Hypertension Management Clinical Guideline

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I. PURPOSE AND SCOPE

A. Purpose

This clinical practice guideline provides evidence-based recommendations for the screening, diagnosis, and comprehensive management of hypertension (high blood pressure) in adults. The objectives are to:

1. Standardize hypertension care across our healthcare system
2. Improve blood pressure control rates and reduce cardiovascular complications
3. Align clinical practice with current ACC/AHA evidence-based guidelines
4. Provide clear treatment algorithms for primary care and specialty providers
5. Reduce the incidence of stroke, myocardial infarction, heart failure, and kidney disease related to uncontrolled hypertension
6. Support quality measurement and performance improvement initiatives

B. Scope

Applies to:

- All adult patients (≥18 years) seen in primary care, cardiology, nephrology, and other relevant specialties
- All physicians, nurse practitioners, physician assistants, and clinical pharmacists managing hypertension

Does NOT apply to:

- Pediatric patients (separate pediatric hypertension guidelines exist)
- Pregnant patients (see obstetric guidelines for hypertensive disorders of pregnancy)
- Hypertensive emergencies requiring ICU care (separate acute care protocol)

C. Target Population

This guideline addresses:

- **Screening:** All adults for early detection of elevated blood pressure
- **Primary Prevention:** Adults with elevated BP (120-129/<80) to prevent progression
- **Treatment:** Adults with hypertension Stage 1 or 2
- **Special Populations:** Patients with comorbidities (diabetes, CKD, CVD) requiring tailored management

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II. DEFINITIONS AND CLASSIFICATION

A. Blood Pressure Categories (2017 ACC/AHA Guidelines)

Blood pressure is classified based on systolic (SBP) and diastolic (DBP) measurements:

Category	Systolic BP (mmHg)	AND/OR	Diastolic BP (mmHg)
Normal	<120	and	<80
Elevated	120-129	and	<80
Hypertension Stage 1	130-139	or	80-89
Hypertension Stage 2	≥140	or	≥90
Hypertensive Crisis	>180	and/or	>120

Note: Classification is based on the higher category when SBP and DBP fall into different categories.

B. Confirmation of Hypertension

Do NOT diagnose hypertension based on a single elevated reading (unless severely elevated or hypertensive emergency). Diagnosis requires:

- **≥2 elevated readings** obtained on ≥2 separate occasions, separated by at least 1 week (preferably 2-4 weeks)
- **OR** Elevated office readings confirmed by out-of-office measurements (home BP monitoring or ambulatory BP monitoring)

Rationale: Reduces false positives from white-coat hypertension (elevated BP in clinical settings but normal at home) and ensures accurate diagnosis.

C. White-Coat and Masked Hypertension

White-Coat Hypertension:

- Elevated BP in the office (≥130/80) but normal BP at home (<130/80 on home monitoring)
- Affects ~15-30% of patients with elevated office readings
- Not immediately treated with medications, but patients are monitored as they have increased risk of developing sustained hypertension

Masked Hypertension:

- Normal BP in office (<130/80) but elevated at home (≥130/80)
- Affects ~10-15% of population
- These patients ARE at cardiovascular risk and should be treated

Recommendation: Use home BP monitoring (HBPM) or 24-hour ambulatory BP monitoring (ABPM) to confirm diagnosis when white-coat or masked hypertension is suspected.

III. SCREENING AND DETECTION

A. Universal Screening

Recommendation: All adults ≥18 years should have blood pressure measured at every healthcare visit, and at least annually if BP is normal.

Frequency:

- **Normal BP (<120/80):** Recheck annually
- **Elevated BP (120-129/<80):** Recheck in 3-6 months
- **Stage 1 Hypertension (130-139/80-89):** Recheck in 1-2 months, or sooner if high cardiovascular risk
- **Stage 2 Hypertension (≥140/90):** Recheck within 1 month, or initiate treatment based on risk assessment

B. Proper Blood Pressure Measurement Technique

Accurate BP measurement is critical. Follow these steps to avoid errors:

Patient Preparation:

1. Patient should be seated quietly for at least 5 minutes before measurement
2. Patient should avoid caffeine, exercise, and smoking for 30 minutes prior
3. Empty bladder before measurement (full bladder can elevate BP by 10-15 mmHg)
4. Patient should not talk during measurement
5. Feet should be flat on floor, legs uncrossed
6. Back should be supported (sitting in chair with back support)

Positioning:

- Arm supported at heart level (on desk or arm rest)
- Upper arm should be bare (no clothing)
- Use the correct cuff size:
  - Cuff bladder should encircle 80% of the arm
  - Too small cuff = falsely high reading; too large cuff = falsely low reading
  - Measure arm circumference to select appropriate cuff (small, regular, large, or extra-large adult cuff)

Measurement:

1. Place cuff on upper arm with center of bladder over brachial artery, 1 inch above the antecubital fossa
2. Use validated, calibrated oscillometric device (automated BP monitor) or manual auscultatory method with aneroid/mercury sphygmomanometer
3. Take at least 2 readings, 1 minute apart; if readings differ by >10 mmHg, take a third reading
4. Record the average of the readings
5. Measure BP in both arms at the first visit; use the arm with the higher reading for subsequent visits (>10 mmHg difference between arms may indicate peripheral artery disease and warrants further evaluation)

Documentation: Document BP as SBP/DBP, arm used, cuff size, and patient position (seated, standing if orthostatic check).

C. Out-of-Office Blood Pressure Monitoring

Home Blood Pressure Monitoring (HBPM):

- Patients use a validated home BP monitor to measure BP at home
- **Protocol:** Measure BP twice daily (morning and evening) for 7 days, take 2 readings each time 1 minute apart, and record
- Calculate average of all readings (excluding first day's readings): Average ≥130/80 confirms hypertension
- **Benefits:** Improves diagnostic accuracy, detects white-coat and masked hypertension, assesses treatment response, engages patients in self-management

Ambulatory Blood Pressure Monitoring (ABPM):

- Patient wears a device that measures BP every 15-30 minutes over 24 hours
- Provides comprehensive data (daytime, nighttime, and 24-hour averages)
- **Thresholds for hypertension:**
    - 24-hour average ≥125/75
    - Daytime (awake) average ≥130/80
    - Nighttime (asleep) average ≥110/65
- **Indications for ABPM:**
    - Suspected white-coat hypertension
    - Suspected masked hypertension (normal office BP but patient has high CVD risk or target organ damage)
    - Evaluation of resistant hypertension
    - Assessment of nocturnal hypertension

Recommendation: Encourage HBPM for all hypertensive patients for ongoing monitoring. Use ABPM when diagnostic uncertainty exists or for resistant hypertension evaluation.

IV. CARDIOVASCULAR RISK ASSESSMENT

A. Rationale

Not all patients with the same BP level have the same cardiovascular risk. Treatment thresholds are individualized based on:

- Absolute cardiovascular disease (CVD) risk
- Presence of CVD, diabetes, or chronic kidney disease

B. ASCVD Risk Calculation

For patients without established CVD, calculate the **10-year atherosclerotic cardiovascular disease (ASCVD) risk** using the ACC/AHA Pooled Cohort Equations:

Risk Calculator Inputs:

- Age, sex, race
- Total cholesterol and HDL cholesterol
- Systolic blood pressure
- Whether patient is on BP medication

- Smoking status
- Diabetes status

Risk Categories:

- **Low risk:** <5% 10-year ASCVD risk
- **Borderline risk:** 5-7.4%
- **Intermediate risk:** 7.5-19.9%
- **High risk:** ≥20%

Access: Online calculator available at: [tools.acc.org/ASCVD-Risk-Estimator-Plus]

Limitation: Risk calculator is validated for adults 40-79 years without established ASCVD. For younger or older patients, clinical judgment is needed.

C. Baseline Evaluation

For all patients with newly diagnosed hypertension, perform a baseline evaluation to:

1. Identify cardiovascular risk factors
2. Screen for secondary causes of hypertension
3. Assess for target organ damage

History:

- Duration of known elevated BP
- Family history of hypertension, premature CVD, CKD, diabetes
- Symptoms suggesting secondary hypertension (e.g., headache, palpitations, muscle weakness, snoring/sleep apnea)
- Dietary habits (sodium intake, alcohol use)
- Physical activity level
- All medications (including over-the-counter, NSAIDs, decongestants, oral contraceptives, which can raise BP)
- Smoking history

Physical Exam:

- Height, weight, BMI, waist circumference
- Blood pressure in both arms
- Cardiovascular exam (heart rate, rhythm, murmurs, extra heart sounds, peripheral pulses)
- Signs of target organ damage (fundoscopic exam for hypertensive retinopathy, neurologic exam, edema)
- Signs of secondary hypertension (e.g., abdominal bruit suggesting renal artery stenosis, cushingoid features)

Laboratory and Diagnostic Tests (Baseline):

- **Fasting glucose** (or HbA1c) – screen for diabetes
- **Lipid panel** (total cholesterol, LDL, HDL, triglycerides) – assess dyslipidemia
- **Serum creatinine and eGFR** – assess kidney function
- **Urinalysis and urine albumin-to-creatinine ratio (UACR)** – detect proteinuria (sign of kidney damage)
- **Serum electrolytes (sodium, potassium)** – baseline, especially before starting diuretics or ACE inhibitors
- **TSH** (thyroid function) – if clinical suspicion of thyroid disorder
- **Electrocardiogram (ECG)** – screen for left ventricular hypertrophy, arrhythmias, prior MI

Optional Tests (if indicated):

- Echocardiogram if suspicion of heart failure or LVH
- Ankle-brachial index (ABI) if peripheral artery disease suspected
- Sleep study if obstructive sleep apnea suspected (major secondary cause of hypertension)
- Plasma aldosterone and renin if resistant hypertension (screen for primary aldosteronism)
- Renal artery imaging if young patient with abrupt onset severe hypertension (renal artery stenosis)

V. NON-PHARMACOLOGIC MANAGEMENT (LIFESTYLE MODIFICATIONS)

Every patient with elevated BP or hypertension should receive counseling on lifestyle modifications. These interventions can prevent or delay the need for medication and enhance the effectiveness of pharmacologic therapy.

A. Weight Loss

Recommendation: Achieve and maintain a healthy body weight (BMI <25 kg/m² ideal, or at least reduce BMI if obese).

Evidence: Weight reduction of ~10 kg (22 lbs) can lower SBP by 5-20 mmHg.

Approach:

- Set realistic weight loss goals (5-10% of body weight over 6 months)
- Refer to dietitian or weight management program
- Consider weight loss medications or bariatric surgery referral if BMI ≥35 with comorbidities or BMI ≥40

B. Heart-Healthy Diet (DASH Diet)

Recommendation: Adopt the Dietary Approaches to Stop Hypertension (DASH) eating plan.

DASH Diet Principles:

- Emphasize fruits, vegetables, whole grains, lean proteins (poultry, fish), low-fat dairy, nuts, and legumes
- Limit red meat, sweets, and saturated fats
- Rich in potassium, magnesium, calcium, fiber

Evidence: DASH diet can reduce SBP by ~11 mmHg in hypertensive patients.

Resources: Provide patients with DASH diet handout or refer to nutrition counseling.

C. Sodium Reduction

Recommendation: Reduce sodium intake to <1,500 mg/day (ideal), or at least <2,300 mg/day.

Evidence: Sodium reduction from typical intake (~3,400 mg/day) to 1,500 mg/day can lower SBP by 5-6 mmHg on average (greater effect in African Americans, older adults, and those with higher baseline BP).

Counseling Points:

- Avoid adding salt at the table
- Limit processed and restaurant foods (major sources of sodium)
- Read nutrition labels and choose low-sodium options (<140 mg per serving is "low sodium")
- Use herbs, spices, lemon, vinegar for flavor instead of salt

D. Potassium Supplementation

Recommendation: Increase dietary potassium intake (unless contraindicated by CKD or medication interactions).

Target: 3,500-5,000 mg/day from diet.

Food Sources: Bananas, oranges, potatoes, tomatoes, spinach, beans, yogurt, fish.

Evidence: Adequate potassium can lower SBP by 4-5 mmHg.

Caution: Do not supplement potassium in patients with CKD stage 4-5 or those on potassium-sparing diuretics or ACE inhibitors/ARBs without monitoring potassium levels.

E. Physical Activity

Recommendation: Engage in regular aerobic exercise – at least 150 minutes per week of moderate-intensity activity (e.g., brisk walking, cycling) or 75 minutes per week of vigorous activity.

Additional: Include muscle-strengthening activities (resistance training) on 2 or more days per week.

Evidence: Regular aerobic activity can reduce SBP by 4-8 mmHg.

Approach:

- Encourage patients to find activities they enjoy (walking, swimming, dancing, sports)
- Start slowly if sedentary, and gradually increase duration and intensity
- Break into shorter sessions if needed (e.g., 10-minute walks three times a day)

F. Limit Alcohol Intake

Recommendation:

- Men: ≤2 standard drinks per day
- Women: ≤1 standard drink per day

(1 standard drink = 12 oz beer, 5 oz wine, or 1.5 oz liquor)

Evidence: Reducing excessive alcohol consumption can lower SBP by ~4 mmHg.

G. Smoking Cessation

Recommendation: All patients should be advised to quit smoking and offered cessation support (counseling, nicotine replacement, medications like varenicline or bupropion).

Rationale: While smoking does not directly cause chronic hypertension, it is a major CVD risk factor and each cigarette causes acute BP elevation. Quitting smoking profoundly reduces overall cardiovascular risk.

H. Stress Management

Recommendation: Consider stress-reduction techniques such as mindfulness, meditation, yoga, or cognitive-behavioral therapy.

Evidence: While direct BP-lowering effects are modest, stress management improves overall well-being and may improve adherence to other lifestyle changes.

VI. PHARMACOLOGIC THERAPY

A. When to Initiate Medication

Treatment Thresholds:

The decision to start BP medication depends on the BP level and the patient's cardiovascular risk:

Blood Pressure Level	Clinical CVD or 10-year ASCVD Risk ≥10%	No CVD and ASCVD Risk <10%
Stage 1 HTN (130-139/80-89)	Initiate medication + lifestyle Rx	Lifestyle Rx for 3-6 months; if BP remains elevated, consider medication
Stage 2 HTN (≥140/90)	Initiate medication + lifestyle Rx	Initiate medication + lifestyle Rx

Clinical CVD includes:

- History of myocardial infarction, acute coronary syndrome, coronary revascularization (PCI, CABG)
- Stroke or TIA
- Heart failure
- Peripheral artery disease

Also initiate medication for Stage 1 HTN (≥130/80) in:

- **Diabetes mellitus**

- **Chronic kidney disease (CKD)** stage 3 or higher (eGFR <60) or any stage with albuminuria

Rationale: These patients benefit from early and aggressive BP control due to high cardiovascular and renal risk.

B. Blood Pressure Treatment Goals

Target BP for Most Patients: <130/80 mmHg

Evidence: Trials (SPRINT, ACCORD) show that achieving SBP <130 (vs. <140) reduces cardiovascular events and mortality.

Special Populations:

- **Older adults (≥65 years) who are ambulatory and healthy:** Target SBP <130 is appropriate if tolerated without significant side effects (e.g., orthostatic hypotension, falls).
- **Older adults who are frail, have limited life expectancy, or multiple comorbidities:** A less stringent goal (e.g., <140/90) may be reasonable to avoid adverse effects. Use clinical judgment.
- **CKD with albuminuria:** Target <130/80 to slow progression of kidney disease.
- **Diabetes:** Target <130/80 (some guidelines suggest <140/90 is acceptable; our organization follows the more stringent <130/80 per ACC/AHA).
- **Post-stroke:** In general, target <130/80; however, in acute stroke or with certain cerebrovascular issues, individualize (may tolerate slightly higher BP initially).

Individualization: Targets should be individualized. If a patient experiences significant side effects or has contraindications to intensive BP lowering (e.g., severe bilateral carotid stenosis), goals may be adjusted.

C. First-Line Antihypertensive Medications

Four drug classes are considered first-line for most patients:

1. **Thiazide or Thiazide-like Diuretics**

- Examples: Hydrochlorothiazide (HCTZ) 12.5-25 mg daily, Chlorthalidone 12.5-25 mg daily, Indapamide 1.25-2.5 mg daily
- Chlorthalidone is preferred over HCTZ due to longer half-life and more robust outcome data, but HCTZ is more commonly used
- Mechanism: Reduce blood volume and sodium
- Particularly effective in African Americans and elderly
- Side effects: Hypokalemia, hyperuricemia, hyperglycemia (usually mild), photosensitivity
- Monitoring: Check electrolytes and creatinine 2-4 weeks after initiation

2. **Angiotensin-Converting Enzyme (ACE) Inhibitors**

- Examples: Lisinopril 10-40 mg daily, Enalapril 5-40 mg daily, Ramipril 2.5-10 mg daily
- Mechanism: Block conversion of angiotensin I to II, reducing vasoconstriction and aldosterone secretion
- Preferred in patients with diabetes, CKD with proteinuria, heart failure, post-MI
- Side effects: Dry cough (~10-20% of patients), hyperkalemia, angioedema (rare but serious), contraindicated in pregnancy
- Monitoring: Check creatinine and potassium 1-2 weeks after initiation (small rise in creatinine is expected and acceptable; >30% rise or hyperkalemia may require dose adjustment or discontinuation)

3. **Angiotensin II Receptor Blockers (ARBs)**

- Examples: Losartan 50-100 mg daily, Valsartan 80-320 mg daily, Olmesartan 20-40 mg daily
- Mechanism: Block angiotensin II receptors
- Similar indications as ACE inhibitors; often used if ACE inhibitor causes intolerable cough
- Side effects: Hyperkalemia, (no cough), angioedema (rare), contraindicated in pregnancy
- Monitoring: Same as ACE inhibitors

4. **Calcium Channel Blockers (CCBs)**

- Examples: Amlodipine 5-10 mg daily, Nifedipine XL 30-90 mg daily (dihydropyridines), Diltiazem SR 120-360 mg daily, Verapamil SR 120-480 mg daily (non-dihydropyridines)
- Mechanism: Block calcium entry into vascular smooth muscle, causing vasodilation
- Dihydropyridines (amlodipine, nifedipine) are preferred for hypertension (more vascular-selective)
- Non-dihydropyridines (diltiazem, verapamil) also slow heart rate; useful in atrial fibrillation, but avoid in heart failure with reduced ejection fraction (HFrEF)
- Side effects: Peripheral edema (especially with dihydropyridines), constipation (verapamil), headache, flushing
- Particularly effective in African Americans and elderly

Beta-blockers: Not first-line for uncomplicated hypertension (less effective at reducing stroke and CV events compared to the above four classes). However, beta-blockers are indicated in hypertensive patients with specific comorbidities:

- Post-myocardial infarction
- Heart failure with reduced ejection fraction (HFrEF)
- Atrial fibrillation (for rate control)
- Angina

Examples: Metoprolol, Atenolol, Carvedilol, Bisoprolol.

D. Choice of Initial Medication

General Population (no compelling indications):

- Start with any first-line agent (thiazide diuretic, ACE inhibitor, ARB, or CCB)
- Thiazide diuretics are inexpensive and effective; often a good starting choice

African American Patients (without CKD):

- Thiazide diuretics or CCBs are particularly effective as initial monotherapy
- ACE inhibitors and ARBs are less effective as monotherapy in African Americans without CKD, but combination therapy (e.g., ACE-I + CCB or diuretic) is effective

Patients with Compelling Indications:

- **Diabetes:** ACE inhibitor or ARB preferred (renal protective, cardiovascular benefits)
- **CKD (eGFR <60 or any eGFR with albuminuria):** ACE inhibitor or ARB (slows progression of CKD)
- **Heart Failure (HFrEF):** ACE inhibitor (or ARB) + beta-blocker + diuretic; consider aldosterone antagonist
- **Post-MI:** Beta-blocker + ACE inhibitor (or ARB)
- **Coronary artery disease:** Beta-blocker or CCB for angina; ACE inhibitor for risk reduction

E. Monotherapy vs. Combination Therapy

Stage 1 Hypertension: Start with a single agent at low to moderate dose, titrate up.

Stage 2 Hypertension (BP ≥20/10 mmHg above goal, e.g., ≥150/90 if goal is 130/80):

- Consider starting with **two drugs from different classes** to achieve faster control
- Example combinations:
  - ACE inhibitor + CCB
  - ACE inhibitor + thiazide diuretic
  - ARB + CCB
  - ARB + thiazide diuretic

- Many fixed-dose combination pills available for convenience and adherence

Advantages of Combination Therapy:

- Complementary mechanisms
- Lower doses of each drug may minimize side effects
- Faster achievement of BP goal

Do NOT combine:

- ACE inhibitor + ARB together (increased risk of hyperkalemia and renal impairment without

added benefit)
- Two drugs from the same class (not beneficial)

F. Titration and Follow-Up

Follow-Up After Initiating or Adjusting Therapy:

- **1 month after starting medication or changing dose:** Assess BP response, side effects, adherence
- If BP not at goal, increase dose or add a second agent
- Repeat follow-up monthly until BP is controlled

Once BP is at Goal:

- Follow-up every 3-6 months
- Check BP, reinforce lifestyle measures, assess adherence, monitor for side effects
- Periodically check labs (electrolytes, creatinine) per medication (e.g., annually if on diuretic or ACE-I/ARB and stable)

If BP Remains Uncontrolled:

- Assess adherence (medication non-adherence is the most common reason for apparent treatment failure)
- Confirm elevated BP with home or ambulatory monitoring (rule out white-coat effect)
- Review lifestyle factors (weight gain, high sodium intake, alcohol, NSAIDs)
- Advance to triple therapy if on dual therapy (e.g., ACE-I + CCB + diuretic)
- If still uncontrolled on 3 drugs (including a diuretic), consider resistant hypertension (see below)

VII. RESISTANT HYPERTENSION

A. Definition

Resistant hypertension: BP remains above goal (≥130/80) despite concurrent use of 3 antihypertensive agents of different classes at optimal doses, one of which is a diuretic. OR BP is controlled but requires ≥4 medications.

Prevalence: Affects ~10-15% of hypertensive patients.

B. Evaluation

Before diagnosing true resistant hypertension, rule out:

Pseudo-resistance:

- Poor BP measurement technique
- White-coat hypertension (confirm with home or ambulatory BP monitoring)
- Medication non-adherence (most common)

Secondary Causes of Hypertension:

- **Primary aldosteronism** (excess aldosterone) – most common secondary cause in resistant HTN; screen with plasma aldosterone/renin ratio
- **Renal artery stenosis** – consider if abrupt onset, refractory to meds, or worsening renal function on ACE-I/ARB; evaluate with renal artery duplex ultrasound or CT/MR angiography
- **Obstructive sleep apnea (OSA)** – very common in resistant HTN (screen with sleep study if snoring, daytime sleepiness, witnessed apneas)
- **Chronic kidney disease** – worsening kidney function can make HTN harder to control
- **Pheochromocytoma** – rare; suspect if paroxysmal hypertension, headaches, palpitations, sweating; test plasma or urine metanephrines
- **Cushing syndrome** – excess cortisol; look for weight gain, moon face, striae, hyperglycemia
- **Hyperthyroidism or hypothyroidism**
- **Coarctation of aorta** – in younger patients; check for differential BP in arms vs. legs

Contributing Factors:

- NSAIDs, decongestants, oral contraceptives, stimulants, excessive alcohol, high sodium intake, obesity

C. Management

1. **Optimize Current Regimen:**

   - Ensure patient is on a long-acting thiazide-like diuretic (chlorthalidone or indapamide preferred over HCTZ) at adequate dose
   - Maximize doses of current medications
   - Ensure combination includes an ACE-I or ARB, CCB, and diuretic

2. **Add a Fourth Agent – Aldosterone Antagonist:**

   - **Spironolactone** 25-50 mg daily (potassium-sparing diuretic and aldosterone antagonist)
   - Very effective in resistant HTN (can lower BP by 20-25 mmHg on average)
   - Monitor potassium and creatinine closely (risk of hyperkalemia, especially if on ACE-I/ARB)
   - Alternative if spironolactone not tolerated: Eplerenone (fewer anti-androgenic side effects, but more expensive)

3. **Consider Additional Agents:**

- Beta-blocker (if not already on one)
- Alpha-blocker (doxazosin, terazosin) – effective but may cause orthostatic hypotension
- Centrally acting agents (clonidine, methyldopa) – can be effective but have more side effects (sedation, dry mouth)
- Direct vasodilators (hydralazine, minoxidil) – typically reserved for refractory cases; minoxidil is very potent but causes fluid retention and hirsutism

4. **Treat Secondary Causes:**

- OSA: CPAP therapy
- Primary aldosteronism: spironolactone or surgical adrenalectomy if adenoma
- Renal artery stenosis: angioplasty/stenting in select cases
- Pheochromocytoma: surgical removal

5. **Referral to Hypertension Specialist:**

- If BP remains uncontrolled on 4-5 medications, refer to a hypertension specialist (cardiologist or nephrologist with expertise in resistant HTN) for further evaluation and management
- May consider renal denervation or other investigational procedures in select cases

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VIII. SPECIAL POPULATIONS AND SITUATIONS

A. Older Adults (≥65 Years)

Goal BP: <130/80 for most healthy, ambulatory older adults (if tolerated without adverse effects).

Considerations:

- Start medications at lower doses and titrate slowly
- Monitor for orthostatic hypotension (measure BP sitting and standing); older adults are at higher risk for falls
- Assess for polypharmacy and drug interactions
- Cognitive and functional status: In frail elderly or those with limited life expectancy, less intensive BP control may be appropriate (e.g., <140/90)

Preferred Medications: Thiazide diuretics and CCBs are generally well-tolerated and effective. Avoid alpha-blockers due to orthostatic hypotension risk.

B. Diabetes Mellitus

Goal BP: <130/80

Preferred Medications: ACE inhibitor or ARB (first-line due to renal protective effects). If BP not controlled, add a CCB or thiazide diuretic.

Special Considerations:

- Tight BP control in diabetes reduces microvascular (retinopathy, nephropathy) and macrovascular (CV events) complications
- Monitor for diabetic nephropathy (urine albumin); if present, ACE-I/ARB is essential

C. Chronic Kidney Disease (CKD)

Goal BP: <130/80 (or <120/80 in some guidelines for CKD with significant proteinuria)

Preferred Medications:

- **ACE inhibitor or ARB** – slows progression of CKD, especially if albuminuria is present (UACR >30 mg/g)
- If BP not controlled, add a CCB or diuretic

Considerations:

- Monitor creatinine and potassium closely when starting ACE-I/ARB (small rise in creatinine expected; up to 30% increase is acceptable; discontinue if >30% rise or if hyperkalemia develops)
- In advanced CKD (stage 4-5), loop diuretics (furosemide) are more effective than thiazide diuretics
- Avoid potassium-sparing diuretics in severe CKD due to hyperkalemia risk

D. Coronary Artery Disease (CAD)

Goal BP: <130/80

Preferred Medications:

- Beta-blocker (especially post-MI)
- ACE inhibitor (reduces CV events)
- CCB if angina present (or if beta-blocker contraindicated)

Caution: Avoid excessive BP lowering (diastolic BP <60 may compromise coronary perfusion and worsen angina)

E. Heart Failure

Heart Failure with Reduced Ejection Fraction (HFrEF):

- **First-line:** ACE inhibitor (or ARB if ACE-I not tolerated) + beta-blocker + diuretic (for volume management)
- **Additional:** Aldosterone antagonist (spironolactone or eplerenone) if EF <35%
- **Avoid:** Non-dihydropyridine CCBs (diltiazem, verapamil) in HFrEF (they can worsen heart failure)

Heart Failure with Preserved Ejection Fraction (HFpEF):

- Diuretics for symptom management
- Control of BP is crucial (many HFpEF patients have hypertension as an underlying cause)
- ACE-I/ARB, beta-blockers, and CCBs can be used as needed for BP control

F. Pregnancy

Hypertensive Disorders of Pregnancy are managed per obstetric protocols (outside the scope of this guideline).

Key Points:

- Chronic hypertension in pregnancy: Target BP <140/90; medications of choice are labetalol, nifedipine, or methyldopa
- **ACE inhibitors and ARBs are contraindicated in pregnancy** (teratogenic)
- Women of childbearing age on ACE-I or ARB should be counseled to discontinue these medications if planning pregnancy or if pregnancy is detected

G. African American Patients

Considerations:

- Higher prevalence of hypertension and higher rates of complications (stroke, kidney disease)
- Thiazide diuretics and CCBs are particularly effective as initial monotherapy
- If CKD is present, ACE-I or ARB should be included (renal protection outweighs the modest differences in efficacy)
- Combination therapy (e.g., ACE-I + CCB or diuretic) is often needed

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IX. PATIENT EDUCATION AND SELF-MANAGEMENT

A. Education Topics

Provide all hypertensive patients with education on:

1. **What is hypertension:** "Silent killer," often no symptoms, damages blood vessels over time leading to heart attack, stroke, kidney disease
2. **BP targets and why they matter**
3. **Lifestyle modifications** (diet, exercise, weight loss, sodium reduction, alcohol moderation)
4. **Medication adherence:** Importance of taking meds every day even when feeling well
5. **Side effects:** What to expect and when to call the provider
6. **Home BP monitoring:** How to measure BP correctly at home

B. Home Blood Pressure Monitoring

Benefits:

- Empowers patients in self-management
- Provides more data points for better assessment of BP control
- Detects white-coat and masked hypertension
- Improves medication adherence

Patient Instructions:

- Purchase a validated, automatic upper-arm cuff monitor (avoid wrist or finger monitors)
- Measure BP at the same times each day (morning and evening)
- Sit quietly for 5 minutes before measurement; follow proper technique (as outlined in Section III.B)
- Record readings in a log or app
- Bring log to appointments

When to Call Provider:

- BP consistently >180/110
- Symptoms such as chest pain, shortness of breath, severe headache, vision changes

C. Adherence Strategies

Barriers to adherence:

- Forgetfulness
- Cost of medications

- Side effects
- Lack of understanding of importance
- Complex medication regimens

Strategies to improve adherence:

- Simplify regimens: once-daily medications, combination pills
- Align medication timing with daily routines (e.g., take with breakfast)
- Use pill organizers or smartphone reminder apps
- Address side effects promptly (switch medications if needed)
- Assist with medication costs: generic options, patient assistance programs, formulary-preferred drugs
- Motivational interviewing and shared decision-making

X. QUALITY MEASURES AND PERFORMANCE IMPROVEMENT

A. Quality Metrics

Our organization tracks the following hypertension quality measures:

1. **BP Control Rate:**
   Percentage of patients with hypertension who have BP <140/90 (HEDIS measure) or <130/80 (internal more stringent goal)
   - Target: >70% of hypertensive patients at goal

2. **BP Screening Rate:**
   Percentage of adult patients who have had BP measured in the past year
   - Target: >95%

3. **ASCVD Risk Assessment:**
   Percentage of hypertensive patients who have had a 10-year ASCVD risk calculated
   - Target: >80%

4. **Diabetes and HTN:**
   Percentage of diabetic patients with hypertension who are on an ACE-I or ARB
   - Target: >90%

B. Performance Improvement Initiatives

- EHR clinical decision support alerts for providers when BP is not at goal, prompting intensification of therapy

- Patient registries to identify patients with uncontrolled hypertension for outreach and care management
- Group medical visits for hypertension education and lifestyle coaching
- Pharmacist-led hypertension management programs (clinical pharmacists titrate medications under collaborative practice agreements)
- Annual provider education on updated guidelines

C. Documentation

Providers should document in each encounter for hypertensive patients:

- Current BP reading
- Medications and doses
- Lifestyle modifications counseled
- Assessment of adherence
- Any changes to the treatment plan
- Next follow-up interval

Use structured templates or EHR flowsheets for hypertension management to facilitate tracking and quality reporting.

XI. REFERENCES

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5. American Diabetes Association. Standards of Medical Care in Diabetes—2024. *Diabetes Care.* 2024;47(Suppl 1).

XII. APPENDICES

Appendix A: Home Blood Pressure Monitoring Log (patient handout)

Appendix B: DASH Diet Patient Education Handout

Appendix C: Low-Sodium Food Choices Guide

Appendix D: ASCVD Risk Calculator Instructions for Staff

Appendix E: Medication Titration Protocol for Clinical Pharmacists

Appendix F: Resistant Hypertension Evaluation Checklist

END OF GUIDELINE

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