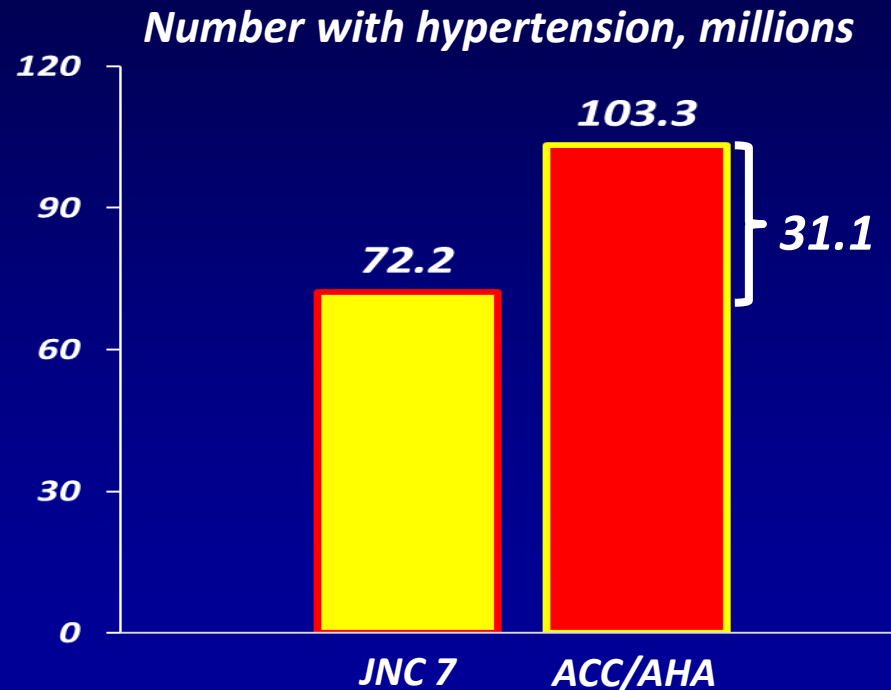
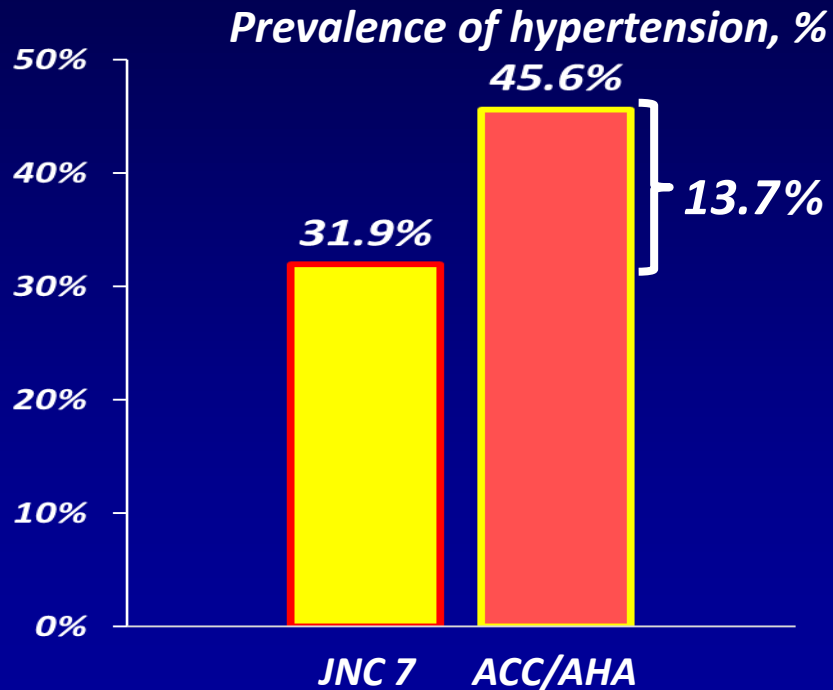
<i>SBP</i>		<i>DBP</i>	<i>2003 JNC7</i>	<i>2017 ACC/AHA</i>	
<i><120</i>	<i>and</i>	<i><80</i>	<i>Normal BP</i>	<i>Normal BP</i>	
<i>120–129</i>	<i>and</i>	<i><80</i>	<i>Prehypertension</i>	<i>Elevated BP</i>	} <i>Major area of difference</i>
<i>130–139</i>	<i>or</i>	<i>80–89</i>		<i>Stage 1 hypertension</i>	
<i>140–159</i>	<i>or</i>	<i>90–99</i>	<i>Stage 1 hypertension</i>	<i>Stage 2 hypertension</i>	
<i>≥160</i>	<i>or</i>	<i>≥100</i>	<i>Stage 2 hypertension</i>	<i>Stage 2 hypertension</i>	

- *Blood Pressure should be based on an average of ≥2 careful readings on ≥2 occasions*
- *Adults with SBP or DBP in two categories should be designated to the higher BP category*

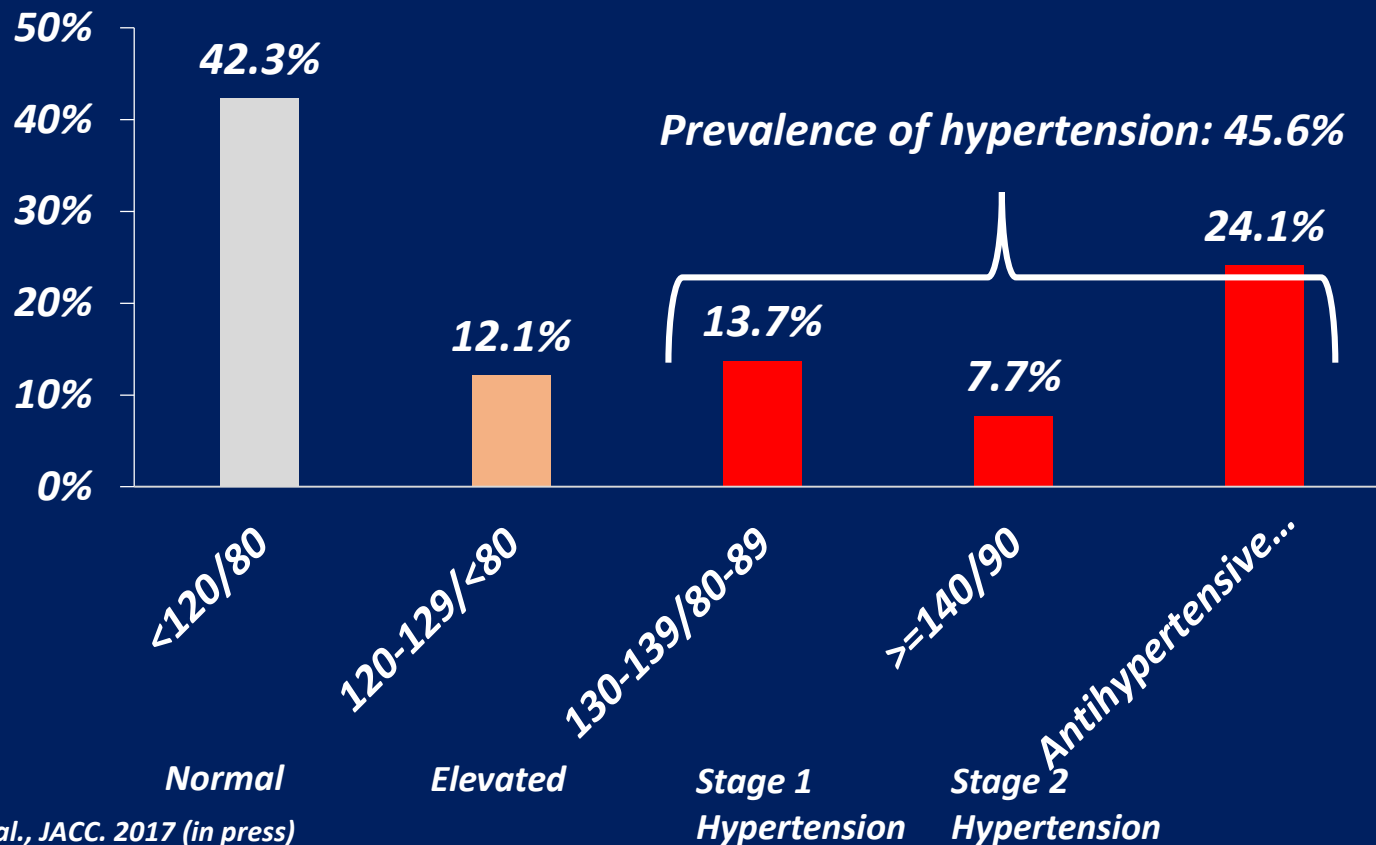
Whelton PK et al. Hypertension/J Am Coll Cardiol. 2017;Epub ahead of print

% Prevalence and Number of US Adults with Hypertension

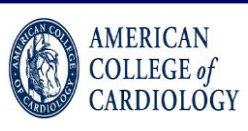
2003 JNC 7 and 2017 ACC/AHA Guidelines



Distribution of US adults into BP Categories – NHANES 2011-2014



BP THRESHOLDS AND RECOMMENDATIONS FOR TREATMENT OF HYPERTENSION



Whelton PK, et al. *Hypertension*. (2017). Originally published November 13, 2017.
doi: <https://doi.org/10.1161/HYP.0000000000000065>

Whelton PK, et al. *J Am Coll Cardiol*. (2017). pii: S0735-1097(17)41519-1.
doi: [10.1016/j.jacc.2017.11.006](https://doi.org/10.1016/j.jacc.2017.11.006). [Epub ahead of print].

2017 Guideline for the Management of Patients with Hypertension



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IS THERE ANY DIFFERENCE IN EXPECTED BENEFIT FROM BP LOWERING ACCORDING TO CVD RISK?

- Yes
- Data from the BP Lowering Treatment Trialists Collaboration meta-analysis provided empirical evidence that the absolute benefits achieved with BP-lowering therapy are driven by the combination of CVD risk factors determining risk of a CVD event rather than simply the BP level in isolation.
- Thus, the most intensive BP-lowering therapies should be directed to those at highest CVD risk.

Sundstrom J *et al.* Blood Pressure Lowering Treatment Trialists.
*Lancet.*2014;384;591-598.

BP & PREDICTED CVD RISK-DRUG TREATMENT DECISIONS

- The predicted risk of CVD between 2 people with the same SBP can differ by 20-fold based on the individual's global ASCVD risk.
- The increase in predicted CVD risk with higher BP is small among otherwise low-risk individuals but is much higher in those with higher ASCVD risk scores. Clinical trials and meta-analyses are based on participants with high ASCVD risk.
- Therefore, one can rationalize utilizing ASCVD risk calculations in antihypertensive drug treatment decisions.

Goff DC Jr *et al.* 2013 AHA/ACC guideline on the assessment of cardiovascular risk. *J Am Coll Cardiol.* 2013;101:1005.

ACC/AHA POOLED COHORT EQUATIONS

To estimate the 10-year risk of ASCVD

Based on age, race, sex, total cholesterol, LDL cholesterol, HDL cholesterol, treatment with a statin, systolic BP, treatment for hypertension, history of diabetes, current smoker, aspirin therapy

Validated for adults 40-79 years of age.

<http://tools.acc.org/ASCVD-Risk-Estimator/>
APP Store: ASCVD Risk Estimator Plus



AMERICAN
COLLEGE of
CARDIOLOGY

ASCVD Risk Estimator Plus

Estimate Risk

Therapy Impa

Current 10-Year
ASCVD Risk

~%

Previous 10-Year
ASCVD Risk

~%

Patient Demographics

Current Age

Age must be between 40-79

Sex

Male

Female

Race

White

African American

Other

Current Labs/Exam

Total Cholesterol (mg/dL)

Value must be between 130 - 320

HDL Cholesterol (mg/dL)

Value must be between 20 - 100

LDL Cholesterol (mg/dL) ⓘ

Value must be between 30-300

Systolic Blood Pressure (mm of Hg)

Value must be between 90-200

Personal History

History of Diabetes?

Yes

No

On Hypertension Treatment?

Yes

No

Smoker: ⓘ

Yes

Former

No

On a Statin? ⓘ

Yes

No

On Aspirin Therapy? ⓘ

Yes

No

BP TREATMENT THRESHOLD AND THE USE OF ASCVD RISK ESTIMATION TO GUIDE DRUG TREATMENT OF HYPERTENSION

Recommendations for BP Treatment Threshold and Use of ASCVD Risk Estimation* to Guide Drug Treatment of Hypertension		
COR	LOE	Recommendations
I	SBP: A	1. Use of BP-lowering medications is recommended for secondary prevention of recurrent CVD events in patients with clinical CVD and an average SBP of 130 mm Hg or higher or an average DBP of 80 mm Hg or higher, and for primary prevention in adults with an estimated 10-year atherosclerotic cardiovascular disease (ASCVD) risk of 10% or higher and an average SBP 130 mm Hg or higher or an average DBP 80 mm Hg or higher.
	DBP: C-EO	
I	C-LD	2. Use of BP-lowering medication is recommended for primary prevention of CVD in adults with no history of CVD and with an estimated 10-year ASCVD risk <10% and an SBP of 140 mm Hg or higher or a DBP of 90 mm Hg or higher

* ACC/AHA Pooled Cohort Equations to estimate 10-y risk of ASCVD. ASCVD was defined as a first nonfatal MI or CHD death, or fatal or nonfatal stroke among adults free of CVD.

Whelton PK, et al. *Hypertension*. (2017). Originally published November 13, 2017. doi: <https://doi.org/10.1161/HYP.0000000000000065>

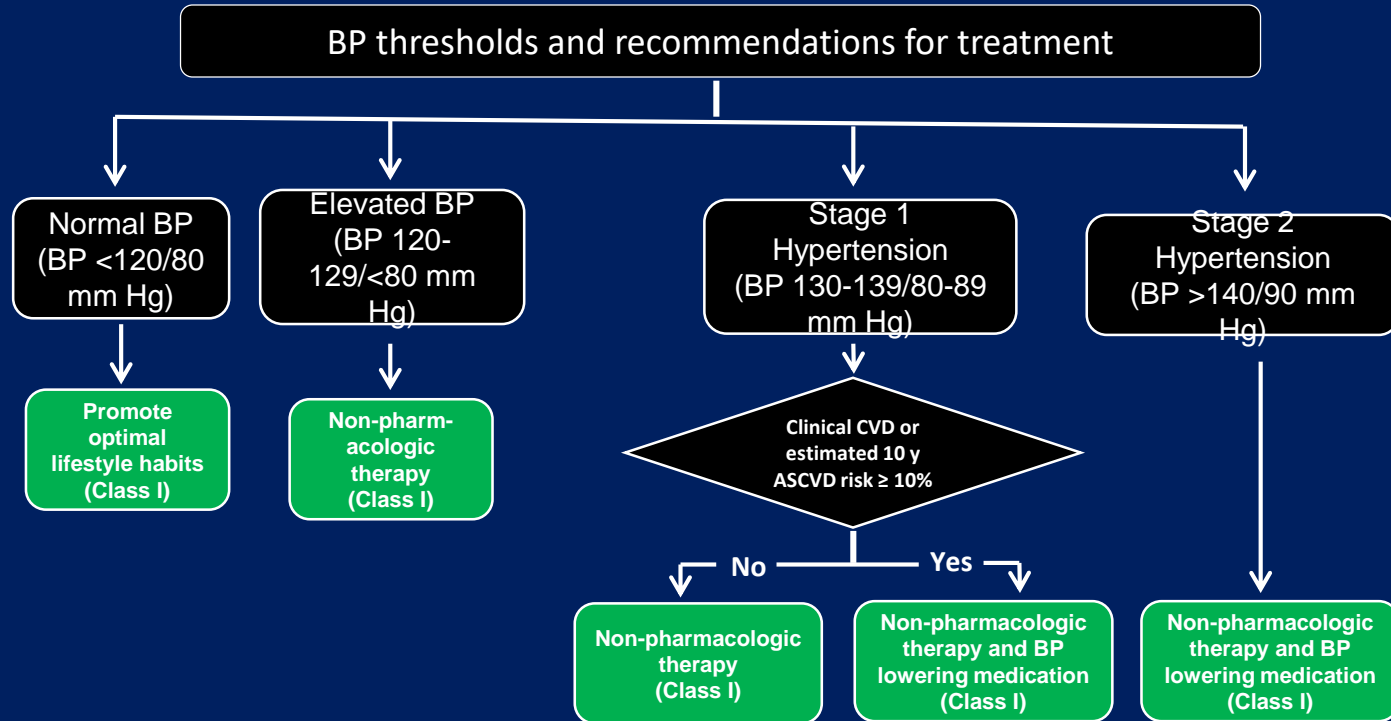
Whelton PK, et al. *J Am Coll Cardiol*. (2017). pii: S0735-1097(17)41519-1. doi: [10.1016/j.jacc.2017.11.006](https://doi.org/10.1016/j.jacc.2017.11.006). [Epub ahead of print].

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BP THRESHOLDS AND RECOMMENDATIONS FOR TREATMENT

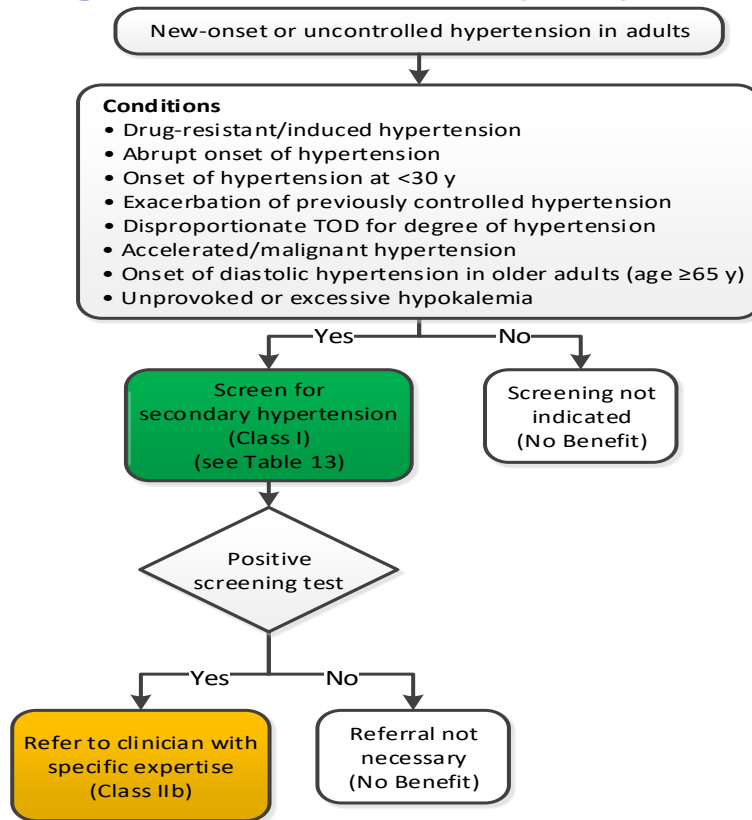


SUMMARY: BP THRESHOLDS AND ASCVD RISK

Benefits of using both BP and ASCVD risk assessment in determining BP thresholds for antihypertensive drug therapy

- Treatment is focused on patients most likely to have events
- More CVD events are prevented
- Larger absolute CVD risk reduction with treatment
- Lower number needed-to-treat to prevent one CVD event
- More quality-adjusted life years are saved
- Lower cost of care

Screening for Secondary Hypertension



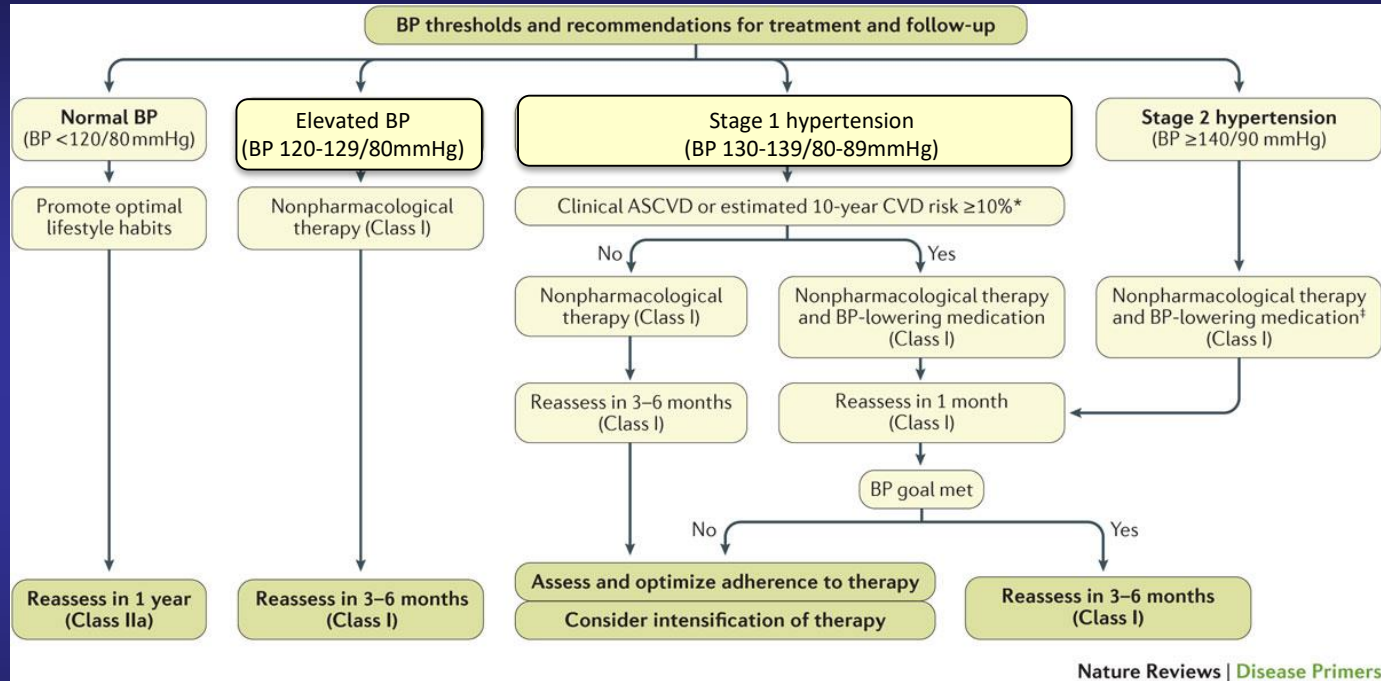
Colors correspond to Class of Recommendation in Table 1 .

TOD indicates target organ damage (e.g., cerebrovascular disease, hypertensive retinopathy, left ventricular hypertrophy, left ventricular dysfunction, heart failure, coronary artery disease, chronic kidney disease, albuminuria, peripheral artery disease).

Causes of Secondary Hypertension With Clinical Indications

Common causes
Renal parenchymal disease
Renovascular disease
Primary aldosteronism
Obstructive sleep apnea
Drug or alcohol induced
Uncommon causes
Pheochromocytoma/paraganglioma
Cushing's syndrome
Hypothyroidism
Hyperthyroidism
Aortic coarctation (undiagnosed or repaired)
Primary hyperparathyroidism
Congenital adrenal hyperplasia
Mineralocorticoid excess syndromes other than primary aldosteronism
Acromegaly

HTN MANAGEMENT ALGORITHM



LIFESTYLE MODIFICATION: THE CORNERSTONE FOR PREVENTION AND TREATMENT OF HYPERTENSION



<u>Lifestyle Intervention</u>	<u>Dose</u>	<u>Impact on SBP</u>	
		<u>Hypertension</u>	<u>Normotension</u>
Weight loss	Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight.	-5 mm Hg	-2/3 mm Hg
Healthy 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	Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults.	-5/6 mm Hg	-2/3 mm Hg
Enhanced intake of dietary potassium	Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium.	-4/5 mm Hg	-2 mm Hg

All 4 Recommendations COR:1; LOE:A

JAMA | Special Communication

The Physical Activity Guidelines for Americans

Katrina L. Piercy, PhD, RD; Richard P. Trolano, PhD; Rachel M. Ballard, MD, MPH; Susan A. Carlson, PhD, MPH; Janet E. Fulton, PhD; Deborah A. Galuska, PhD, MPH; Stephanie M. George, PhD, MPH; Richard D. Olson, MD, MPH

IMPORTANCE Approximately 80% of US adults and adolescents are insufficiently active. Physical activity fosters normal growth and development and can make people feel, function, and sleep better and reduce risk of many chronic diseases.

OBJECTIVE To summarize key guidelines in the *Physical Activity Guidelines for Americans*, 2nd edition (PAG).

PROCESS AND EVIDENCE SYNTHESIS The 2018 Physical Activity Guidelines Advisory Committee conducted a systematic review of the science supporting physical activity and health. The committee addressed 38 questions and 104 subquestions and graded the evidence based on consistency and quality of the research. Evidence graded as strong or moderate was the basis of the key guidelines. The Department of Health and Human Services (HHS) based the PAG on the 2018 *Physical Activity Guidelines Advisory Committee Scientific Report*.

◀ Viewpoint page 1971 and
Editorial page 1983

+ Video

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LIFESTYLE MODIFICATION: THE CORNERSTONE FOR PREVENTION AND TREATMENT OF HYPERTENSION



Nonpharmacological <u>Intervention</u>			<u>Effect on SBP</u>	
		<u>Dose</u>	<u>Hypertension</u>	<u>Normotension</u>
Physical activity	Aerobic	<ul style="list-style-type: none"> ● 90–150 min/wk ● 65%–75% heart rate reserve 	-5/8 mm Hg	-2/4 mm Hg
	Dynamic resistance	<ul style="list-style-type: none"> ● 90–150 min/wk ● 50%–80% 1 rep maximum ● 6 exercises, 3 sets/exercise, 10 repetitions/set 	-4 mm Hg	-2 mm Hg
	Isometric resistance	<ul style="list-style-type: none"> ● 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk ● 8–10 wk 	-5 mm Hg	-4 mm Hg
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol to: <ul style="list-style-type: none"> ● Men: ≤2 drinks daily ● Women: ≤1 drink daily 	-4 mm Hg	-3 mm

Both Recommendations COR:1; LOE:A

Percentage of US Adults 18 Years or Older Who Met the Aerobic and Muscle-Strengthening Guidelines



NEW EVIDENCE FOR HEALTH BENEFITS OF PHYSICAL ACTIVITY

Improved bone health and weight status for children aged 3 through 5 years

Improved cognitive function for youth aged 6 to 13 years

Reduced risk of cancer at additional sites

Brain health benefits, including improved cognitive function, reduced anxiety and depression risk, and improved sleep and quality of life

Reduced risk of fall-related injuries for older adults

For pregnant women, reduced risk of excessive weight gain, gestational diabetes, and postpartum depression

For people with various chronic medical conditions, reduced risk of all-cause and disease-specific mortality, improved function, and improved quality of life

CHOICE OF INITIAL MEDICATION

COR	LOE	Recommendation for Choice of Initial Medication
I	A ^{SR}	For initiation of antihypertensive drug therapy, first-line agents include thiazide diuretics, CCBs, and ACE inhibitors or ARBs

CHOICE OF INITIAL MONOTHERAPY VERSUS INITIAL COMBINATION DRUG THERAPY

COR	LOE	Recommendations for Choice of Initial Monotherapy Versus Initial Combination Drug Therapy*
I	C-EO	Initiation of antihypertensive drug therapy with 2 first-line agents of different classes, either as separate agents or in a fixed-dose combination, is recommended in adults with stage 2 hypertension and an average BP more than 20/10 mm Hg above their BP target.
Ila	C-EO	Initiation of antihypertensive drug therapy with a single antihypertensive drug is reasonable in adults with stage 1 hypertension and BP goal <130/80 mm Hg with dosage titration and sequential addition of other agents to achieve the BP target.

Summary

- Treatment of hypertension significantly lowers CV risk, including in the very elderly.
- Treatment should utilize both lifestyle changes and pharmacologic therapies.
- Benefit of antihypertensive treatment is largely due to the degree of blood pressure reduction and less so to the types of agents used.
- Most patients will require 2-3 agents: preferred order of agents is unresolved.
- Poor adherence is major impediment to blood pressure control.

Routine Follow-Up

- Generally see patient back 4 weeks after initiating or titrating therapy to assess efficacy, to monitor for adverse effects and to reinforce importance of blood pressure control including life style changes
- Encourage home blood pressure monitoring as more accurate and engages patient
- Ambulatory monitoring may be helpful in patients with white coat hypertension is suspected or with extreme blood pressure fluctuations
- Once blood pressure controlled see patient back every 6 months

Special Populations: Special Problems



Racial and Ethnic Differences in Treatment

COR	LOE	Recommendations for Race and Ethnicity
I	B-R	In black adults with hypertension but without HF or CKD, including those with DM, initial antihypertensive treatment should include a thiazide-type diuretic or CCB.
I	C-LD	Two or more antihypertensive medications are recommended to achieve a BP target of less than 130/80 mm Hg in most adults with hypertension, especially in black adults with hypertension.

Special Populations: Special Problems

OBESITY

- **OBESITY: an increasing problem.**
 - Extra-large “thigh” cuff required to measure BP in brachial artery.
 - Extra-large cuffs need validation – not always available.
 - Conic arm shapes are challenging.
 - Extra-large cuffs with conic shape are available – but not everywhere!
 - Validated wrist devices may be appropriate if extra-large cuffs are not available.

Rationale for Blood Pressure Goal of <130 mmHg in Older Adults

- Large number of older adults have been enrolled in BP lowering treatment trials
- BP lowering trials have shown:
 - Decreased CVD morbidity and mortality
 - *SPRINT Research Group. JAMA.2016;315:2673-2682.*
 - No increased risk for falls or orthostatic hypotension
 - *SPRINT Research Group. JAMA.2016;315:2673-2682.*
 - *ACCORD: Margolis KL et al. JGIM. 2014; 29:1599-606.*

Recommendations

Recommendations for Treatment of Hypertension in Older Persons

References that support recommendations are summarized in Online Data Supplement 54.

COR	LOE	Recommendations
I	A	3. Treatment of hypertension with a SBP treatment goal of less than 130 mm Hg is recommended for noninstitutionalized ambulatory community-dwelling adults (≥ 65 years of age) with an average SBP of 130 mm Hg or higher).
Ia	C-EO	4. For older adults (≥ 65 years of age) with hypertension and a high burden of comorbidity and limited life expectancy, clinical judgment, patient preference, and a team-based approach to assess risk/benefit is reasonable for decisions regarding intensity of BP lowering and choice of antihypertensive drugs.

Stable Ischemic Heart Disease

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)
I	SBP: B-R	In adults with SIHD and hypertension, a BP target of less than 130/80 mm Hg is recommended.
	DBP: C-EO	
I	SBP: B-R	Adults with SIHD and hypertension (BP \geq 130/80 mm Hg) should be treated with medications (e.g., GDMT beta blockers, ACE inhibitors, or ARBs) for compelling indications (e.g., previous MI, stable angina) as first-line therapy, with the addition of other drugs (e.g., dihydropyridine CCBs, thiazide diuretics, and/or mineralocorticoid receptor antagonists) as needed to further control hypertension.
	DBP: C-EO	

Stable Ischemic Heart Disease (cont.)

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)
I	B-NR	In adults with SIHD with angina and persistent uncontrolled hypertension, the addition of dihydropyridine CCBs to GDMT beta blockers is recommended.
Ila	B-NR	In adults who have had a MI or acute coronary syndrome, it is reasonable to continue GDMT beta blockers beyond 3 years as long-term therapy for hypertension.
Ilb	C-EO	Beta blockers and/or CCBs might be considered to control hypertension in patients with CAD (without HFrEF) who had an MI more than 3 years ago and have angina.

Heart Failure With Reduced Ejection Fraction

COR	LOE	Recommendations for Treatment of Hypertension in Patients With HFrEF
I	C-EO	Adults with HFrEF and hypertension should be prescribed GDMT titrated to attain a BP of less than 130/80 mm Hg.
III: No Benefit	B-R	Nondihydropyridine CCBs are not recommended in the treatment of hypertension in adults with HFrEF.

Heart Failure With Preserved Ejection Fraction

COR	LOE	Recommendations for Treatment of Hypertension in Patients With HF _p EF
I	C-EO	In adults with HF _p EF who present with symptoms of volume overload, diuretics should be prescribed to control hypertension.
I	C-LD	Adults with HF _p EF and persistent hypertension after management of volume overload should be prescribed ACE inhibitors or ARBs and beta blockers titrated to attain SBP of less than 130 mm Hg.

Chronic Kidney Disease

COR	LOE	Recommendations for Treatment of Hypertension in Patients With CKD
I	SBP: B-R^{SR}	Adults with hypertension and CKD should be treated to a BP goal of less than 130/80 mm Hg.
	DBP: C-EO	
IIa	B-R	In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [≥ 300 mg/d, or ≥ 300 mg/g albumin-to-creatinine ratio or the equivalent in the first morning void]), treatment with an ACE inhibitor is reasonable to slow kidney disease progression.
IIb	C-EO	In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [≥ 300 mg/d, or ≥ 300 mg/g albumin-to-creatinine ratio in the first morning void]), treatment with an ARB may be reasonable if an ACE inhibitor is not tolerated.

SR indicates systematic review.

2017 ACC/AHA Hypertension Guideline: Diabetes Mellitus

COR	LOE	Recommendations for Treatment of Hypertension in Patients With DM
I	SBP: B-R ^{SR}	In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg .
	DBP: C-EO	
I	A ^{SR}	In adults with DM and hypertension, all first-line classes of antihypertensive agents (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective.
IIb	B-NR	In adults with DM and hypertension, ACE inhibitors or ARBs may be considered in the presence of albuminuria.

SR indicates systematic review.

Diabetes Mellitus

COR	LOE	Recommendations for Treatment of Hypertension in Patients With DM
I	SBP: B-R^{SR}	In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg.
	DBP: C-EO	
I	A^{SR}	In adults with DM and hypertension, all first-line classes of antihypertensive agents (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective.
IIb	B-NR	In adults with DM and hypertension, ACE inhibitors or ARBs may be considered in the presence of albuminuria.

SR indicates systematic review.

Atrial Fibrillation

COR	LOE	Recommendation for Treatment of Hypertension in Patients With AF
Ila	B-R	Treatment of hypertension with an ARB can be useful for prevention of recurrence of AF.

BP Thresholds for and Goals of Pharmacological Therapy in Patients With Hypertension According to Clinical Conditions

Clinical Condition(s)	BP Threshold, mm Hg	BP Goal, mm Hg
General		
Clinical CVD or 10-year ASCVD risk $\geq 10\%$	$\geq 130/80$	$< 130/80$
No clinical CVD and 10-year ASCVD risk $< 10\%$	$\geq 140/90$	$< 130/80$
Older persons (≥ 65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥ 130 (SBP)	< 130 (SBP)
Specific comorbidities		
Diabetes mellitus	$\geq 130/80$	$< 130/80$
Chronic kidney disease	$\geq 130/80$	$< 130/80$
Chronic kidney disease after renal transplantation	$\geq 130/80$	$< 130/80$
Heart failure	$\geq 130/80$	$< 130/80$
Stable ischemic heart disease	$\geq 130/80$	$< 130/80$
Secondary stroke prevention	$\geq 140/90$	$< 130/80$
Secondary stroke prevention (lacunar)	$\geq 130/80$	$< 130/80$
Peripheral arterial disease	$\geq 130/80$	$< 130/80$

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.


2017 Guideline for the Management of Patients with Hypertension



- BP measurement
 - Accuracy, use of averages, and out of office measurements
- New BP classification system
- New approach to hypertension treatment decisions
 - CVD risk estimation in addition to average BP
- Lower targets for BP during treatment of hypertension
- **Strategies to improve BP control during treatment of hypertension**

Strategies to Improve Hypertension Treatment and Control

- **Adherence strategies**
 - Once daily dosing/combination pills
- **Strategies to promote lifestyle modification**
- **Team-based care**
 - Health professionals: physicians, nurses, pharmacists
 - Patient
 - Staff: office staff and community health workers
 - Others: spouse, relatives, friends
- **Use (active) of EHR and Patient Registries**
- **Telehealth strategies**
- **Performance measures and quality Improvement initiatives**
- **Financial incentives**



SHARED DECISION-MAKING

The Plan of Care for Hypertension

COR	LOE	Recommendations
I	C-EO	Every adult with hypertension should have a clear, detailed, and current evidence-based plan of care that ensures the achievement of treatment and self-management goals, encourages effective management of comorbid conditions, prompts timely follow-up with the healthcare team, and adheres to CVD GDMT.

Clinician's Sequential Flow Chart for the Management of Hypertension

Clinician's Sequential Flow Chart for the Management of Hypertension
Measure office BP accurately
Detect white coat hypertension or masked hypertension by using ABPM and HBPM
Evaluate for secondary hypertension
Identify target organ damage
Introduce lifestyle interventions
Identify and discuss treatment goals
Use ASCVD risk estimation to guide BP threshold for drug therapy
Align treatment options with comorbidities
Account for age, race, ethnicity, sex, and special circumstances in antihypertensive treatment
Initiate antihypertensive pharmacological therapy
Insure appropriate follow-up
Use team-based care
Connect patient to clinician via telehealth
Detect and reverse nonadherence
Detect white coat effect or masked uncontrolled hypertension
Use health information technology for remote monitoring and self-monitoring of BP

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.

Persistent Needs and Goals

NEED:

- Evaluate effectiveness of multidisciplinary healthcare teams to achieve BP treatment goals at low cost.
- Evaluate effectiveness of social media to communicate with patients.
- Evaluate effectiveness of information technology to monitor outcomes and decrease practice variability.
- Evaluate effectiveness of incentives to providers to achieve better outcomes for patients.

GOAL:

- Reduction in healthcare disparities across ethnicity, sex, social, economic class and age barriers.

The Future ???



Thank you!

Publication Information

This slide set is adapted from the 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/ NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

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Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbiagele B, Smith SC Jr, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams KA Sr, Williamson JD, Wright JT Jr. **2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA 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 Task Force on Clinical Practice Guidelines.** *Hypertension*. 2017. HYP.0000000000000065, originally published November 13, 2017.
<https://doi.org/10.1161/HYP.0000000000000065>.

The full-text guidelines are also available on the following websites:

AHA (professional.heart.org)

ACC (www.acc.org)

