

Adult & Elderly Hypertension: A M.A.P. for Improving Blood Pressure Control

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Learning objectives

1. Consider current management of hypertension in adult patients, as compared to current JNC 8 guidelines and AAFP/USPSTF screening recommendations.
2. Counsel patients on how to make healthy behavior changes to reduce their risk for developing hypertension or prehypertension.
3. Address barriers to care among patients in your practice, especially elderly and minority patients, and identify or develop tools to help address hypertension.
4. Prepare treatment regimens of antihypertensive medications and tools with an emphasis on patient adherence.

Hypertension: Disease burden

- Estimated 874 million adults worldwide have SBP of 140 mmHg or higher.
- Hypertension is second only to cigarette smoking as a preventable cause of death in the United States.
- In 2010, hypertension was the leading cause of death and disability-adjusted life years worldwide.

Hypertension and CVD risk

- Risk of CVD increases in a log-linear fashion from SBP <115 to >180 and from DBP <75 to >105 mm Hg.
- Each 20 mmHg SBP and 10 mmHg DBP elevation is associated with a doubling in the risk of death from stroke, heart disease, or other vascular disease.

JNC-1: Where it all began

- 1977; NHLBI-appointed committee
- Recommended stepped-care approach for antihypertensive therapy in (virtually) all adults with diastolic BP ≥ 105 mmHg.
- No recommendations for classification or treatment based on systolic BP.
- Thiazide diuretics advocated as first-line treatment.

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)

JAMA. 2014;311(5):507-520.

JNC 8 recommendations

In the general population < 60 years, and

- population ≥ 18 years with CKD, and
- population ≥ 18 years with diabetes:
 - Initiate treatment at SBP ≥ 140 *or* DBP ≥ 90
 - Treat to goal SBP < 140 *and* DBP < 90

In the general population ≥ 60 years:

- Initiate treatment at SBP ≥ 150 *or* DBP ≥ 90
- Treat to goal SBP < 150 *and* DBP < 90

JNC 8 recommendations

- In the general non-black population, including those with diabetes, initial treatment should include:
 - A thiazide-type diuretic, *or* CCB, *or* ACEI, *or* ARB
- In the general black population, including those with diabetes, initial treatment should include:
 - A thiazide-type diuretic, *or* CCB

JNC 8 recommendations

- In the population > 18 years with CKD, initial (or add-on) treatment should include an ACEI or ARB to improve kidney outcomes.
- Do not use an ACEI and an ARB together in the same patient.
- The main objective of hypertension treatment is to attain and maintain goal BP.
 - Add and titrate as necessary to meet this objective.

2013 ESH/ESC Guidelines for the management of arterial hypertension

- Incorporates HTN grading:
 - High normal (SBP 130-139 or DBP 85-89)
 - Grade 1 HTN (SBP 140-159 or DBP 90-99)
 - Grade 2 HTN (SBP 160-179 or DBP 100-109)
 - Grade 3 HTN (SBP \geq 180 or DBP \geq 110)
- With risk factor quantification

To direct therapy decisions with goal BP <140/90

Clinical Practice Guidelines for the Management of Hypertension in the Community

A Statement by the American Society of Hypertension and the International Society of Hypertension

The Journal of Clinical Hypertension. 2014;16;14–26.

ASH/ISH recommendations

- In patients > 18 years, initiate treatment at BP \geq 140/90
- In patients \geq 80 years, initiate treatment at BP \geq 150/90
- Initial therapy:
 - Non-black < 60: ACEI or ARB
 - Non-black \geq 60: CCB or thiazide
 - Black: CCB or thiazide
- If initial BP > 160/100, initiate with 2 drugs
 - CCB or thiazide *plus* ACEI or ARB

Compelling indications for individual drug classes (JNC 7)

Compelling indication	Diuretic	BB	ACEI	ARB	CCB	Aldo ANT
Heart failure	✓	✓	✓	✓		✓
Post-MI		✓	✓			✓
High coronary disease risk	✓	✓	✓		✓	
Diabetes	✓	✓	✓	✓	✓	
Chronic kidney disease			✓	✓		
Recurrent stroke prevention	✓		✓			

ASH/ISH: other major conditions

Hypertension *plus*:

Diabetes:	ACEI or ARB
CKD:	ACEI or ARB
Clinical CAD:	β -blocker <i>plus</i> ACEI or ARB
Stroke history:	ACEI or ARB
CHF:	β -blocker <i>plus</i> ACEI or ARB, <i>plus</i> diuretic, <i>plus</i> spironolactone, <i>regardless of BP</i>

HTN in ischemic heart disease

- American Heart Association guidelines recommend β -blockers and/or ACEIs for hypertensive patients with stable ischemic heart disease.
- ACEIs are recommended in patients already on β -blocker therapy (especially following myocardial infarction), in diabetics, and in patients with left ventricular dysfunction.

Circulation. 2012;126:e354-e471

Is SBP <150 ever an appropriate goal?

Post-hoc analysis of INVEST trial (INternational VErapamil SR Trandolapril STudy)

- 8354 patients \geq age 60 with CAD and pretreatment SBP \geq 150
- Categorized based on *on-treatment* SBP:
 - <140, 140-149, \geq 150

J Am Coll Cardiol. 2014;64:784–93.

Is SBP <150 ever an appropriate goal?

Primary outcome was first occurrence of all-cause death, nonfatal myocardial infarction (MI), or nonfatal stroke

- Rate of primary outcome by on-treatment SBP:
9.36% vs. 12.71% vs. 21.32%
- All-cause mortality: 7.92% vs. 10.07% vs. 16.81%
- Total stroke: 1.19% vs. 2.63% vs. 3.85%

Evidence Supporting a Systolic Blood Pressure Goal of Less Than 150 mm Hg in Patients Aged 60 Years or Older: The Minority View

- 5 of 17 Panel members disagreed with the 150 mm Hg initiation/target, citing:
 - Insufficient evidence for increasing initiation/target
 - Concern for increased risk for large at-risk population
 - Concern for “undoing” the remarkable improvement in CV outcomes over past decades

Ann Intern Med. 2014;160(7):499-503.

Evidence Supporting a Systolic Blood Pressure Goal of Less Than 150 mm Hg in Patients Aged 60 Years or Older: The Minority View

- A target SBP of < 140 mm Hg for patients younger than 80 years would also be in line with guidelines from:
 - Europe, Canada, the United Kingdom, the American College of Cardiology Foundation and the American Heart Association, the American Society of Hypertension, and the International Society of Hypertension.

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group

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

SPRINT

- Randomized, controlled, open-label, NHLBI sponsored trial
- 9361 participants
- Standard treatment: SBP target <140 mm Hg
- Intensive treatment: SBP target <120 mm Hg
- The protocol encouraged, but did not mandate, the use of drug classes with the strongest evidence for reduction in cardiovascular outcomes.
 - Chlorthalidone was encouraged as the primary thiazide-type diuretic, and amlodipine as the preferred calcium channel blocker.

SPRINT

- Inclusion criteria:
 - Age ≥ 50 y
 - SBP 130 to 180 mm Hg
 - Increased risk of cardiovascular events
 - Clinical or subclinical CVD, excluding stroke
 - CKD with eGFR 20-59 ml/min, excluding PCKD
 - Framingham risk score $\geq 15\%$ 10-year risk
- Exclusion criteria:
 - *Diabetes*
 - Prior stroke

SPRINT

- Composite outcome of:
 - Myocardial infarction
 - Acute coronary syndrome not resulting in myocardial infarction
 - Stroke
 - Acute decompensated heart failure
 - Death from cardiovascular causes

SPRINT

- Throughout the 3.26 years of follow-up, mean systolic blood pressure was:
 - 121.5 mm Hg in the intensive treatment group
 - 134.6 mm Hg in the standard treatment group
- Mean number of blood pressure medications was 2.8 and 1.8, respectively.

SPRINT: outcomes

- A primary outcome event was confirmed in 562 participants:
 - 243 (1.65% per year) in the intensive treatment group
 - 319 (2.19% per year) in the standard-treatment group (hazard ratio with intensive treatment, 0.75; 95% confidence interval [CI], 0.64 to 0.89; $P < 0.001$)
- *The relative risk of death from cardiovascular causes was 43% lower with the intensive intervention than with the standard treatment (p = 0.005).*
- The numbers needed to treat to prevent a primary outcome event, death from any cause, and death from cardiovascular causes during the median 3.26 years of the trial were 61, 90, and 172, respectively.

ACCORD-BP

- 4733 participants with type 2 diabetes randomized to:
 - Intensive therapy, targeting SBP <120 mmHg
 - Standard therapy, targeting SBP <140 mmHg
- Over 4.7 years of follow-up, the annual rate of the primary outcome (nonfatal MI, nonfatal stroke, CV death):
 - 1.87% in the intensive-therapy group
 - 2.09% in the standard-therapy group (HR 0.88; 95% CI 0.85-1.35, p=0.20)
 - (HR for stroke: 0.59; 95% CI 0.39-0.89, p=0.01)

N Engl J Med 2010;362:1575-85.

SPRINT + ACCORD-BP

- Analysis of pooled individual patient data with “harmonized” follow-up durations
- Composite primary endpoint: unstable angina, MI, acute heart failure, stroke, CV death
- HR for composite endpoint = 0.82 (95% CI 0.73-0.93, P=0.0017)
- Conclusion: Intensive blood pressure lowering may have a similar favorable effect and appears to decrease cardiovascular events in both patients with and patients without T2DM. *Diabetes Care.* 2017. Published online ahead of print December 6, 2017.

US Preventive Services Task Force

- The USPSTF recommends screening for high blood pressure in adults aged 18 years or older.
- The USPSTF recommends obtaining measurements outside of the clinical setting for diagnostic confirmation before starting treatment. (*Grade A recommendation*)

Final Recommendation Statement: High Blood Pressure in Adults: Screening. U.S. Preventive Services Task Force. September 2017.

USPSTF recommendations

- The disadvantages of diagnosing hypertension solely in the office setting include:
 - measurement errors,
 - the limited number of measurements that can be made conveniently, and
 - the confounding risk for isolated clinic hypertension.
- Epidemiologic data suggest that *15% to 30% of the population believed to have hypertension may have lower blood pressure outside of the office setting.*

USPSTF recommendations

- The USPSTF found convincing evidence that ambulatory blood pressure monitoring (ABPM) is the best method for diagnosing hypertension.
- There was significant discordance between the office diagnosis of hypertension and 12- and 24-hour average blood pressures using ABPM, with significantly fewer patients requiring treatment based on ABPM.

USPSTF recommendations

- The USPSTF recommends *annual screening for adults aged 40 years or older* and for those who are at increased risk for high blood pressure.
- Persons at increased risk include:
 - those who have high-normal blood pressure (130 to 139/85 to 89 mm Hg),
 - those who are overweight or obese, and
 - African Americans.

USPSTF recommendations

- Adults aged 18 to 39 years with normal blood pressure (<130/85 mm Hg) who do not have other risk factors should be *rescreened every 3 to 5 years*.
- The USPSTF recommends rescreening with properly measured office blood pressure and, if blood pressure is elevated, confirming the diagnosis of hypertension with ABPM.

USPSTF recommendations

- Little research has been done on the best approach to measuring blood pressure in the office setting.
- Most clinical trials of hypertension treatment:
 - used the mean of 2 measurements taken while the patient was seated,
 - allowed for at least 5 minutes between entry into the office and blood pressure measurement,
 - used an appropriately sized arm cuff, and
 - placed the patient's arm at the level of the right atrium during measurement.

USPSTF recommendations

- Screening for high blood pressure may be done in the office setting by using the proper methods described.
- USPSTF recommends confirmation outside of the clinical setting before a diagnosis of hypertension is made and treatment is started.
- Because blood pressure is a continuous value with natural variations throughout the day, repeated measurements over time are generally more accurate in establishing a diagnosis of hypertension.

Blood pressure targets for the treatment of people with hypertension and cardiovascular disease

Cochrane Database of Systematic Reviews 2017

- We included six trials with 9795 participants who were followed-up for between a year and 4.7 years.
- We analyzed data to detect differences between lower and standard blood pressure goals on numbers of deaths and serious adverse events (leading to hospital admission).

Blood pressure targets for the treatment of people with hypertension and cardiovascular disease

Cochrane Database of Systematic Reviews 2017

- We found *no differences* in total numbers of deaths, heart or vascular deaths or serious harms between lower and standard blood pressure goal approaches.
- Based on very little information, we found more dropouts due to drug-related harms in the lower blood pressure target group.
- The only significant benefit among people in the lower group in the studies analyzed was a slight decrease in total heart or vascular problems, but there was no overall health benefit.

Blood pressure targets for hypertension in older adults

Cochrane Database of Systematic Reviews 2017

- We found and included three unblinded randomized trials in 8221 older adults (mean age 74.8 years), in which:
 - higher BP targets of less than 150/90 mmHg (two trials) and,
 - less than 160/90 mmHg (one trial) were compared to:
 - a lower target of less than 140/90 mmHg.

Blood pressure targets for hypertension in older adults

Cochrane Database of Systematic Reviews 2017

- Treatment to the two different BP targets over two to four years failed to produce a difference in any of our primary outcomes, including all-cause mortality (RR 1.24 95% CI 0.99 to 1.54), stroke (RR 1.25 95% CI 0.94 to 1.67) and total cardiovascular serious adverse events (RR 1.19 95% CI 0.98 to 1.45).
- However, the 95% confidence intervals of these outcomes suggest the lower BP target is probably not worse, and might offer a clinically important benefit. We judged all comparisons to be based on low-quality evidence.

Pharmacologic Treatment of Hypertension in Adults
Aged 60 Years or Older to Higher Versus Lower
Blood Pressure Targets:
A Clinical Practice Guideline From the American
College of Physicians and the American Academy
of Family Physicians

Ann Intern Med. 2017;166(6):430-439.

ACP/AAFP Clinical Practice Guideline

Two recommendations:

1. ACP and AAFP recommend that physicians consider initiating or intensifying drug therapy in adults aged 60 years old and older with a history of stroke or transient ischemic attack to achieve a target systolic blood pressure of less than 140 mm Hg to reduce the risk of recurrent stroke.

ACP/AAFP Clinical Practice Guideline

2. ACP and AAFP recommend that physicians consider initiating or intensifying pharmacological treatment in some adults aged 60 years old and older at high cardiovascular risk, based on individualized assessment, to achieve a target systolic blood pressure of less than 140 mm Hg to reduce the risk of stroke or cardiac events.

ACP/AAFP Clinical Practice Guideline

- “Increased cardiovascular risk” includes all people with known vascular disease and among others, is defined as most patients with diabetes, individuals with chronic kidney disease with estimated glomerular filtration rate (eGFR) <45 mL/min/per 1.73 m², metabolic syndrome (abdominal obesity, hypertension, diabetes, and dyslipidemia), and older age.

ACP/AAFP Clinical Practice Guideline

- When prescribing drug therapy, physicians should select generic formulations over brand name drugs, which have similar efficacy, reduced cost, and therefore better adherence.
- Because of insufficient evidence, ACP and AAFP did not make any recommendations about diastolic blood pressure targets.

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;00:e000-e000.

2017 Clinical Practice Guideline for High Blood Pressure

- 481 pages(!)
- 15 sections, 106 recommendations
- Each recommendation is accompanied by:
 - Class of Recommendation (COR)
 - Level of Evidence (LOE)
- Includes results from systematic review and meta-analysis for four questions of special interest.

2017 Clinical Practice Guideline for High Blood Pressure

- What's new:
 - Focus on SBP, but with recommendations for DBP.
 - Recommendation for estimation of underlying ASCVD risk (using ACC/AHA risk calculator) and use of information to guide drug treatment decisions.
 - New treatment thresholds, goals.
 - Stress on importance of out-of-office BP readings.
 - Contemporary strategies to improve BP control.

2017 CPG: Diagnosis

- Normal: <120/80 mmHg
- Elevated: 120-129/<80 mm Hg
- Stage 1 hypertension: 130-139/80-89 mmHg
- Stage 2 hypertension: \geq 140/90

Out-of-office BP measurement

- 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. [COR I; LOE A, based on systematic review]

Masked vs. white coat hypertension

	Office/Clinic/Healthcare Setting	Home/Nonhealthcare/ABPM Setting
Masked hypertension	No hypertension	Hypertension
White coat hypertension	Hypertension	No hypertension

White coat hypertension

- White coat hypertension prevalence averages 13-35%, depending on the population studied.
- ABPM and HBPM are better predictors of CVD risk due to elevated BP than are office BP measurements; ABPM is preferred.
- White coat hypertension has typically been associated with a minimal to only slightly increased risk of CVD and all-cause mortality risk.

Masked hypertension

- In contrast to white coat hypertension, masked hypertension is associated with a CVD and all-cause mortality risk twice as high as that seen in normotensive individuals, with a risk range similar to that of patients with sustained hypertension.

Secondary hypertension

- Screen for secondary hypertension:
 - Drug-resistant/induced hypertension
 - Abrupt onset of hypertension
 - Onset of hypertension at <30 y
 - Exacerbation of previously controlled hypertension
 - Disproportionate TOD for degree of hypertension
 - Accelerated/malignant hypertension
 - Onset of diastolic hypertension in older adults (age ≥ 65 y)
 - Unprovoked or excessive hypokalemia

Secondary hypertension

- More common causes of secondary hypertension:
 - Renal parenchymal disease (1-2%)
 - Renovascular disease (5-34%)
 - Primary aldosteronism (8-20%)
 - Obstructive sleep apnea (25-50%)
 - Drug or alcohol induced (2-4%)

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
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)	$\geq 130/80$	< 130 (SBP)

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

Specific comorbidities	BP Threshold, mm Hg	BP Goal, mm Hg
Diabetes mellitus	$\geq 130/80$	$< 130/80$
Chronic kidney disease, including 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	$\geq 130/80$	$< 130/80$

Nonpharmacologic interventions

1. Weight loss for those who are overweight or obese.
2. Heart-healthy diet, such as DASH.
3. Sodium reduction.
4. Potassium supplementation, preferably by diet.
5. Increased physical activity.
6. No more than 2 standard drinks per day for men; no more than 1 for women.

Effects of Different Dietary Interventions on Blood Pressure

Systematic Review and Meta-Analysis of Randomized Controlled Trials

- The overall pooled net effect of dietary intervention on systolic BP and diastolic BP was -3.07 mm Hg (95% CI, -3.85 to -2.30) and -1.81 mm Hg (95% CI, -2.24 to -1.38), respectively.
- The Dietary Approaches to Stop Hypertension diet had the largest net effect (systolic BP, -7.62 mm Hg [95% CI, -9.95 to -5.29] and diastolic BP, -4.22 mm Hg [95% CI, -5.87 to -2.57]).

Association Between Urinary Sodium and Potassium Excretion and Blood Pressure Among Adults in the United States: National Health and Nutrition Examination Survey, 2014

- Hypertension was linearly associated with progressively higher sodium and lower potassium excretion; compared with the lowest quartiles of excretion.
- Adjusted odds of hypertension for the highest quartiles were 4.22 (95% CI 1.36, 13.15) for sodium, and 0.38 (95% CI 0.17, 0.87) for potassium, respectively, $P < 0.01$ for trends.

2017 CPG: Management

- In patients warranting pharmacotherapy, first-line agents include:
 - Thiazide diuretics
 - Calcium channel blockers
 - ACE-inhibitors
 - Angiotensin II receptor blockers (ARBs)

2017 CPG: Management

- Patients with stage 2 hypertension and an average BP $>20/10$ mmHg above their BP target should begin therapy with 2 first-line agents of different classes.

Racial and ethnic differences in treatment

- In black adults with hypertension but without heart failure or CKD, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB. [COR I; LOE B]

Impact of 2017 guidelines

- Estimated an additional 31 million individuals in the US will now need treatment.
 - Most nonpharmacological, but
 - 4.2 million will require antihypertensive medication.
- An estimated 53% of the 55 million US patients already taking antihypertensive medication will need to intensify their current regimen.

AAFP declines to endorse new 130/80 BP treatment guidelines

- AAFP will continue to endorse JNC-8 (in conjunction with the 2017 ACP/AAFP clinical practice guideline).
 - “the bulk of the guideline wasn’t based on a systematic evidence review.”
 - No evidence the ACC/AHA risk assessment tool used in this manner improves outcomes.
 - Too much weight was given to SPRINT.

The BEST approach

- JNC-8
- ASH/ISH
- ACP/AAFP Clinical Practice Guideline
- 2017 Clinical Practice Guideline

The BEST approach

ACP/AAFP 2013 Clinical JNC-8 Practice
ASH/ISH 2017 Guideline

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