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

The prehypertension category has been narrowed, and many individuals are now considered to have hypertension. Still, the number requiring medication management is expected to increase only slightly.

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I. Introduction

The American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Clinical Practice Guidelines recently released updated guidelines about the prevention, evaluation, and management of high blood pressure (BP) in adults. These guidelines were developed by the ACC/AHA with input from a number of other health care organizations. They are the first comprehensive updated guidelines since 2003. One of the major changes is the lowering of BP numbers that define high BP to account for complications that can occur at lower numbers and to allow for earlier intervention.

According the guideline authors, these new definitions will result in nearly half of the U.S. adult population (46%) having high BP, with the greatest impact expected among younger people. Additionally, the prevalence of high BP is expected to triple in men aged <45 years and to double in women aged <45 years. However, only a small increase is expected in the number of adults requiring antihypertensive medication. The information below summarizes the most important recommendations regarding diagnosis and initial management of high blood in adults provided by the new guidelines.

II. Definition

Recommendation

BP should be categorized as normal, elevated, or stage 1 or 2 hypertension to prevent and treat high BP. (Class I: strong recommendation; Level of evidence B-R [randomized trials]: moderate-quality evidence from 1 or more RCTs or a meta-analysis of moderate quality RCTs)

Details

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

Individuals with systolic BP (SBP) and diastolic BP (DBP) in 2 categories should be considered in the higher BP category. BP indicates blood pressure (based on an average of ≥2 readings obtained on ≥2 occasions).

Comment

The guidelines have moved away from the previous JNC 7 categories of prehypertension and hypertension and now categorize patients as either normal, elevated, or hypertensive. Although older guidelines classified 140/90 mm Hg as Stage 1 hypertension, this BP level is now considered Stage 2 hypertension under the new guidelines.

As with older BP classification systems, the choice and the naming of the categories were based on interpretation of risks and benefits of BP reduction in clinical trials. A number of meta-analyses of observational studies have demonstrated that hypertension is associated with increased risk of cardiovascular disease, end-stage renal disease, subclinical atherosclerosis, and all-cause death and that lowering BP is associated with benefits.

III. Office Measurement

Recommendation
For diagnosis and management of high BP, proper methods are recommended for accurate measurement and documentation of BP. (Class I: strong recommendation; Level of evidence C-EO [expert opinion]: consensus of expert opinion based on clinical experience)

Details

Key Steps for Proper BP Measurements
Step 1: Properly prepare the patient.
Step 2: Use proper technique for BP measurements.
Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension.
Step 4: Properly document accurate BP readings.
Step 5: Average the readings.
Step 6: Provide BP readings to patient.

Comment
Although BP measurements are performed routinely in a variety of health care settings, often, proper steps to accurately measure BP are not adhered to.

Patient preparation includes the following:

- The patient should relax, sitting in a chair (feet on floor, back supported) for >5 minutes. This means that BP measurements should not be performed while the patient is sitting or lying on an examining table.
- The patient should avoid caffeine, exercise, and smoking for at least 30 minutes before measurement.
- The patient should empty his/her bladder.
- Neither the patient nor the observer should talk during the rest period or during the measurement.
- Remove all clothing covering the location of cuff placement; BP measurements should not be performed over clothing.

Appropriate techniques for BP measurements include:

- Use a BP measurement device that has been validated, and ensure that the device is calibrated periodically.
- Support the patient's arm (eg, resting on a desk).
- Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum).
- Use the correct cuff size, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used.

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

Proper measurements for the diagnosis and treatment of hypertension include the following:

- At the first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings.
- Separate repeated measurements by 1 to 2 minutes.
- For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20 to 30 mm Hg above this level for an auscultatory determination of the BP level.
- For auscultatory readings, deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds.

When documenting the readings, the time of the most recent dose of antihypertensive medications should be noted. An average of ≥2 readings obtained on ≥2 occasions should be used when making the diagnosis of hypertension. Following BP measurement, the values should be communicated to the patients verbally and in writing.

IV. Out-of-Office Measures and Self-Monitoring

Recommendation
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. (Class I: strong recommendation; Level of evidence A: high-quality evidence from ≥1 RCT or meta-analysis of high-quality RCTs or ≥1 RCTs corroborated by high-quality registry studies)

Details
Home or ambulatory measurement of BP can be helpful for confirmation and management of hypertension. Self-monitoring of BP has shown limited evidence for treatment-related BP reduction and achievement of BP control. However, with the increased recognition of inconsistencies between clinic/office and home BP monitoring (HBPM) or ambulatory BP monitoring (ABPM) and greater reduction in BP being recommended in the updated guidelines for hypertension control, ABPM readings are gaining more importance. Although APBM is considered the best out-of-office measurement method, HBPM is a more practical for most patients. If self-monitoring is used, it is important that the BP measurement device used has been validated with an internationally accepted protocol and the results have been published in a peer-reviewed journal.

The relationship between HBPM BP readings and corresponding readings obtained in the office and by ABPM is listed in the table below. Although the exact relationship between clinic/office BP results and home or ambulatory BP readings is not known, it is generally accepted that clinic/office BP reading are higher than HBPM or ABPM measurements.

Clinic	HBPM	Daytime ABPM	Nighttime ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

ABPM-ambulatory BP monitoring; DBP-diastolic BP; HBPM-home BP monitoring; and SBP-systolic BP

Commentmment
ABPM and HBPM have been used for many years to assess BP in a nonclinic/office setting. A systematic review conducted by the U.S. Preventive Services Task Force reported that ABPM provided a better method to predict long-term cardiovascular disease (CVD) outcomes than did office BPs. It incorporates new information from studies of HBPM, ABPM, and the relationship of overall CVD risk to the effectiveness of BP lowering, clinical outcomes related to different BP goals, strategies to improve BP control, and other areas. Limited evidence suggests, but could not confirm, that HBPM may serve as a similar predictor of outcomes. Meta-analyses of RCTs have identified clinically useful reductions in SBP and DBP and achievement of BP goals at 6 months and 1 year when self-monitoring of BP has been used in conjunction with other interventions, compared with usual care. Meta-analyses of RCTs have identified only small net reductions in SBP and DBP at 6 months and 1 year for use of self-monitoring of BP on its own, as compared with usual care.

V. BP Treatment Threshold and the Use of CVD Risk Estimation

Recommendation
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 an average DBP of ≥80 mm Hg, and for primary prevention in adults with an estimated 10-year atherosclerotic CVD (ASCVD) risk of ≥10% and an average SBP ≥130 mm Hg or an average DBP ≥80 mm Hg. (For SBP-Class I: strong recommendation; Level of evidence A: high-quality evidence from ≥1 RCT or meta-analysis of high-quality RCTs or ≥1 RCTs corroborated by high-quality registry studies; for DBP-Class I: strong recommendation; Level of evidence C-EO [expert opinion]: consensus of EO based on clinical experience)

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 a DBP of ≥90 mm Hg. (Class I: strong recommendation; Level of evidence C-LD [limited data]: Randomized or nonrandomized observational or registry studies with limitations of design or execution, or meta-analyses of these studies or physiological or mechanistic studies in human subjects)

Details
The new guidelines recommend only prescribing medication for Stage I hypertension (SBP 130 mmHg to 139 mm Hg or DBP 80 mm Hg to 89 mmHg) if the patient:
- has a history of a previous cardiovascular event such as a heart attack or stroke
- is at high risk of heart attack or stroke based on age, the presence of diabetes mellitus, chronic kidney disease or calculation of atherosclerotic risk (using the same risk calculator used in evaluating high cholesterol).

In patients with none of these risk factors, BP medication for primary prevention is not recommended in patients with Stage 1 hypertension.

Comment
Nonpharmacological treatment (weight loss, a heart-healthy diet such as the DASH diet, sodium restriction, potassium supplementation preferably from the diet, physical activity, and moderation of alcohol intake) should be used in all patients with elevated BP or hypertension. Pharmacological therapy should be reserved for only a subset of patients.

In patients with Stage 1 hypertension who have an established history of a cardiovascular event, pharmacological therapy for BP lowering is considered secondary prevention and several meta-analyses of RCTs support the use of these agents to prevent additional cardiovascular events.

In patients without cardiovascular disease, until recently, the use of pharmacological agents was less well-established. In the past, many RCTs of BP lowering in adults included relatively few low-risk adults without a history of cardiovascular disease with hypertension. More recently, the SPRINT trial (Systolic Blood Pressure Intervention Trial) provides support for the use of BP-lowering medications in patients without cardiovascular disease, but at risk for cardiovascular disease, at SBP levels ≥130 mm Hg. However, it is important to note that few SPRINT participants had untreated SBP between 130 mm Hg and 139 mm Hg at baseline.

Increased risk of CVD was defined by ≥1 of the following: clinical or subclinical CVD other than stroke; chronic kidney disease (estimated glomerular filtration rate of 20 to <60 mL/minute per 1.73 m2), a 10-year risk of CVD of ≥15% based on the Framingham risk score; or an age of ≥75 years. Patients with diabetes mellitus or prior stroke were excluded. Although the Framingham risk score used for this trial is roughly equivalent to only a 6% to 7% 10-year ASCVD risk per the ACC/AHA Pooled Cohort Equations, most participants in SPRINT had a much higher level of CVD risk.

These recommendations for use of antihypertensive therapy for secondary prevention differ from JNC 7 in its use of CVD risk, rather than diabetes or chronic kidney disease. In JNC 7, the BP threshold for initiation of antihypertensive drug therapy was ≥ 140/90 mm Hg for the general adult population and ≥130/80 mm Hg for adults with diabetes or chronic kidney disease. Since the publication of JNC 7, clinical trials using risk assessment and new data from randomized trials, observational studies, and simulation analyses have found that antihypertensive drug treatment based on overall ASCVD risk assessment as used for the initiation of antihyperlipidemic therapy, along with BP levels, may prevent more CVD events than treatment based on BP levels alone.

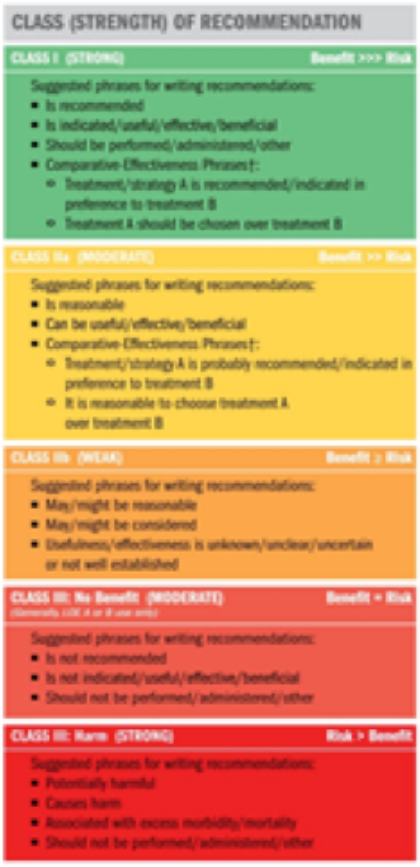
This recommendation for antihypertensive therapy for primary prevention of CVD is consistent with prior guidelines, such as JNC 7. As in the past, for those for whom nonpharmacological therapy has been ineffective, antihypertensive drug treatment should be added in patients with an SBP ≥140 mm Hg or a DBP ≥90 mm Hg, even in adults who are at lower risk than those included in RCTs.

VI. Choice of Initial Medication

Recommendation
For initiation of antihypertensive drug therapy, first-line agents include thiazide diuretics, CCBs, and ACE inhibitors or ARBs. (Class I: strong recommendation; Level of evidence A: high-quality evidence from >1 RCT or meta-analysis of high-quality RCTs or ≥1 RCTs corroborated by high-quality registry studies)

Details
When initiation of pharmacological therapy with a single medication is appropriate, consideration should be given to comorbid conditions (eg, HF, CKD) for which specific classes of BP-lowering medication are indicated. It should be noted that most patients who require pharmacological therapy may be best treated initially with 2 agents. Alpha blockers are not used as first-line therapy for hypertension because

Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care*
(Updated August 2015)



CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — Benefit >>> Risk

Suggested phrases for writing recommendations:
- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS IIa (MODERATE) — Benefit >> Risk

Suggested phrases for writing recommendations:
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS IIb (WEAK) — Benefit ≥ Risk

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

CLASS III: No Benefit (MODERATE) — Benefit = Risk
(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:
- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS III: Harm (STRONG) — Risk > Benefit

Suggested phrases for writing recommendations:
- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A
- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R (Randomized)
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR (Nonrandomized)
- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD (Limited Data)
- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO (Expert Opinion)

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

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VII. About the Authors

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VIII. References

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