



Blood Pressure Treatment in 2018

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Disclosures: None

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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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

Published on November 13, 2017, available at: *Hypertension* and *Journal of the American College of Cardiology*.

The full-text guidelines are also available on the following websites: AHA (professional.heart.org) and ACC (www.acc.org)



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Classification of BP

Categories of BP in Adults

| 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 |

Prevalence of Hypertension Based on 2 SBP/DBP Thresholds

| | SBP/DBP \geq 130/80 mm Hg or Self-Reported Antihypertensive Medication† | | SBP/DBP \geq 140/90 mm Hg or Self-Reported Antihypertensive Medication‡ | |
|----------------------------------|---|----------------|---|----------------|
| | Men (n=4717) | Women (n=4906) | Men (n=4717) | Women (n=4906) |
| Overall, crude | 46% | | 32% | |
| Overall, age-sex adjusted | 48% | 43% | 31% | 32% |
| Age group, y | | | | |
| 20–44 | 30% | 19% | 11% | 10% |
| 45–54 | 50% | 44% | 33% | 27% |
| 55–64 | 70% | 63% | 53% | 52% |
| 65–74 | 77% | 75% | 64% | 63% |
| 75+ | 79% | 85% | 71% | 78% |
| Race-ethnicity § | | | | |
| Non-Hispanic White | 47% | 41% | 31% | 30% |
| Non-Hispanic Black | 59% | 56% | 42% | 46% |
| Non-Hispanic Asian | 45% | 36% | 29% | 27% |
| Hispanic | 44% | 42% | 27% | 32% |

Points to Consider

- Definition of Hypertension
 - Emphasis on accurate measurement
- Role of Lifestyle modification
 - Initial and ongoing
- Selection and Titration of Medications
- Special Groups

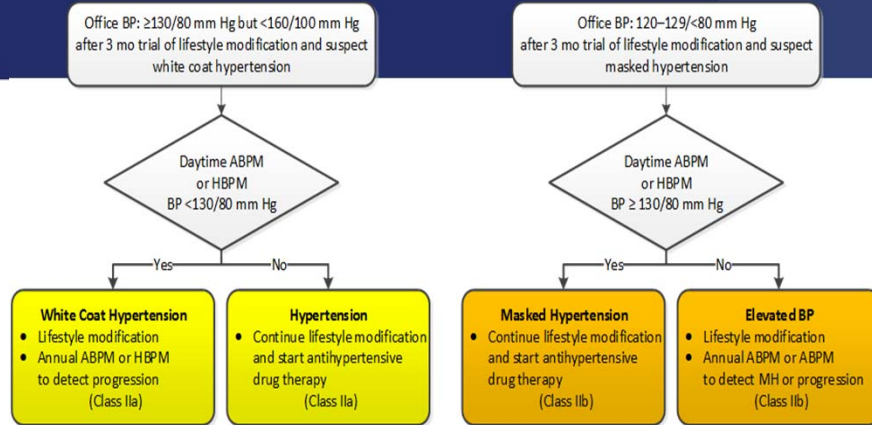
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Measurement of BP

BP Patterns Based on Office and Out-of-Office Measurements

| | Office/Clinic/Healthcare Setting | Home/Nonhealthcare/ABPM Setting |
|-------------------------|---|--|
| Normotensive | No hypertension | No hypertension |
| Sustained hypertension | Hypertension | Hypertension |
| Masked hypertension | No hypertension | Hypertension |
| White coat hypertension | Hypertension | No hypertension |

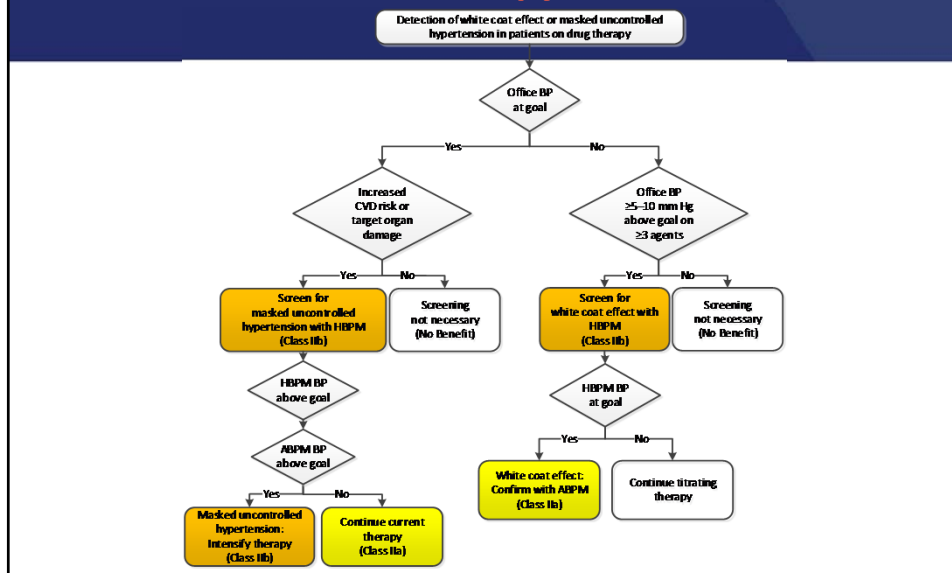
Detection of White Coat Hypertension or Masked Hypertension in Patients Not on Drug Therapy



Colors correspond to Class of Recommendation in Table 1.

ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; and HBPM, home blood pressure monitoring.

Detection of White Coat Effect or Masked Uncontrolled Hypertension in Patients on Drug Therapy



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Causes of Hypertension

Screening for Secondary Hypertension

New-onset or uncontrolled hypertension in adults

Conditions

- 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

Yes

No

Screen for secondary hypertension (Class I) (see Table 13)

Screening not indicated (No Benefit)

Positive screening test

Yes

No

Refer to clinician with specific expertise (Class IIb)

Referral not necessary (No Benefit)

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 |

Renal Artery Stenosis

| COR | LOE | Recommendations for Renal Artery Stenosis |
|-----|------|---|
| I | A | Medical therapy is recommended for adults with atherosclerotic renal artery stenosis. |
| IIb | C-EO | In adults with renal artery stenosis for whom medical management has failed (refractory hypertension, worsening renal function, and/or intractable HF) and those with nonatherosclerotic disease, including fibromuscular dysplasia, it may be reasonable to refer the patient for consideration of revascularization (percutaneous renal artery angioplasty and/or stent placement). |

Obstructive Sleep Apnea

| COR | LOE | Recommendation for Obstructive Sleep Apnea |
|------------|------------|--|
| IIb | B-R | In adults with hypertension and obstructive sleep apnea, the effectiveness of continuous positive airway pressure (CPAP) to reduce BP is not well established. |

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Nonpharmacological Interventions

Nonpharmacological Interventions

| COR | LOE | Recommendations for Nonpharmacological Interventions |
|-----|-----|---|
| I | A | Weight loss is recommended to reduce BP in adults with elevated BP or hypertension who are overweight or obese. |
| I | A | A heart-healthy diet, such as the DASH (Dietary Approaches to Stop Hypertension) diet, that facilitates achieving a desirable weight is recommended for adults with elevated BP or hypertension. |
| I | A | Sodium reduction is recommended for adults with elevated BP or hypertension. |
| I | A | Potassium supplementation, preferably in dietary modification, is recommended for adults with elevated BP or hypertension, unless contraindicated by the presence of CKD or use of drugs that reduce potassium excretion. |

Nonpharmacological Interventions (cont.)

| COR | LOE | Recommendations for Nonpharmacological Interventions |
|-----|-----|--|
| I | A | Increased physical activity with a structured exercise program is recommended for adults with elevated BP or hypertension. |
| I | A | Adult men and women with elevated BP or hypertension who currently consume alcohol should be advised to drink no more than 2 and 1 standard drinks* per day, respectively. |

*In the United States, 1 "standard" drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).

Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension

| | Nonpharmacological Intervention | Dose | Approximate Impact on SBP | |
|---|---------------------------------|---|---------------------------|--------------|
| | | | Hypertension | Normotension |
| Weight loss | Weight/body fat | 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 | DASH dietary pattern | 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/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 | Dietary potassium | Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium. | -4/5 mm Hg | -2 mm Hg |

Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension* (cont.)

| | Nonpharmacological Intervention | Dose | Approximate Impact on SBP | |
|-------------------------------------|---------------------------------|--|---------------------------|--------------|
| | | | Hypertension | Normotension |
| 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 | <p>In individuals who drink alcohol, reduce alcohol[†] to:</p> <ul style="list-style-type: none"> ● Men: ≤2 drinks daily ● Women: ≤1 drink daily | -4 mm Hg | -3 mm |

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Patient Evaluation

Basic and Optional Laboratory Tests for Primary Hypertension

| | |
|-------------------------|-------------------------------------|
| Basic testing | Fasting blood glucose* |
| | Complete blood count |
| | Lipid profile |
| | Serum creatinine with eGFR* |
| | Serum sodium, potassium, calcium* |
| | Thyroid-stimulating hormone |
| | Urinalysis |
| | Electrocardiogram |
| Optional testing | Echocardiogram |
| | Uric acid |
| | Urinary albumin to creatinine ratio |

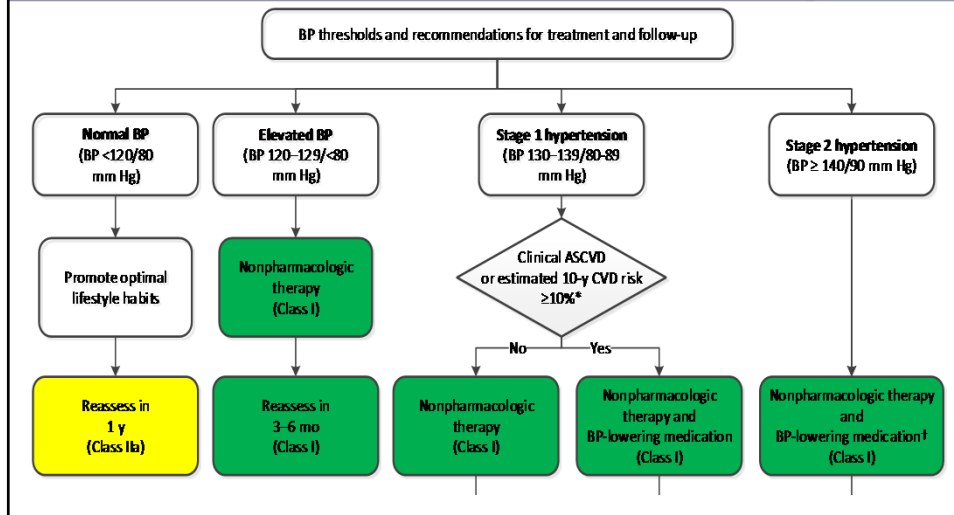
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Treatment of High BP

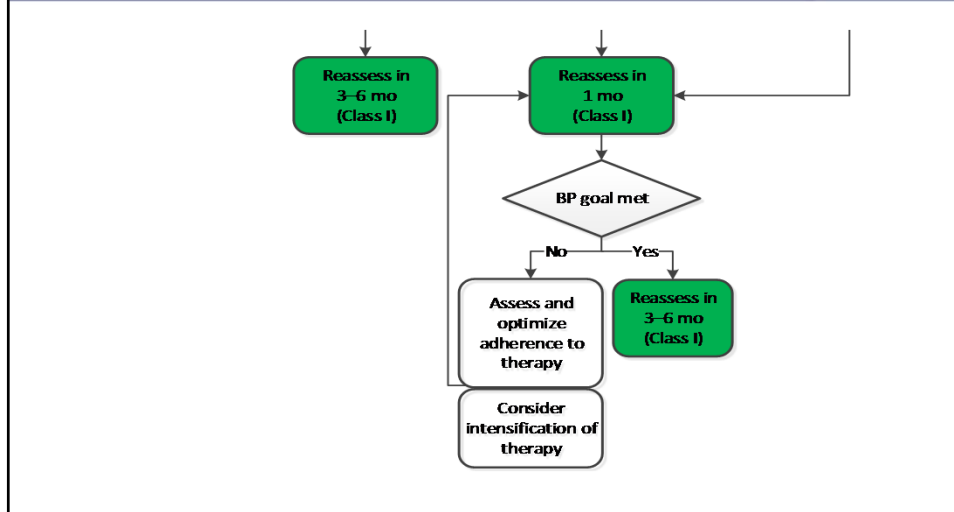
BP Treatment Threshold and the Use of CVD Risk Estimation to Guide Drug Treatment of Hypertension

| COR | LOE | Recommendations for BP Treatment Threshold and Use of Risk Estimation* to Guide Drug Treatment of Hypertension |
|-----|--------------|--|
| I | SBP: A | 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 | 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. |

Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up (continued on next slide)



Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up (continued)



General Principles of Drug Therapy

| COR | LOE | Recommendation for General Principle of Drug Therapy |
|----------------------|----------|--|
| III: Harm | A | Simultaneous use of an ACE inhibitor, ARB, and/or renin inhibitor is potentially harmful and is not recommended to treat adults with hypertension. |

BP Goal for Patients With Hypertension

| COR | LOE | Recommendations for BP Goal for Patients With Hypertension |
|------------|----------------------------------|---|
| I | SBP: B-R^{SR} | For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher a BP target of less than 130/80 mm Hg is recommended. |
| | DBP: C- EO | |
| IIb | SBP: B-NR | For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable. |
| | DBP: C- EO | |

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. |
| IIa | 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. |

Hypertension in Patients With Comorbidities

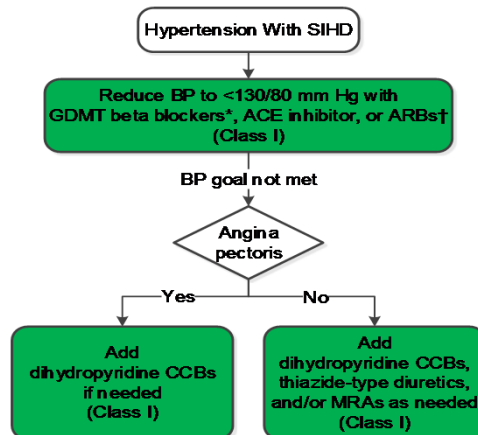
Stable Ischemic Heart Disease

| 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. |
| IIa | 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. |
| IIb | 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. |

Management of Hypertension in Patients With SIHD



Heart Failure

| COR | LOE | Recommendation for Prevention of HF in Adults With Hypertension |
|-----|-----------|--|
| I | SBP: B-R | In adults at increased risk of HF, the optimal BP in those with hypertension should be less than 130/80 mm Hg. |
| | DBP: C-EO | |

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. |

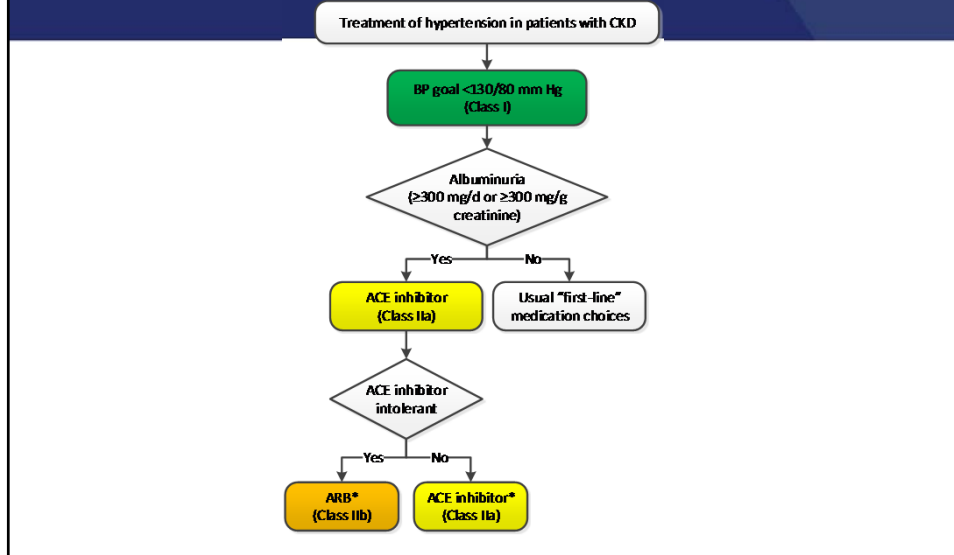
Heart Failure With Preserved Ejection Fraction

| COR | LOE | Recommendations for Treatment of Hypertension in Patients With HFpEF |
|-----|------|--|
| I | C-EO | In adults with HFpEF who present with symptoms of volume overload, diuretics should be prescribed to control hypertension. |
| I | C-LD | Adults with HFpEF 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. |

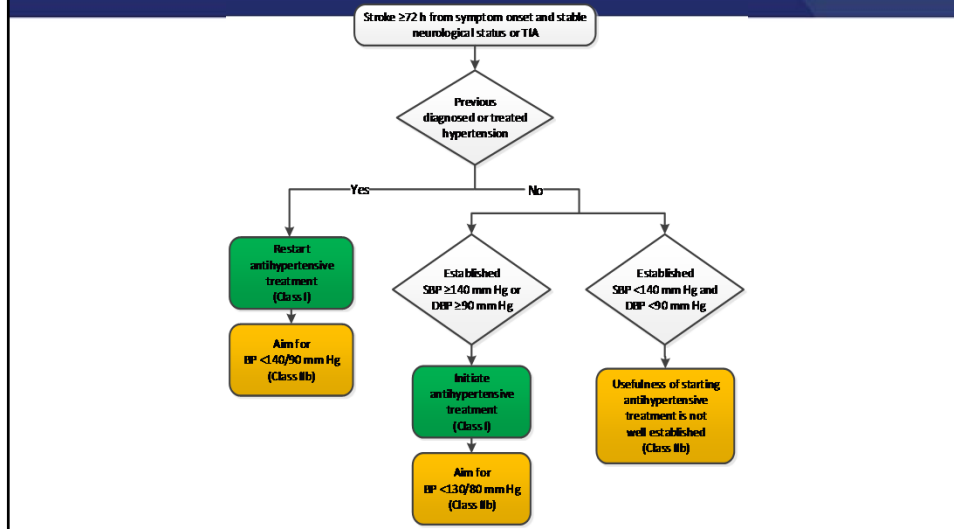
Chronic Kidney Disease

| 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. |

Management of Hypertension in Patients With CKD



Management of Hypertension in Patients With a Previous History of Stroke (Secondary Stroke Prevention)



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. |

Atrial Fibrillation

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

Valvular Heart Disease

| COR | LOE | Recommendations for Treatment of Hypertension in Patients With Valvular Heart Disease |
|-----|------|---|
| I | B-NR | In adults with asymptomatic aortic stenosis, hypertension should be treated with pharmacotherapy, starting at a low dose and gradually titrating upward as needed. |
| IIa | C-LD | In patients with chronic aortic insufficiency, treatment of systolic hypertension with agents that do not slow the heart rate (i.e., avoid beta blockers) is reasonable. |

Aortic Disease

| COR | LOE | Recommendation for Management of Hypertension in Patients With Aortic Disease |
|-----|------|---|
| I | C-EO | Beta blockers are recommended as the preferred antihypertensive agents in patients with hypertension and thoracic aortic disease. |

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Special Patient Groups

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. |

Age-Related Issues

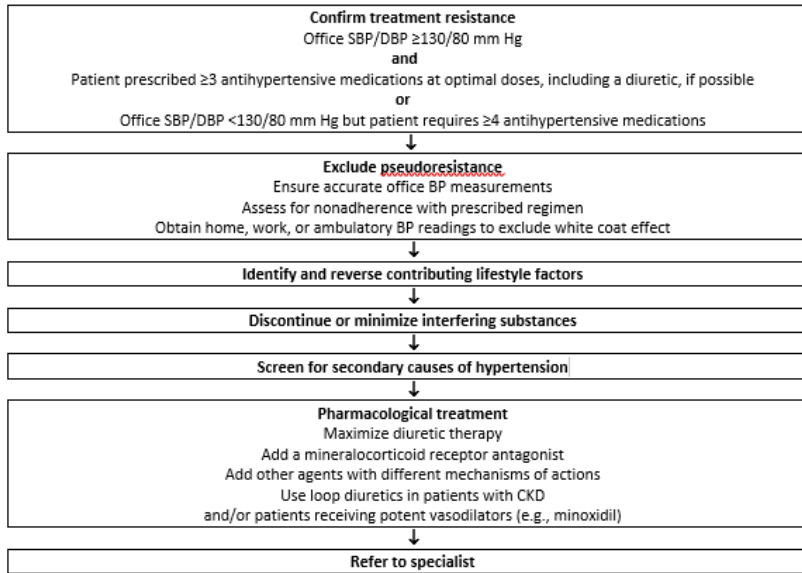
| COR | LOE | Recommendations for Treatment of Hypertension in Older Persons |
|-----|------|---|
| I | A | Treatment of hypertension with a SBP treatment goal of less than 130 mm Hg is recommended for noninstitutionalized ambulatory community-dwelling adults (≥65 years of age) with an average SBP of 130 mm Hg or higher. |
| Ila | C-EO | 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. |

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Other Considerations

Resistant Hypertension: Diagnosis, Evaluation, and Treatment

Figure 10. Resistant Hypertension: Diagnosis, Evaluation, and Treatment



2017 Hypertension Guideline

Summary of BP Thresholds and Goals for Pharmacological Therapy Plan of Care for Hypertension

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 | $\geq 130/80$ | $< 130/80$ |

Blood Pressure Treatment in 2018

Questions?