Hypertension Management in Black Adults

Basic Information

Terminology

- US Census Bureau defines the adjectives *Black* or *African American* as denoting US Americans with ancestral origins in any of the Black racial groups of Africa[1]
- US and European guidelines on hypertension[2,3] also use the adjective *Black* with that intended meaning: US or European people (respectively) with ancestral origins in any of the Black racial groups of Africa

Risk Models and Risk Scores

- For atherosclerotic cardiovascular disease: the ASCVD Risk Estimator, an online calculator by the American College of Cardiology[4,5]
  - Web-based application that uses data obtained from the race- and sex-specific Pooled Cohort Equations[4] to predict 10-year and lifetime risk of atherosclerotic cardiovascular disease[5]
  - May be used to assess individualized cardiovascular risk for patients with hypertension to help define appropriate treatment goals and options;[6] it is intended for patients with LDL-C level less than 190 mg/dL, without atherosclerotic cardiovascular disease, and not on LDL-C–lowering therapy[5]

Epidemiology

- Prevalence and control rates of hypertension vary significantly according to racial/ethnic subgroups[7]
- Black Americans develop hypertension and associated organ damage at younger ages, have a higher frequency of resistant hypertension, and have a higher risk of end-organ damage including stroke, heart failure, and kidney disease, culminating in greater hypertension-associated mortality, than other racial/ethnic American subgroups[7-9]
  - For epidemiologic purposes, presence of hypertension can be defined as (1) systolic blood pressure of 130 mm Hg or more or diastolic blood pressure of 80 mm Hg or more; (2) if the person said yes to taking antihypertensive medication; or (3) if the person has been told by a health care professional on 2 or more occasions that they had hypertension.[10] By that definition, the prevalence of hypertension among Black Americans is high, with an age-adjusted prevalence of 56.6% (males) and 55.3% (females) between 2015 and 2018[10]

- Black Americans with hypertension are at 1.8 times higher risk of fatal stroke, 1.5 times higher risk of heart failure, and 4.2 times higher risk of end-stage renal disease compared with the cohort of Americans who are White, Hispanic, or both[2]
- Among Americans recommended to take blood pressure medication, blood pressure control is higher among non-Hispanic White adults (32%) than among non-Hispanic Black adults (25%), non-Hispanic Asian American adults (19%), or Hispanic adults (25%)[11]
- Age-adjusted, hypertension-attributable mortality rates are higher for non-Hispanic Black Americans (males and females) than for other racial/ethnic subgroups[2]

- Social determinants of health and environmental factors likely play a significant role in how hypertensive disease manifests within the Black patient population[9,12]

Treatment

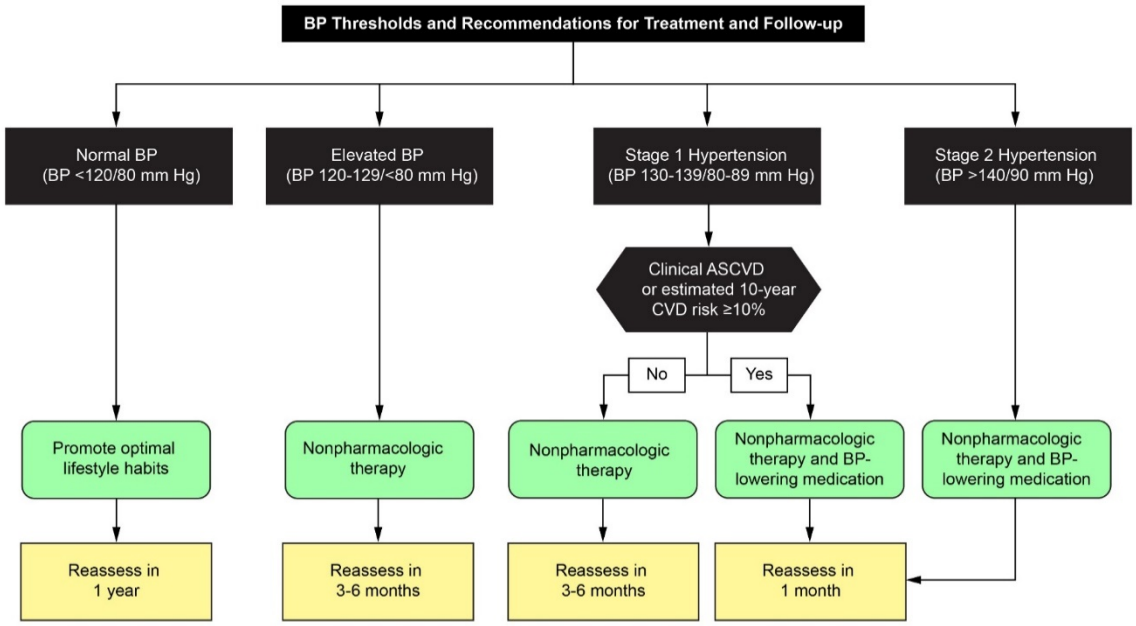
Approach to Treatment

- 2017 American College of Cardiology/American Heart Association blood pressure guideline defines hypertension in adult patients as blood pressure of 130/80 mm Hg or more and recommends it be lowered to a goal of less than 130/80 mm Hg in patients with increased risk of cardiovascular disease[2]
  - A blood pressure goal of less than 130/80 mm Hg may also be reasonable in adults with confirmed hypertension without additional markers of increased risk of cardiovascular disease[2]
- Blood pressure goal in Black patients is the same as in the general population[2]
- 2017 American College of Cardiology/American Heart Association blood pressure guideline[2] recommends estimating a patient's individualized 10-year risk of atherosclerotic cardiovascular disease, using the ASCVD Risk Estimator,[5] to risk stratify all patients with hypertension before defining treatment goals and options[2] **(Figure 1)**
  - This individualized cardiovascular risk data enables patients to understand the risk and benefits of achieving blood pressure goals[4]
  - Patients with blood pressure of 130/80 mm Hg or more and 10-year risk of atherosclerotic cardiovascular disease more than 10%, as well as those with blood pressure more than 140/90 mm Hg, are recommended to receive pharmacologic therapy[2]
- 2017 American College of Cardiology/American Heart Association blood pressure guideline endorses the use of thiazide-type diuretics such as chlorthalidone or a calcium channel blocker such as amlodipine as initial therapy in Black patients without heart failure or chronic kidney disease if monotherapy is indicated **(Figure 2)**
  - However, most patients with hypertension, and particularly Black patients, do not achieve control with 1 medication[2]
- 2018 European Society of Cardiology/European Society of Hypertension blood pressure guideline recommends initial therapy with a 2-drug combination, preferably as a single-pill combination, for most patients with hypertension[3]

- Single-pill combination typically consists of a renin-angiotensin system inhibitor (ie, an ACE inhibitor or an angiotensin receptor blocker) in combination with a calcium channel blocker or a diuretic[3,7]
- Previous evidence has confirmed that a blood pressure decline of 10/5 mm Hg or more with this therapeutic approach leads to a reduction in cardiovascular morbidity and mortality consistently across age, gender, and race/ethnicity groups[13]

- Combination therapy has been shown to be effective and efficient for all patient groups with hypertension and provides a much-needed benefit to Black patients, who overall have higher blood pressure and increased morbidity
- Ultimately, the approach to management of hypertension is similar in Black patients compared with other patients except for the small percentage of patients who can attain control with monotherapy alone

Figure 1. Blood pressure thresholds and recommendations for treatment and follow-up.



BP, blood pressure; ASCVD, atherosclerotic cardiovascular disease; CVD, cardiovascular disease.

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

Figure 2. 2017 AHA/ACC hypertension recommendations for Black patients.

2017 AHA/ACC Hypertension Recommendations for Black Patients		
COR	**LOE**	**Recommendation**
I	B-R	1. In black adults with hypertension without HF or nephropathy, including those with DM, initial antihypertensive treatment should include a thiazide-type diuretic or calcium channel blocker.
I	C-LD	2. Two or more antihypertensive medications are recommended for most adults with hypertension to achieve the BP target of <130/80 mmHg, especially in black patients with hypertension.

AHA/ACC, American Heart Association and American College of Cardiology; COR, class of recommendation; LOE, level of evidence; B-R, B-randomized; C-LD, C–limited data; HF, heart failure; DM, diabetes mellitus; BP, blood pressure.

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

Nondrug and Supportive Care

- Patient education and efforts to overcome nonadherence are of extreme importance
  - Clinicians should use culturally appropriate and literacy-appropriate material
  - Team-based care, involving primary care practitioner, pharmacists, other health care professionals, patient, and family/support system, is necessary
- Initiate comprehensive, therapeutic lifestyle modifications that can be maintained in all patients with hypertension[9]
- Discuss all lifestyle modifications with the patient with hypertension[14]
- Ensure proper self-measured home blood pressure monitoring[15]
  - Self-measured home blood pressure monitoring is a cost-effective means of managing hypertension
  - Benefit of overall blood pressure control is found to be greatest when self-measured home blood pressure monitoring is performed along with cointerventions, such as patient education and training, behavioral change counseling, medication recommendations and management, and prescription and adherence monitoring[15]
- Recommend at least moderate level of physical activity for at least 90 to 150 minutes/week[6]
- Prescribe the DASH diet or variants thereof to lower blood pressure (Dietary Approaches to Stop Hypertension)[16]
  - Standard DASH diet limits daily sodium intake to 2300 mg/day and enhances dietary intake of potassium, leading to a reduction in blood pressure

  - Black patients have experienced the largest blood pressure reduction in response to the DASH approach[6]
- Recommend weight loss of 1 kg or more for all patients who are overweight, with an optimal goal of ideal body weight[6]
- Recommend alcohol use in moderation[6]
  - Males: less than 2 drinks/day
  - Females: less than 1 drink/day
- Recommend smoking cessation, supportive care, and referral to smoking cessation programs[3]
- Encourage community outreach programs to raise awareness and promote treatment adherence in the management of hypertension[17]
  - LABBPS model of care (from the Los Angeles Barbershop Blood Pressure Study) was developed by pharmacists for non-Hispanic Black hypertensive males and carried out through a collaboration between barbers, pharmacists, and physicians
  - This model serves as an example of integrated hypertension care aimed at high-risk populations to encourage treatment adherence and successful management

Drug Therapy

Monotherapy

- Most patients will require drug therapy in addition to lifestyle modification to achieve optimal blood pressure control[3]
- The 4 major classes of antihypertensive drugs generally considered for initial treatment of hypertension are: ACE inhibitors, angiotensin receptor blockers (sartans), calcium channel blockers, and thiazide or thiazide-type diuretics[3,6] **(Table 1)**
  - Use of β-blockers in hypertension is restricted to patients with additional indications or comorbidities (eg, angina, previous myocardial infarction, heart failure, heart rate control)[3,6]
- Monotherapy with a thiazide-type diuretic or dihydropyridine calcium channel blocker is preferred to monotherapy with an ACE inhibitor or an angiotensin receptor blocker in Black patients with hypertension; however, most patients with hypertension, and particularly most Black patients, do not achieve control with monotherapy[2]

Combination Therapy

- For patients with blood pressure more than 20/10 mm Hg above goal (less than 130/80 mm Hg by American College of Cardiology/American Heart Association guideline) or patients above goal (less than 140/90 mm Hg by European Society of Cardiology/European Society of Hypertension guideline), initiate combination therapy, consisting of 2 different classes of antihypertensive medication, as first line therapy[2,3,6]

- Consider initiating combination therapy as initial therapy in Black patients to reach goal blood pressure less than 130/80 mm Hg, given the higher incidence of resistant hypertension in this population (ie, uncontrolled blood pressure on 3 drug classes or controlled blood pressure on 4 or more drug classes)[2,6]
    - Both the European and American guidelines emphasize this approach as an alternative to monotherapy in Black patients[2,18]
        - Prescribe single-pill combination therapy with an ACE inhibitor or an angiotensin II receptor blocker along with a thiazide-type diuretic or a dihydropyridine calcium channel blocker[2]
        - Single-pill combination therapy encourages better medication adherence with higher likelihood of achieving blood pressure goals and less risk of adverse effects[6]
- Add a third agent (either the calcium channel blocker or diuretic if not already started) if hypertension is not effectively controlled by initial combination therapy (ie, an ACE inhibitor or an angiotensin receptor blocker plus a dihydropyridine calcium channel blocker or a diuretic)[2]
- Additional lines of therapy are as follows:
    - Fourth line: mineralocorticoid receptor antagonists (eg, eplerenone, spironolactone)
    - Fifth and sixth line: additional diuretic, vasodilator, or sympatholytic, if additional indications exist based on comorbidities[2]
- Refer to a hypertension specialist for resistant hypertension, defined as uncontrolled blood pressure on 3 or more complementary antihypertensive medications given at optimal doses and including a diuretic, or controlled blood pressure on 4 or more medications[2]

Table 1. Drug Therapy: Hypertension management in Black patients.*†‡

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
Thiazide diuretics					
Chlorthalidone	First line monotherapy in the absence of a compelling indication or as part of a multidrug regimen[D1,D2] Thiazide diuretics are recommended in combination with a renin-angiotensin system blocker in patients with volume overload or edema[D2] Preferred	Usual dose: 12.5-25 mg PO once daily[D1] Max dose: 100 mg PO once daily[D4]	Contraindicated in anuric patients and those with sulfonamide hypersensitivity[D4] Potential for exacerbation or activation of systemic lupus erythematosus[D4] Use with caution in severe renal disease, hepatic impairment, progressive liver disease, or gout[D1,D4]	Cholesterol/triglycerides increased Electrolyte depletion Hyperglycemia Hyperuricemia Hypovolemia[D4,D5]	Monitor electrolytes and uric acid concentrations periodically[D1] Low risk of cross-sensitivity with sulfonamide allergy[D6] Appears to retain effectiveness at GFR < 30 mL/minute/1.73 m^2[D7]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	thiazide diuretic owing to long half-life and proven trial reduction of CVD[D1]				
Hydrochlorothiazide	First line monotherapy in the absence of a compelling indication or as part of a multidrug regimen[D1,D2] Thiazide diuretics are recommended in combination with a renin-angiotensin system blocker in patients with volume	Usual dose: 25-50 mg PO once daily[D1] Max dose: 50 mg PO once daily[D5]	Contraindicated in anuric patients and those with sulfonamide hypersensitivity[D5] Potential for exacerbation or activation of systemic lupus erythematosus[D5] Use with caution in patients with severe renal disease, hepatic impairment, progressive liver disease, or gout[D1,D5]	Acute myopia Cholesterol/triglycerides increased Electrolyte depletion Hyperglycemia Hyperuricemia Hypovolemia Secondary angle-closure glaucoma[D5]	Monitor electrolytes and uric acid concentrations periodically[D1] Low risk of cross-sensitivity with sulfonamide allergy[D6] Does not appear to retain effectiveness at GFR < 30 mL/minute/1.73 m^2[D7]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	overload or edema[D2]				
Calcium channel blockers (CCB)					
Dihydropyridines					
Amlodipine	First line monotherapy in the absence of a compelling indication or as part of a multidrug regimen[D1,D2] Add-on to beta-blockers in patients with concomitant SIHD/angina and uncontrolled hypertension[D1]	Usual dose: 2.5-10 mg PO once daily[D1] Max dose: 10 mg PO once daily[D8]	Use with caution in patients with HFrEF; amlodipine is a preferred dihydropyridine CCB if use is required[D1] Use with caution in patients with hepatic failure or severe aortic stenosis[D8]	Hypotension Peripheral edema[D8]	Edema more common in females than in males[D1]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
Felodipine, extended-release	First line monotherapy in the absence of a compelling indication or as part of a multidrug regimen[D1,D2] Add-on to beta-blockers in patients with concomitant SIHD/angina and uncontrolled hypertension[D1]	Usual dose: 2.5-10 mg PO once daily[D1] Max dose: 10 mg PO once daily[D9]	Use with caution in patients with HFrEF or hepatic impairment[D1,D9] Drug interactions: may need to avoid or adjust dosage of certain drugs[D9]	Hypotension Peripheral edema[D9]	Edema more common in females than in males[D1]
Nondihydropyridines					
Diltiazem, extended-release	First line monotherapy in the absence of a compelling indication or as part of a	Usual dose: 120-360 mg PO once daily[D1] Max dose:	Contraindicated in patients with second- or third-degree heart block, sick sinus syndrome, hypotension, or	AV block Bradycardia Constipation Hepatic enzymes increased Hypotension Rash[D11]	Monitor renal and hepatic function at regular intervals[D11]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	multidrug regimen[D1,D2] Preferred in patients with concomitant atrial fibrillation[D10] Preferred over dihydropyridine CCB if monotherapy with a CCB used in a CKD patient with proteinuria[D2, D7]	480 mg PO once daily[D11]	acute MI and pulmonary congestion[D11] Do not use in HFrEF[D1] May worsen heart failure[D11] Use with caution in patients with renal or hepatic impairment[D11] Drug interactions: may need to avoid or adjust dosage of certain drugs[D11]		
Verapamil, extended-release	First line monotherapy in the absence of a compelling indication or as part of a multidrug regimen[D1,D2]	Usual dose: 120-360 mg/day PO 1-2 doses[D1] Max dose: 480 mg/day PO[D12]	Contraindicated in patients with severe left ventricular dysfunction, second- or third-degree heart block, sick sinus syndrome,	AV block Bradycardia Constipation Hepatic enzymes increased Hypotension[D12]	Monitor hepatic function periodically[D12]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	Preferred in patients with concomitant atrial fibrillation[D10] Preferred over dihydropyridine CCB if monotherapy with a CCB used in a CKD patient with proteinuria[D2, D7]		hypotension, cardiogenic shock, WPW, or Lown-Ganong-Levine syndrome[D12] Do not use in HFrEF[D1] May worsen heart failure[D12] Use with caution in patients with renal impairment, hepatic impairment, myasthenia gravis, or Duchenne muscular dystrophy[D12] Drug interactions: may need to avoid or adjust dosage of certain drugs[D12]		
Angiotensin receptor blockers (ARB)					

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
Losartan	First line in patients with concomitant albuminuria[D1] Recommended in patients with HFpEF and persistent hypertension after management of volume overload[D1] May be preferred over ACEI owing to increased risk of ACEI-associated angioedema in Black patients[D13-D15]	Usual dose: 50-100 mg/day PO in 1-2 doses[D1] Max dose: 100 mg/day PO[D16] Adjust initial dose for mild to moderate hepatic impairment[D16]	Has not been studied in patients with severe hepatic impairment[D16] Patients whose renal function is dependent on the renin-angiotensin system (e.g., those with heart failure) may be at risk of developing renal dysfunction[D16] Drug interactions: may need to avoid or adjust dosage of certain drugs[D16]	Hyperkalemia Hypotension Nephrotoxicity[D16]	Monitor blood pressure, renal function, and serum potassium closely during therapy[D16] Patients with ACEI-induced angioedema can receive an ARB 6 weeks after the ACEI is discontinued[D1]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
Valsartan	First line in patients with concomitant albuminuria[D1] Recommended in patients with HFpEF and persistent hypertension after management of volume overload[D1] May be preferred over ACEI owing to increased risk of ACEI-associated angioedema in Black patients[D13-D15]	Usual dose: 80-320 mg PO once daily[D1] Max dose: 320 mg PO once daily[D17]	Has not been studied in patients with severe hepatic impairment[D17] Patients whose renal function is dependent on the renin-angiotensin system (e.g., those with heart failure) may be at risk of developing renal dysfunction[D17] Drug interactions: may need to avoid or adjust dosage of certain drugs[D17]	Hyperkalemia Hypotension Nephrotoxicity[D17]	Monitor blood pressure, renal function, and serum potassium closely during therapy[D17] Patients with ACEI-induced angioedema can receive an ARB 6 weeks after the ACEI is discontinued[D1]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
Angiotensin-converting enzyme inhibitors (ACEI)					
Benazepril	First line in patients with concomitant albuminuria[D1] Recommended in patients with HFpEF and persistent hypertension after management of volume overload[D1] ARB may be preferred over ACEI owing to increased risk of ACEI-associated angioedema in Black	Usual dose: 10-40 mg/day PO in 1-2 doses[D1] Max dose: 40 mg/day PO[D18] Adjust dose for GFR < 30 mL/minute/1.73 m^2[D18]	Contraindicated in patients with history of angioedema[D18] Use with caution in patients with renal impairment, renal artery stenosis, or obstruction in the outflow tract of the left ventricle (i.e., aortic stenosis, hypertrophic cardiomyopathy)[D18,D19] Patients whose renal function is dependent on the renin-angiotensin system (e.g., those with heart failure) may be at risk of developing renal dysfunction[D18]	Agranulocytosis Angioedema Cough Hepatotoxicity Hyperkalemia Hypotension Nephrotoxicity Neutropenia[D18,D19]	Angioedema and cough occur more often in Black patients compared with other patients[D1,D2,D14] Monitor blood pressure, renal function, serum potassium, and WBC closely during therapy[D18,D19]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	patients[D13-D15]		Drug interactions: may need to avoid or adjust dosage of certain drugs[D18]		
Lisinopril	First line in patients with concomitant albuminuria[D1] Recommended in patients with HFpEF and persistent hypertension after management of volume overload[D1] ARB may be preferred over ACEI owing to increased risk of ACEI-associated angioedema	Usual dose: 10-40 mg PO once daily[D1] Max dose: 40 mg PO once daily[D21] Adjust dose for CrCl ≤ 30 mL/minute[D21]	Contraindicated in patients with history of angioedema[D21] Use with caution in patients with renal artery stenosis or obstruction in the outflow tract of the left ventricle (i.e., aortic stenosis, hypertrophic cardiomyopathy)[D21] Patients whose renal function is dependent on the renin-angiotensin system (e.g., those with heart failure) may be at risk of developing renal	Agranulocytosis Angioedema Cough Hepatotoxicity Hyperkalemia Hypotension Nephrotoxicity Neutropenia[D19,D21]	Angioedema and cough occur more often in Black patients compared with other patients[D1,D2,D14] Monitor blood pressure, renal function, serum potassium, and WBC closely during therapy[D19,D21]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	in Black patients[D13-D15] Lisinopril may be a preferred ACEI in patients with hepatic dysfunction as it is not a prodrug and does not require hepatic activation[D20]		dysfunction[D21] Drug interactions: may need to avoid or adjust dosage of certain drugs[D21]		
Beta-blockers					
Carvedilol	First line in patients with concomitant SIHD/angina[D1] Preferred in patients with HFrEF§, aortic	Usual dose: 6.25-25 mg PO twice daily[D1] Max dose: 25 mg PO twice daily[D22]	Contraindicated in patients with asthma, significant bradycardia, second- or third-degree heart block, sick sinus syndrome, decompensated heart failure,	Bradycardia Dizziness Fatigue Hyperkalemia Hypotension[D22,D23]	Nonselective beta-blocker with alpha$_1$-blocking activity[D22] Dizziness and other adverse reactions may occur at a

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	disease, atrial fibrillation, or post-MI[D1]		cardiogenic shock, and severe hepatic impairment[D22] Avoid in patients with chronic aortic insufficiency[D1] Abrupt discontinuation may result in severe exacerbations of angina, MI, and/or ventricular arrhythmia[D22] May worsen heart failure[D22] Beta-blockers may mask signs and symptoms of hypoglycemia and hyperthyroidism[D22] Use with caution in patients with bronchospastic disease, peripheral		higher rate in patients with poor metabolism of CYP2D6, owing to higher plasma drug concentrations[D22]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
			vascular disease, pheochromocytoma, and Prinzmetal variant angina[D22] Drug interactions: may need to avoid or adjust dosage of certain drugs[D22]		
Metoprolol succinate, extended-release	First line in patients with concomitant SIHD/angina[D1] Preferred in patients with HFrEF§, aortic disease, atrial fibrillation, or post-MI[D1] Cardioselective agents preferred in patients with	Usual dose: 50-200 mg PO once daily[D1] Max dose: 400 mg PO once daily[D24]	Contraindicated in patients with significant bradycardia, second or third-degree heart block, sick sinus syndrome, decompensated heart failure, and cardiogenic shock[D24] Abrupt discontinuation may result in severe exacerbations of angina, MI, and/or ventricular	Bradycardia Dizziness Fatigue Hyperkalemia Hypotension[D23,D24]	Cardioselective beta-blocker[D24] Cardioselectivity is decreased in patients with poor metabolism of CYP2D6, owing to higher plasma drug concentrations[D24]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	bronchospastic disease[D1]		arrhythmia[D24] May worsen heart failure[D24] Beta-blockers may mask signs and symptoms of hypoglycemia and hyperthyroidism[D24] Use with caution in patients with hepatic impairment, bronchospastic disease, peripheral vascular disease, and pheochromocytoma[D24]		
Nebivolol	First line in patients with concomitant SIHD/angina[D1] Preferred in patients with	Usual dose: 5-40 mg PO once daily[D1] Max dose: 40 mg PO once daily[D25]	Contraindicated in patients with significant bradycardia, second- or third-degree heart block, sick sinus syndrome,	Bradycardia Dizziness Fatigue Headache Hyperkalemia Hypotension[D23,D25]	Cardioselective beta-blocker[D25] Induces nitric oxide-induced vasodilation[D1]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	HFrEF§, aortic disease, atrial fibrillation, or post-MI[D1] Cardioselective agents preferred in patients with bronchospastic disease[D1]	Adjust initial dose for moderate hepatic impairment or CrCl < 30 mL/minute[D25]	decompensated heart failure, cardiogenic shock, and severe hepatic impairment[D25] Abrupt discontinuation may result in severe exacerbations of angina, MI, and/or ventricular arrhythmia[D25] May worsen heart failure[D25] Beta-blockers may mask signs and symptoms of hypoglycemia and hyperthyroidism[D25] Use with caution in patients with bronchospastic disease, peripheral vascular disease, and		

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
			pheochromocytoma[D25] Drug interactions: may need to avoid or adjust dosage of certain drugs[D25]		
Mineralocorticoid receptor antagonists (MRA)					
Eplerenone	Add-on therapy for resistant hypertension[D1] Preferred agent for primary aldosteronism[D1] Proven benefit in patients with concomitant HF or post-MI[D2,D26,D27]	Usual dose: 50-100 mg/day PO in 1-2 doses[D1] Max dose: 50 mg PO twice daily[D28]	Contraindicated in patients with serum potassium > 5.5 mEq/L at initiation, T2DM with microalbuminuria, SCr > 2 mg/dL in males or > 1.8 mg/dL in females, or CrCl < 50 mL/minute[D28] Drug interactions: may need to avoid or adjust dosage of certain drugs[D28]	Gynecomastia Hyperkalemia Hypotension Vaginal bleeding[D28]	Monitor serum potassium before initiating therapy, within the first week, at 1 month after initiation, then periodically thereafter[D28] Eplerenone is 1.3-2 times less potent than spironolactone on a mg-for-mg basis[D2]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
					More favorable adverse effect profile compared with spironolactone; less gynecomastia[D2] The antihypertensive effect of MRA is superior to that of ARB in Black patients[D2]
Spironolactone	Add-on therapy for resistant hypertension[D1] Preferred agent for primary	Usual dose: 25-100 mg PO once daily[D1] Max dose: 100 mg PO once daily[D29]	Contraindicated in patients with hyperkalemia or Addison disease[D29] Drug interactions: may need to avoid or adjust dosage of certain drugs[D29]	Electrolyte depletion Gynecomastia Hyperglycemia Hyperkalemia Hyperuricemia Hypotension Hypovolemia Renal function worsening[D29]	Monitor serum potassium within 1 week of initiation or titration and periodically thereafter[D29]

Medication	Therapeutic use	Dosage	Safety concerns	Notable adverse reactions	Special considerations
	aldosteronism[D1] Proven benefit in patients with concomitant HF or post-MI[D22,D26,D27]				Monitor other serum electrolytes, uric acid, blood glucose, volume status, and renal function periodically[D29] Spironolactone is 1.3-2 times more potent than eplerenone on a mg-for-mg basis[D2] The antihypertensive effect of MRA is superior to that of ARB in Black patients[D2]

ACEI = angiotensin-converting enzyme inhibitor, ARB = angiotensin receptor blocker, AV = atrioventricular, CCB = calcium channel blocker, CKD = chronic kidney disease, CVD = cardiovascular disease, CrCl = creatinine clearance, HF = heart failure, HFpEF = heart failure with preserved ejection fraction, HFrEF = heart failure with reduced ejection fraction, GFR = glomerular filtration rate, MI = myocardial infarction, MRA = mineralocorticoid receptor

antagonist, SCr = serum creatinine, SIHD = stable ischemic heart disease, T2DM = type 2 diabetes mellitus, WBC = white blood cell, WPW = Wolff-Parkinson-White pattern.

*Thiazide diuretics and CCBs demonstrate similar efficacy; both are more effective than ACEI/ARB and beta-blockers for blood pressure reduction and prevention of CVD outcomes (e.g., stroke, HF, coronary events). However, thiazide diuretics are more effective than CCBs for the prevention of HF.[D1-D3]

†When used as monotherapy, thiazide diuretics and CCB are more effective; however, there is no racial/ethnic difference in the antihypertensive efficacy of ACEI/ARB and beta-blockers when combined with a thiazide or CCB. When indicated, select antihypertensive agents for compelling indications (e.g., HF, CKD) first, for monotherapy or include in the 2-drug combination when dual therapy is initiated.[D2]

‡Most patients require 2 or more antihypertensives to achieve their target blood pressure.[D1,D13] The most effective 2-drug combination therapies for hypertension are: CCB plus ACEI/ARB; thiazide plus ACEI/ARB; thiazide plus MRA; or thiazide plus beta-blocker.[D2]

§Bisoprolol, carvedilol, and metoprolol succinate have been shown to reduce mortality in HFrEF and should be used preferentially over other beta-blockers.[D27]

Table 2. Drug Therapy: Select antihypertensive single-pill combinations.

Medication	Dosage
Angiotensin-converting enzyme inhibitor (ACEI) and thiazide diuretic	
Benazepril/hydrochlorothiazide	Usual dose:* 10-20 mg/12.5-25 mg PO once daily Max dose: 20 mg/25 mg PO once daily Safety and efficacy have not been established in patients with CrCl ≤ 30 mL/minute[D30]
Lisinopril/hydrochlorothiazide	Usual dose:* 10-80 mg/12.5-50 mg PO once daily Max dose: 80 mg/50 mg PO once daily Not recommended in patients with CrCl ≤ 30 mL/minute/1.73 m^2[D31]
Angiotensin-converting enzyme (ACEI) and calcium channel blocker (CCB)	

Medication	Dosage
Amlodipine/benazepril	Usual dose:* 2.5-10 mg/10-40 mg PO once daily Max dose: 10 mg/40 mg PO once daily Adjust dose for hepatic impairment Not recommended in patients with severe renal impairment†[D32]
Angiotensin II receptor blocker (ARB) and thiazide diuretic	
Losartan/hydrochlorothiazide	Usual dose:* 50-100 mg/12.5-25 mg PO once daily Max dose: 100 mg/25 mg PO once daily Not recommended for initial use in patients with hepatic impairment† Safety and efficacy have not been established in patients with CrCl < 30 mL/minute[D33]
Valsartan/hydrochlorothiazide	Usual dose:* 160-320 mg/12.5-25 mg PO once daily Max dose: 320 mg/25 mg PO once daily Safety and efficacy have not been established in patients with CrCl ≤ 30 mL/minute[D34]
Angiotensin II receptor blocker (ARB) and calcium channel blocker (CCB)	
Amlodipine/valsartan	Usual dose:* 5-10 mg/160-320 mg PO once daily Max dose: 10 mg/320 mg PO once daily

Medication	Dosage
	Not recommended for initial use in patients with hepatic impairment† Safety and efficacy have not been established in patients with CrCl < 30 mL/minute[D35]

ACEI = angiotensin-converting enzyme inhibitor, ARB = angiotensin receptor blocker, CCB = calcium channel blocker, CrCl = creatinine clearance, SPC = single-pill combination.

*The SPC may be substituted for the titrated individual components.

†The recommended dose of an individual ingredient is not available with the SPC.

Admission Criteria

- Urgently evaluate patients with severely elevated blood pressure (ie, systolic blood pressure more than 180 mm Hg and/or diastolic blood pressure more than 120 mm Hg) with signs or symptoms concerning for new or worsening target organ damage, consistent with a diagnosis of hypertensive emergency[2]
  - Headache
  - Visual disturbances
  - Chest pain
  - Dyspnea
  - Neurologic symptoms
  - Dizziness
  - Nausea
  - Palpitations
- Patients with hypertensive emergency require urgent admission to an ICU for rapid diagnostic work-up, hemodynamic monitoring, and immediate blood pressure reduction, to avoid progressive organ failure[7]

Special Considerations

Patients With Chronic Kidney Disease

- Initiate an ACE inhibitor or an angiotensin receptor blocker in patients with chronic kidney disease, owing to increased risk of hypertension-related renal disease[2]
- Added benefit of ACE inhibitor or angiotensin receptor blocker therapy has been confirmed by the AASK trial (African American Study of Kidney Disease and Hypertension)[19]

Pregnant Patients

- There are no recommended treatment strategies specific to racial/ethnic subgroups in pregnant patients
- Patients who are planning on becoming pregnant should have their ACE inhibitors or angiotensin receptor blockers discontinued owing to risk to the fetus; they can start taking alternative antihypertensive agents (eg, methyldopa, nifedipine, labetalol)[2]
- Consider referral of a pregnant patient with history of hypertension to a maternal-fetal specialist

Older Adults

- There are no recommended treatment strategies specific to racial/ethnic subgroups in older adults (ie, aged 65 years or older)
- Recommend a systolic blood pressure treatment goal of less than 130 mm Hg for ambulatory, community-dwelling older adults[2]
    - Exceptions to this blood pressure target may include:
        - Patients with fall risk
        - Patients with advanced cognitive impairment
        - Patients living in assisted living facilities
        - Patients with high comorbidity burden

Patients With Diabetes

- There are no additional treatment strategies specific to racial/ethnic subgroups in patients with diabetes
- Recommend a blood pressure goal of less than 130/80 mm Hg[2]
- All first line antihypertensive medications, including ACE inhibitors and angiotensin receptor blockers, are indicated[2]

Follow-up

Monitoring

- Patients starting a new or adjusted antihypertensive drug regimen should have follow-up evaluation at monthly intervals until control is achieved, including the following:[2]
    - Assessment of blood pressure control
    - Evaluation for orthostatic hypotension
    - Evaluation for adverse effects from medication therapy
    - Confirmation of medication and lifestyle therapy adherence
    - Assess need for adjustment of medication dosage
    - Other assessment of target organ damage
- Laboratory monitoring (electrolyte levels, renal function status), typically within 7 to 10 days of medication initiation or dose adjustment
- Patients who achieve their target blood pressure goal should have follow-up at 3- to 6-month intervals[2]

Complications

- Black Americans with hypertension are at higher risk of fatal stroke, heart failure, and end-stage renal disease compared with the cohort of Americans who are White, Hispanic, or both[2]
- Optimal blood pressure control is important to reduce risk of these complications

Prognosis

- Framingham Heart Study found that total life expectancy for males and females at age 50 years was 5.1 and 4.9 years longer, respectively, among normotensive Americans compared with those whose blood pressure was uncontrolled[18]

Referral

- Refer to a hypertension specialist for further evaluation if patients do not achieve blood pressure control on 3 or more antihypertensive drug classes (including a diuretic) at maximal doses
- Consider resistant or secondary causes of hypertension in this setting

Summary

Key Points

- Hypertension in Black patients, compared with that in the general population, is characterized by earlier onset, greater blood pressure elevation, and increased propensity to develop progressive renal injury, stroke, and heart disease[7-9]
- Black patients have greater hypertension-associated mortality than other racial/ethnic subgroups in the United States despite equivalent rates of awareness and treatment[2]
- Social determinants of health and environmental factors likely play a significant role in how hypertensive disease manifests within the Black patient population[9,12]
- Recommend lifestyle modifications, including increased physical activity, weight loss, DASH diet or variations thereof (Dietary Approaches to Stop Hypertension), smoking cessation, and regulating alcohol intake, as these have been found to have a significant effect on blood pressure control in the Black patient population[6]
- Encourage community outreach programs to raise awareness and promote hypertension treatment adherence
- Among Black hypertensive patients without nephropathy or heart failure, for those select patients in whom control with monotherapy is considered likely, initiate pharmacologic therapy with a thiazide-type diuretic or a dihydropyridine calcium channel blocker as monotherapy
- For other Black hypertensive patients, and for those in whom monotherapy has failed, initiate combination therapy
    - Ideally as a single-pill combination, as it simplifies pharmacologic recommendations, increases the likelihood of medication adherence, and is more likely to achieve blood pressure control in Black patients[6]
    - If necessary (ie, if hypertension is not effectively controlled by initial combination therapy), add a third agent (whichever not already started); thus, for example, add ACE inhibitor–based or angiotensin receptor blocker–based combination therapy to existing thiazide diuretic and/or calcium channel blocker

- Additional lines of therapy are as follows: mineralocorticoid receptor antagonists; additional diuretic, vasodilator, or sympatholytic, if additional indications exist based on comorbidities
- Refer to a hypertension specialist for resistant hypertension, defined as uncontrolled blood pressure on 3 or more complementary antihypertensive medications given at optimal doses and including a diuretic, or controlled blood pressure on 4 or more medications[2]
- American College of Cardiology/American Heart Association hypertension guidelines do not specify any treatment modifications specific to the Black patient population in the settings of pregnancy, older age, or diabetes
- Ultimately, the approach to management of hypertension is similar in Black patients compared with other patients except for the small percentage of patients who can attain control with monotherapy alone

Alarm Signs and Symptoms

- Urgently evaluate patients with severely elevated blood pressure (more than 180/120 mm Hg) and signs and symptoms concerning for end-organ injury, such as:[7]
  - Headache
  - Visual disturbances
  - Chest pain
  - Dyspnea
  - Neurologic symptoms
  - Dizziness
  - Nausea
  - Palpitations
- Findings are concerning for hypertensive emergency and require admission to an ICU for rapid diagnostic work-up, hemodynamic monitoring, and immediate blood pressure reduction, to avoid progressive organ failure[7]

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Figure Legends

Figure 1. Blood pressure thresholds and recommendations for treatment and follow-up.

BP, blood pressure; ASCVD, atherosclerotic cardiovascular disease; CVD, cardiovascular disease.

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

Figure 2. 2017 AHA/ACC hypertension recommendations for Black patients.

AHA/ACC, American Heart Association and American College of Cardiology; COR, class of recommendation; LOE, level of evidence; B-R, B-randomized; C-LD, C–limited data; HF, heart failure; DM, diabetes mellitus; BP, blood pressure.

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