Clinical Protocol for the Prevention and Treatment of Hypertension in Adults

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Introduction

In 2010, hypertension (HTN) attributed to more cardiovascular disease (CVD) deaths than any other modifiable CVD risk factor, and it was the second-most preventable cause of death for any reason. In a 2011 study using data from the United States National Health and Nutrition Examination Survey (NHANES), more than 50 percent of the surveyed population died from coronary heart disease (CHD) and stroke.[1] Due to the high prevalence of HTN and its attribution to CHD, stroke, and end-stage renal disease, preventing and controlling hypertension continues to be a top public health priority.

In 2012, the U.S. Department of Health and Human Services (DHHS) launched Million Hearts, a federal initiative focused on aligning efforts to make blood pressure (BP) control one of the most important clinical preventive services to prevent CHD and stroke.[2] The initiative involves working with public health professionals, local health departments, and communities to implement systematic, evidence-based interventions in the prevention and management of hypertension.

Purpose

To present practice guidelines and recommendations for primary health care providers serving patients who have developed or are at risk of developing CVD associated with HTN. This document provides population management tools and approaches to proactively monitor and manage HTN, including evidence-based treatment protocols and approaches using clinical practice data to drive improvement.

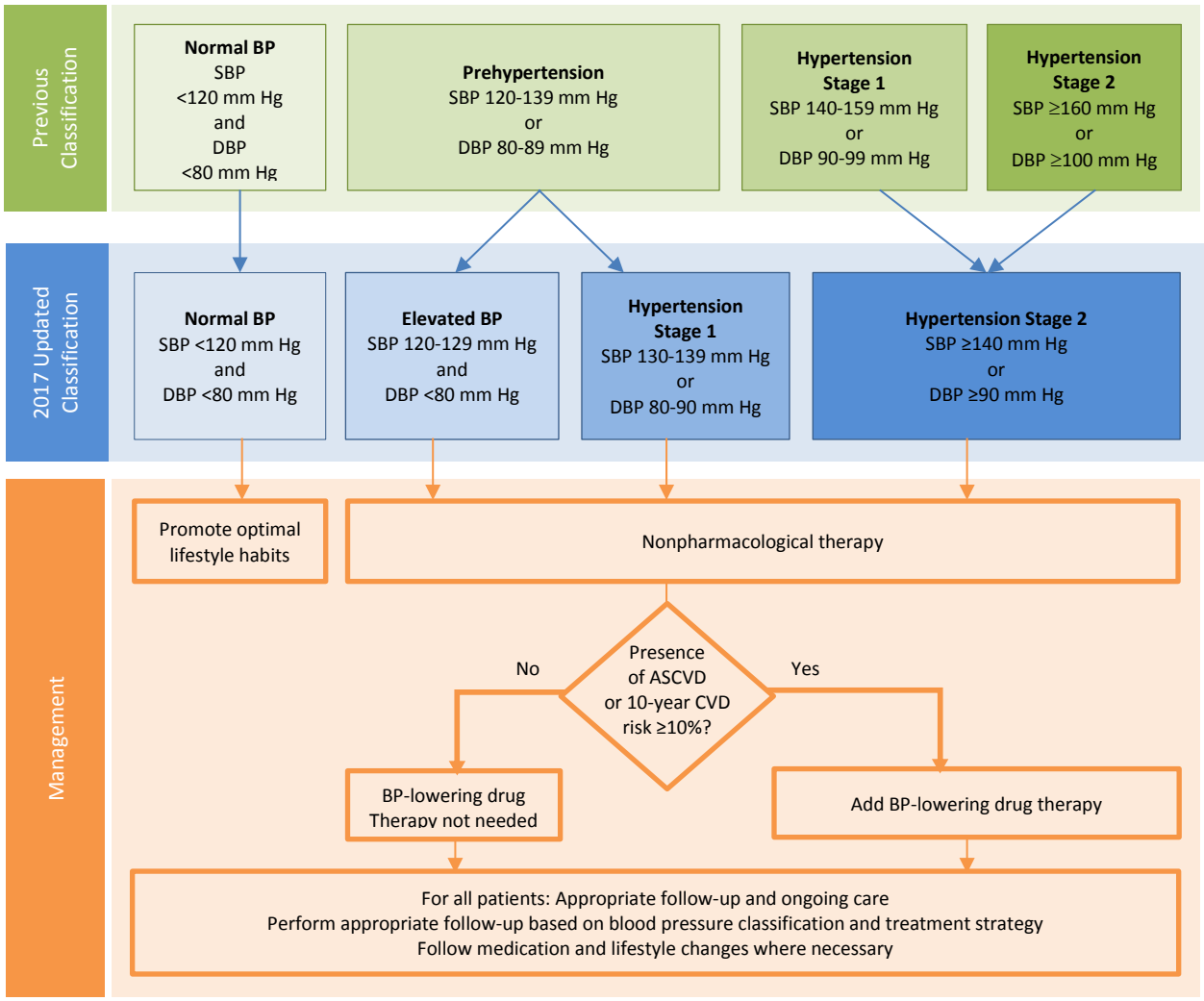
[1] Ford ES. Trends in mortality from all causes and cardiovascular disease among hypertensive and nonhypertensive adults in the United States. Circulation. 2011;123:1737-44.

[2] Farley TA, Dalal MA, Mostashari F, Frieden TR. Deaths preventable in the US by improvements in use of clinical preventive services. Am J Prev Med. 2010;38(6):600-609.

Classification of High Blood Pressure

There are four BP levels used in clinical and public health decision-making; these include normal, elevated, stage 1, and stage 2 HTN. In 2017, the Joint National Committee (JNC) provided new guidance on the classification system for BP among adults (Figure 1).[3,4]

Figure 1. Classification of High Blood Pressure in Adults



SBP indicates Systolic blood pressure; DBP indicates Diastolic blood pressure; ASCVD indicates Atherosclerotic cardiovascular disease

[3] Chobanian AV,Bakris GL,Black HR,etal;theNationalHighBloodPressureEducationProgramCoordinating Committee. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003;42:1206-52.

[4] Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbiagele B, Smith Jr SC, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams Sr KA, Williamson JD, Wright Jr JT, 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, Journal of the American College of Cardiology (2017), doi: 10.1016/j.jacc.2017.11.006.

In-Office Blood Pressure Monitoring

Obtaining accurate BP readings is essential to determining a patient's risk for CVD. Errors that occur in the outpatient setting are common and can be avoided by following a standardized method of measurement (Table 1). Because BP measures are variable and can be influenced by many factors, an average of two measurements are recommended. Caregivers and patients who perform BP self-monitoring should also be trained on these methods.

Table 1. Checklist for Accurate Measurement of Blood Pressure[5,6]

Key Steps	Specific Instructions
Step 1: Properly prepare the patient	1. Have the patient relax, sitting in a chair (feet on floor, back supported) for >5 min. 2. The patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement. 3. Ensure patient has emptied his/her bladder. 4. Neither the patient nor the observer should talk during the >5 min rest period or during the measurement. 5. Remove all clothing covering the location of cuff placement. 6. Measurements made while the patient is sitting or lying on an examining table do not fulfill these criteria.
Step 2: Use proper technique for BP measurements	1. Use a BP measurement device that has been validated and ensure that the device is calibrated periodically. 2. Support the patient's arm (e.g. resting on a desk). 3. Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum). 4. Use the correct cuff size, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used. 5. Either the stethoscope diaphragm or bell may be used for auscultatory readings.[7,8]
Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP	1. At the first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings. 2. Separate repeated measurements by 1–2 min. 3. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20–30 mm Hg above this level for an auscultatory determination of the BP level. 4. For auscultatory readings, deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds.
Step 4: Properly document accurate BP readings	1. Record SBP and DBP. If using the auscultatory technique, record SBP and DBP as onset of the first Korotkoff sound and disappearance of all Korotkoff sounds, respectively, using the nearest even number. 2. Note the time of most recent BP medication taken before measurements.
Step 5: Average the readings	Use an average of ≥2 readings obtained on ≥2 occasions to estimate the individual's level of BP.
Step 6: Provide BP readings to the patient	Provide patients the SBP/DBP readings both verbally and in writing.

BP indicates blood pressure; DBP, diastolic blood pressure; and SBP, systolic blood pressure.

[5] Mancia G, Fagard R, Narkiewicz K, et al. 2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). Eur Heart J. 2013;34:2159-219.

[6] Weir MR. In the clinic: hypertension. Ann Intern Med. 2014;161:ITC1-15.

[7] Liu C, Griffiths C, Murray A, et al. Comparison of stethoscope bell and diaphragm, and of stethoscope tube length, for clinical blood pressure measurement. Blood Press Monit. 2016;21:178-83.

[8] Kantola I, Vesalainen R, Kangassalo K, et al. Bell or diaphragm in the measurement of blood pressure? J Hypertens. 2005;23:499-503.

Out-of-Office/Home Blood Pressure Monitoring

Out-of-office BP monitoring can be helpful in achieving and maintaining good control of HTN. Ambulatory BP monitoring (ABPM) requires a small digital device that measures BP during regular intervals and is designed to capture readings throughout the patient's regular daily activities. Although the ABPM method is considered more accurate, home BP monitoring (HBPM) performed by the patient is often a more practical approach. *See Appendix I for BP Log*.

ABPM and HBPM have different corresponding values compared to in-office BP measurements. The best estimates for home, daytime, nighttime, and 24-hour ambulatory BP readings are provided in Table 2.[9]

Table 2. Corresponding Values of SBP/DBP for In-Office, HBPM and ABPM

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

ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; DBP diastolic blood pressure; HBPM, home blood pressure monitoring; and SBP, systolic blood pressure.

Non-Pharmacological Interventions for Prevention and Treatment

Non-pharmacological interventions are useful for the prevention and treatment of HTN.[10,11] Lifestyle modifications (LM) should be initiated for all patients with HTN.[12] LM may be sufficient on its own or in combination with pharmacological therapy to manage patients with stage 1 HTN. LM is an integral part of the regimen for patients with stage 2 HTN. Table 3 is a summary of the best-proven, non-pharmacological interventions for the prevention and treatment of HTN.

Table 3. Non-Pharmacological Interventions for Prevention and Treatment of Hypertension[13]

	Non-Pharmacological 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 1kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1kg 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

[9] Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbiagele B, Smith Jr SC, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams Sr KA, Williamson JD, Wright Jr JT, 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, Journal of the American College of Cardiology (2017), doi: 10.1016/j.jacc.2017.11.006.

[10] Whelton PK, Appel LJ, Espeland MA, et al. Sodium reduction and weight loss in the treatment of hypertension in older persons: a randomized controlled trial of nonpharmacologic interventions in the elderly (TONE). TONE Collaborative Research Group. JAMA. 1998;279:839-46.

[11] Whelton PK. The elusiveness of population-wide high blood pressure control. Annu Rev Public Health. 2015;36:109-30.

[12] Centers for Disease Control and Prevention. Protocol for Controlling Hypertension in Adults. Atlanta, Georgia. 2013.

[13] Whelton PK, He J, Appel LJ, et al. Primary prevention of hypertension: clinical and public health advisory from the National High Blood Pressure Education Program. JAMA. 2002;288:1882-8.

Non-Pharmacological Intervention		Dose	Approximate Impact on SBP	
			Hypertension	Normotension
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
Physical Activity	Aerobic	● 90–150 min/wk ● 65%–75% heart rate reserve	-5/8 mm Hg	-2/4 mm Hg
	Dynamic resistance	● 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	● 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	In individuals who drink alcohol, reduce alcohol to: ● Men: ≤2 drinks daily ● Women: ≤1 drink daily	-4 mm Hg	-3 mm Hg

DASH indicates Dietary Approaches to Stop HTN; and SBP, systolic blood pressure.

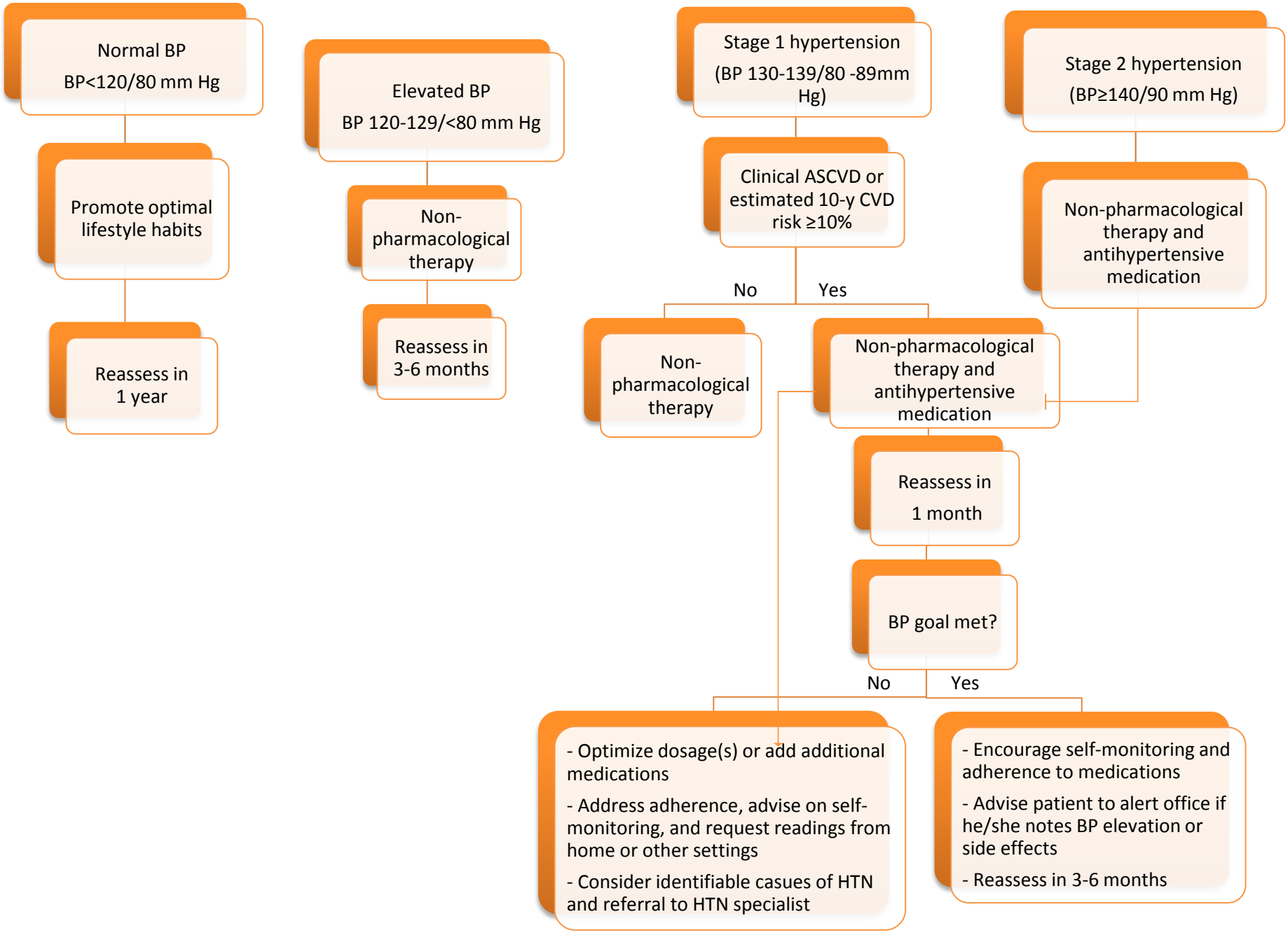
Pharmacological Interventions for Prevention and Treatment

It is essential to focus on overall patient health when managing patients with HTN. All patient risk factors should be addressed in an integrated fashion using comprehensive non-pharmacological and pharmacological therapies. CVD risk and BP level should be used in combination when considering treatment options.

Using anti-hypertensive medications is recommended for secondary prevention of recurrent CVD events (CHD, congestive heart failure and stroke) in patients with clinical CVD and an average SBP of 130 mm Hg or higher or an average diastolic BP (DBP) of 80 mm Hg or higher. Anti-hypertensive medications are recommended for primary prevention in adults with an estimated ten year atherosclerotic cardiovascular disease (ASCVD) risk of 10 percent or higher and an average SBP of 130 mm Hg or higher or an average DBP of 80 mm Hg or higher. It is also recommended for primary prevention of CVD in adults with no history of CVD, an estimated ten year ASCVD risk <10 percent, and an SBP of 140 mm Hg or higher or a DBP of 90 mm Hg or higher.[14] An algorithm for treatment and follow-up based on BP thresholds is shown in Figure 2. Patients with diabetes mellitus (DM) or chronic kidney disease (CKD) are automatically categorized as high-risk.

[14] Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbiagele B, Smith Jr SC, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams Sr KA, Williamson JD, Wright Jr JT, 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, Journal of the American College of Cardiology (2017), doi: 10.1016/j.jacc.2017.11.006.

Figure 2. Algorithm for Treatment and Follow-Up Recommendations



Numerous classes of antihypertensive agents have been shown to reduce adverse clinical events and are available to treat HTN (Appendix 2).[15] Clinical staff should establish consensus on specific medications to be prescribed for most patients with hypertension and other clinical conditions (Table 4), starting doses and dosage increases, intervals for follow-up, and titration.

Table 4. Blood Pressure Thresholds and Goals with Other Clinical Conditions

Clinical Condition(s)	BP Threshold(mm Hg)	BP Goal(mm Hg)
General		
Clinical CVD or 10-year ASCVD risk ≥10%	≥130/80	<130/80
No clinical CVD and 10-year ASCVD risk <10%	≥140/90	<130/80
Older persons (≥65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥130 (SBP)	<130 (SBP)
Specific comorbidities		
Diabetes mellitus	≥130/80	<130/80
CKD	≥130/80	<130/80
Chronic kidney disease after renal transplantation	≥130/80	<130/80
Heart failure	≥130/80	<130/80
Stable ischemic heart disease	≥130/80	<130/80
Secondary stroke prevention	≥140/90	<130/80
Secondary stroke prevention (lacunar)	≥130/80	<130/80
Peripheral arterial disease	≥130/80	<130/80

The patient and their specific factors such as age, concurrent medications, drug adherence, drug interactions, and out-of-pocket costs should be considered when selecting the appropriate antihypertensive agent.[16] Simultaneous use of an angiotensin converting enzyme (ACE) inhibitor, angiotensin receptor blocker (ARB), and/or renin inhibitor is potentially harmful and is not recommended to treat adults with HTN.

[15] Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbiagele B, Smith Jr SC, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams Sr KA, Williamson JD, Wright Jr JT, 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, Journal of the American College of Cardiology (2017), doi: 10.1016/j.jacc.2017.11.006.

[16] Centers for Disease Control and Prevention. Protocol for Controlling Hypertension in Adults. Atlanta, Georgia. 2013.

Undiagnosed Hypertension

Hiding in Plain Sight (HIPS)

Data from 2011-2012 NHANES show that approximately 13 million individuals (36% of the U.S. population with uncontrolled HTN) are neither aware of their HTN status nor taking antihypertensive medications.[17,18] The Million Hearts initiative refers to this population as patients Hiding in Plain Sight (HIPS). The initiative recommends the following four-step approach to identifying and managing HTN in HIPS patients:[19]

HIPS Step 1: Establish clinical criteria for potential undiagnosed HTN
HIPS Step 2: Compare to local, state, or national prevalence data
HIPS Step 3: Search electronic health records (EHR) data for patients that meet clinical criteria
HIPS Step 4: Implement a plan for addressing the identified population

Change Concepts

In 2015, the National Association of Community Health Centers (NACHC) produced a compilation of change ideas from work with the Million Hearts project as guidance to identify and manage patients who potentially have undiagnosed HTN. The change ideas are organized into: key foundations, population health management, and individual care steps (Table 5).[20, 23]

[17] Nwankwo T,Yoon SS, Burt V,Gu Q. Hypertension among adults in the United States: National Health and Nutrition Examination Survey, 2011–2012.
[18] Wall HK, Hannan JA, Wright JS. Patients with Undiagnosed Hypertension: Hiding in Plain Sight. JAMA. 2014;312(19):1973-74.
[19] Ibid.
[20] Baus A, Hendryx M, Pollard C. Identifying patients with hypertension: a case for auditing electronic health record data [published online April 1, 2012]. Perspect Health Inf Manag. 2012;9:1e.
[21] JamesPA,OparilS,CarterBL,CushmanWC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014;311(5):507-520.
[22] WeberMA,SchiffrinEL,WhiteWB,etal.Clinical practice guidelines for the management of hypertension in the community. J Clin Hypertens (Greenwich). 2014; 16(1):14-26.
[23] Centers for Disease Control and Prevention. Hypertension Control Change Package for Clinicians. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2015.

Table 5. Change Concepts for Identifying and Managing Patients with Undiagnosed Hypertension

1. KEY FOUNDATIONS	
CHANGE CONCEPTS	**CHANGE IDEAS**
Make Identification and Diagnosis of HTN a Practice Priority	Designate a HTN Champion
	Ensure Care Team Engagement in HTN Screening and Diagnosis
	Provide BP checks without appointment or co-pay
Implement a Policy and Process to Screen Every Patient for Elevated BP and Undiagnosed HTN at Every Visit	Develop HTN screening and diagnosis policy and protocol (includes elevated BP confirmation approach)
	Develop a flowchart for how potentially undiagnosed hypertensive patients will be proactively identified and engaged
	Develop registry report to identify potentially undiagnosed hypertensive patients
	Develop evidence-based algorithm(s) (clinical criteria) to identify patients with potentially undiagnosed HTN
	Configure the EHR to generate warning in red when BP is out of normal range
	Configure BP reading flow sheet
Train and Evaluate Direct Care Staff on Accurate BP Measurement and Recording	Provide guidance on measuring BP accurately
	Assess adherence to proper BP measurement techniques
	Provide guidance on documenting BP accurately (clinically relevant BP, avoiding terminal digit bias)
	Assess adherence to accurate BP documentation
Systematically Use Evidence-based HTN Diagnosis Guidelines and Protocols	Deploy evidence-based HTN diagnosis protocol (includes elevated BP confirmation approach)
	Overcome HTN diagnosis inertia
	Establish a program to support home or ambulatory BP monitoring

2. POPULATION HEALTH MANAGEMENT	
CHANGE CONCEPTS	**CHANGE IDEAS**
Use a Registry to Identify, Track, and Manage Patients with elevated BP	Implement a registry report to identify potentially undiagnosed hypertensive patients; diagnose as appropriate
	Use a defined process for outreach (e.g., via phone, mail, email, text message) to patients with elevated BP/potentially undiagnosed HTN
Use Practice Data to Drive Improvement	Develop/determine metrics to assess potentially undiagnosed HTN and missed opportunities to diagnose and identify targets for improvement
	Regularly provide a dashboard with BP goals, metrics, and performance

3. INDIVIDUAL PATIENT SUPPORTS	
CHANGE CONCEPTS	**CHANGE IDEAS**
Prepare Patients, Care Team Before Every Visit for Effective	Contact patients to confirm upcoming appointments and instruct them how to prepare for upcoming visit

BP measurement and HTN Identification During Office Visits (e.g., via pre-visit patient outreach and team huddles)	Encourage Self-Monitored Blood Pressure (SMBP) for 5-7 days prior to visit
	Use a flowsheet or dashboard with potentially undiagnosed HTN patients and care gaps highlighted to support team huddles
	Design workflows and use tools to ensure that indicated actions occur during the visit
Use Each Patient Visit Phase to Optimize HTN Identification and Diagnosis: Intake (e.g., check-in, waiting, rooming)	Post/provide educational materials to help patients understand elevated BP and its implications
	Measure, document, and repeat BP correctly as indicated
	EHR generates warning in red when BP is out of normal range
	Design workflows and use tools to ensure elevated BPs are addressed at the point of care (elevated BP magnet on the door, EHR alerts, etc.)
Use Each Patient Visit Phase to Optimize HTN Identification and Diagnosis: Encounter	Follow protocol for HTN diagnosis
Use Each Patient Visit Phase to Optimize HTN Diagnosis: Encounter Closing (e.g., checkout)	Provide patients with a written visit summary, and follow-up guidance at the end of each visit
	Support BP self-monitoring: advise on choosing device/cuff size, check device for accuracy, training patient on use, provide BP logs (electronic/paper/portal)
	Support ambulatory BP monitoring
Use Each Patient Visit Phase to Optimize HTN Diagnosis: Not Visit Related	On the patient portal, provide education materials on elevated BP and to support a low-sodium diet, exercise, and access to community resources

Criteria

HIPS Step 1: Establish clinical criteria for potential undiagnosed HTN

To identify and treat HIPS patients, the primary care team should determine their own specifications for patients with probable HTN and include the number of elevated BP readings and what degree of elevation.

Prevalence

HIPS Step 2: Compare to local, state, or national prevalence data

Adopt a systematic approach to assessing and estimating the HTN prevalence of the practice using the following calculation:

[(adult patients with a diagnosis of essential HTN/adult patients) × 100]

If the prevalence estimate is significantly lower than the national estimate, it may be an indicator that there are patients with elevated BP who have not been identified.

Queries

HIPS Step 3: Search EHR data for patients that meet clinical criteria

Although treatment standards are well-established for the management of HTN, guidelines for identifying HIPS patients need improvement with regard to which threshold, level of elevated readings, and frequency are most appropriate. Since HTN documentation in the EHR is strongly associated with patients receiving treatment, recent efforts have centered on leveraging EHR data.
Patients can be identified by evaluating the practice data. The best approach should be determined based on the practice's resources and capacity, which should be modified over time. Among the approaches are querying an EHR registry, extracting data using quality improvement software, and embedding automated algorithms into the EHR. A sample set of specifications that can be used within the EHR to identify HIPS patients is provided in Table 6.

Table 6. Sample Specifications for Identifying Patients with Undiagnosed Hypertension

Goal: Identify patients ≥18 years old (w/o end stage renal disease, pregnancy or previous HTN Diagnosis during the reporting period who may be hiding in plain sight with undiagnosed HTN based on abnormal BP readings and do NOT use antihypertensive medication
1. Query for all patients => 18 years old during the last 12 months (from date of query being run, back 1 year) with a BP reading => 140/90mmHg at 2 separate visits,[24] including the most recent during the past 12 months OR a reading of ≥160mmHg SBP or ≥100mmHg DSP at any 1 medical visit during the past 12 months. 2. Exclude patients with ESRD. 3. Exclude patients with current or previous HTN diagnosis at any point. 4. Exclude any patients with pregnancy during the report period. 5. Exclude any patients using anti-HTN medications: AMILORIDE, AMILORIDE HCL, AMLODIPINE, AMLODIPINE DIET MANAGE PROD, AMLODIPINE DIET MANAGE PRODMISCELLANEOUS, AMLODIPINE BESYBENAZEPRIL HCL, AMLODIPINE BESYLATE, AMLODIPINE BESYLATEA, AMLODIPINE BESYLATEUNSPECIFIED, AMLODIPINE BESYLATEVALSARTAN, AMLODIPINEATORVASTATIN, AMLODIPINEVALSARTANHCTZ, ATENOLOL, ATENOLOLCHLORTHALIDONE, BENAZEPRIL, BENAZEPRIL HCL, BENAZEPRILHYDROCHLOROTHIAZIDE, BISOPROLOL, BISOPROLOL FUMARATE, CANDESARTAN, CAPTOPRIL, CARVEDILOL, CHLOROTHIAZIDE, CHLOROTHIAZIDEML SUSPENSION, CHLORTHALIDONE, CHLORTHALIDONEUNSPECIFIED, CLONIDINE, CLONIDINE HCL, CLONIDINE HCL ER, CLONIDINEPATCH, DILTIAZEM, DILTIAZEM CD, DILTIAZEM CD EXTENDED RELEASEHOUR, DILTIAZEM CDEXTENDED RELEASEHOUR, DILTIAZEM HCL, DILTIAZEM HCL CR, DILTIAZEM HCL ER, DILTIAZEM HCL ER BEADS EXTENDED RELEASEHOUR, DILTIAZEM HCL ER BEADSEXTENDED RELEASEHOUR, DILTIAZEM HCL ER COATED BEADS EXTENDED RELEASEHOUR, DILTIAZEM HCL ER COATED BEADSEXTENDED RELEASEHOUR, DILTIAZEM HCL ER COATED BEADSHOUR SUSTAINED RELEASE, DILTIAZEM HCL ER EXTENDED RELEASEHOUR, DILTIAZEM HCL EREXTENDED RELEASEHOUR, DILTIAZEM HCL ERHOUR SUSTAINED RELEASE, DILTIAZEM HCL ERUNSPECIFIED, DILTIAZEM HCLML SUSPENSION, DILTIAZEMCAP, DOXAZOSIN, DOXAZOSIN MESYLATE EREXTENDED RELEASEHOUR, DOXAZOSIN MESYLATE, ENALAPRIL, ENALAPRIL MALEATE, ENALAPRIL MALEATEML LIQUID, ENALAPRIL MALEATEML SOLUTION RECONSTITUTED,

[24] Recent observation is that in some environments, patient visit frequency may not be sufficient for 2 visits to render a reasonable patient cohort

Goal: Identify patients ≥18 years old (w/o end stage renal disease, pregnancy or previous HTN Diagnosis during the reporting period who may be hiding in plain sight with undiagnosed HTN based on abnormal BP readings and do NOT use antihypertensive medication
ENALAPRILHYDROCHLOROTHIAZIDE, FELODIPINE, FELODIPINE ER EXTENDED RELEASEHOUR, FOSINOPRIL, FOSINOPRIL SODIUM, FUROSEMIDE, FUROSEMIDE ML SOLUTION, FUROSEMIDEML, FUROSEMIDEML SOLUTION, FUROSEMIDES, FUROSEMIDESOLUTION, FUROSEMIDEUNSPECIFIED, GUANFACINE HCL, GUANFACINE HCL ER UNSPECIFIED, GUANFACINE HCL EREXTENDED RELEASEHOUR, HYDRALAZINE, HYDRALAZINE HCL, HYDRALAZINE HCL ML SOLUTION, HYDRALAZINE HCLUNSPECIFIED, HYDRALAZINEHCTZ, HYDROCHLOROTHIAZIDE, HYDROCHLOROTHIAZIDE E, HYDROCHLOROTHIAZIDE GM, HYDROCHLOROTHIAZIDECAP, HYDROCHLOROTHIAZIDEG, HYDROCHLOROTHIAZIDEMG, HYDROCHLOROTHIAZIDEUNSPECIFIED, INDAPAMIDE, IRBESARTAN, IRBESARTANHYDROCHLOROTHIAZIDE, ISOSORB DINITRATEHYDRALAZINE, LISINOPRIL, LISINOPRIL DIET MANAGE PROD, LISINOPRIL DIET MANAGE PRODMISCELLANEOUS, LISINOPRILHYDROCHLOROTHIAZIDE, LISINOPRILHYDROCHLOROTHIAZIDES, LISINOPRILML, LISINOPRILONCE DAILY, LISINOPRILORAL, LISINOPRILQD, LISINOPRILSOLUTION, LISINOPRILUNSPECIFIED, LOSARTAN, LOSARTAN ML , LOSARTAN POTASSIUM, LOSARTAN POTASSIUMHCTZ, LOSARTAN POTASSIUMUNSPECIFIED, LOSARTANMH, LOSARTANSTRIP, METOPROLOL DIET MANAGE PROD, METOPROLOL DIET MANAGE PROD MISCELLANEOUS, METOPROLOL , METOPROLOL ML , METOPROLOL SUCCINATE, METOPROLOL SUCCINATE ER, METOPROLOL SUCCINATE ER EXTENDED RELEASEHOUR, METOPROLOL SUCCINATE ER EXTENDED RELEASEHOUR, METOPROLOL SUCCINATE ER UNSPECIFIED, METOPROLOL SUCCINATE EREXTENDED RELEASEHOUR, METOPROLOL SUCCINATE ERHOUR SUSTAINED RELEASE, METOPROLOLSUCCINATE ERUNSPECIFIED, METOPROLOL SUCCINATEEXT, METOPROLOL SUCCINATEEXTENDED RELEASE, METOPROLOL TARTRATE, METOPROLOL TARTRATEHOUR SUSTAINED RELEASE, METOPROLOL TARTRATES, METOPROLOLHCTZ ER EXTENDED RELEASEHOUR, METOPROLOLHYDROCHLOROTHIAZIDE, TELMISARTANAMLODIPINE, VALSARTANHYDROCHLOROTHIAZIDE

Outreach/Pre-Visit Planning/Panel Management (Recall)

HIPS Step 4: Implement a plan for addressing the identified population

Today greater ease of communication between patients and their primary care providers has helped bridge the communication gap between clinical visits. Electronic systems may be used by clinicians to create reports on patients with varying risks of disease or with specific diseases management needs, providing them with greater sophistication in developing plans to target outreach to patients.

Pre-Visit Planning and Panel Management are two tools that enable organizations to ensure that:

- Patients receive appropriate confirming diagnostic tests
- Proper diagnoses are entered into medical records accurately
- Patients engage in developing an updated care plan and/or receive a referral to community resources to prevent further exacerbation, and proper management, of chronic diseases

Pre-Visit Planning offers opportunities to improve patient care and to identify gaps in care for patients with upcoming visits. Common pre-visit planning steps include:

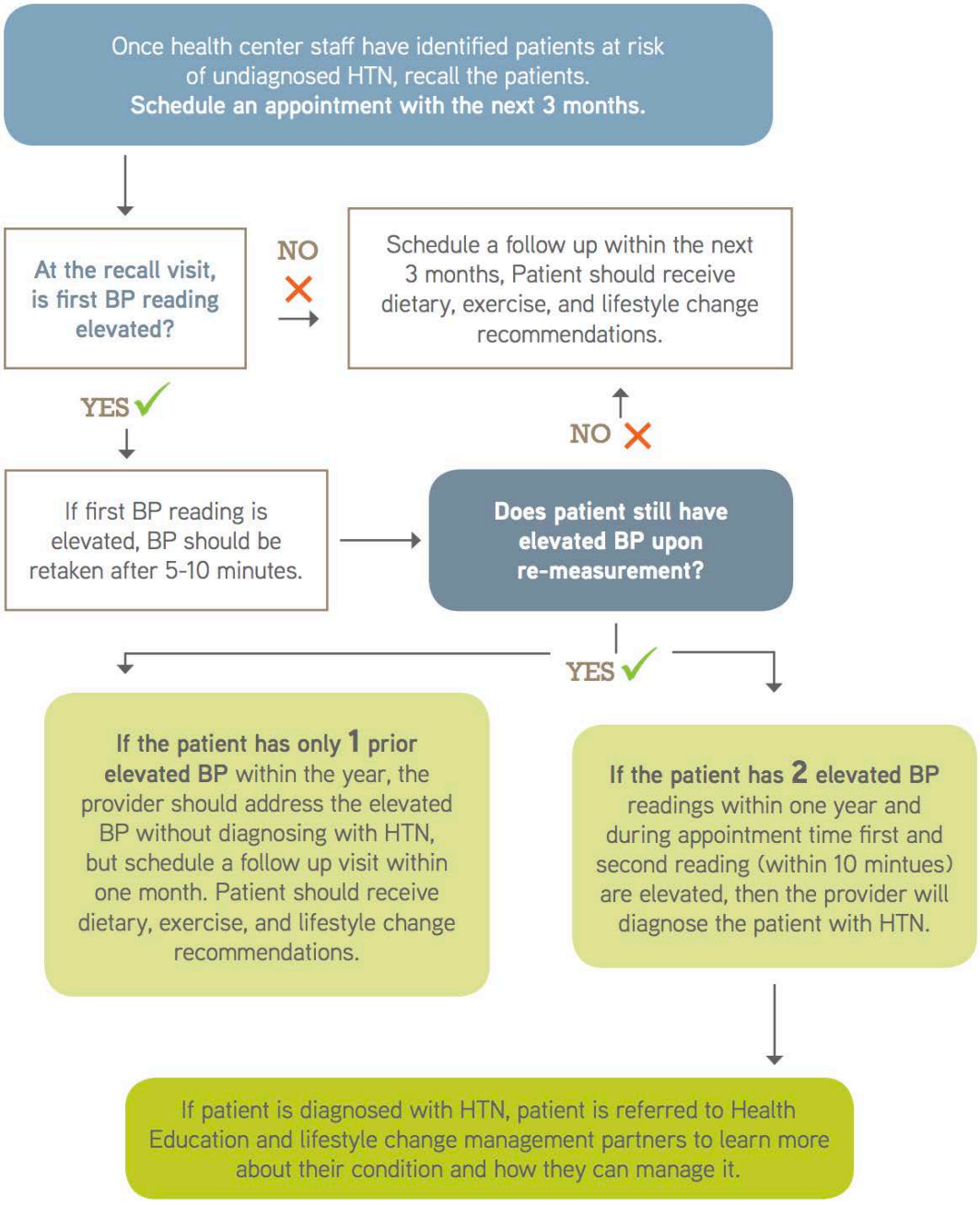
- Gathering the necessary information for upcoming visits
- Planning the current patient visit and preparing for the next
- Pre-populating the next day's visit notes with HTN risks (e.g., abnormal blood sugar, lifestyle risks, high BP, etc.)

- Arranging for pre-visit lab testing

The American Medical Association provides an interactive tool to assist practices in implementing Pre-Visit Planning, available at: https://www.stepsforward.org/modules/pre-visit-planning.

In Panel Management (also known as “Recall”), patients are systematically identified for gaps in care, preventive services, and/or chronic condition management. Panel Management allows organizations to proactively identify and contact patients who are currently accessing the health care system but may be unaware of risk factors or uncontrolled medical conditions. A sample recall flow chart is provided in Figure 3 below. This approach allows clinical staff to improve care for patients who are not necessarily in the office for a visit.

Figure 3. Sample Recall Flowchart



Source: http://mylearning.nachc.com/diweb/fs/file/id/229350

Clinicians are also able to use electronic systems to intervene with patients on their behalf for low-level activities, such as reports which provide phone call reminders to patients flagged with certain risk levels or disease attributes that require extra attention. This can be particularly beneficial for patients who do not schedule regular check-ins with their providers. Through such tools, care teams can reduce overhead associated with administrative tasks and are better able to proactively manage patients.

Conclusion

Improving HTN control is a public health priority because it can prevent CVD and stroke in millions of Americans. However, improvement can only occur if all patients with HTN are promptly identified, accurately diagnosed, and provided with evidence-based treatment and support.

Appendix I: Home Blood Pressure Log

My Blood Pressure Log

American Heart Association | American Stroke Association
life is why

Name_____

My Blood Pressure Goal _____ mm Hg

Instructions

- Take at least two blood pressure readings one minute apart - once in the morning before taking medications and in the evening before dinner.
- For best results, remain still for at least 5 minutes. Sit with your back straight and supported and your feet flat on the floor.
- When you measure your blood pressure, rest your arm on a flat surface (such as a table) so your upper arm is at heart level.
- Record your blood pressure on this sheet and show it to your doctor at every visit.
- You can also use AHA's Check. Change. *Control.*® Tracker (**ccctracker.com/aha**), a free online tool to help you track and monitor your blood pressure.
- You will need a campaign code to sign up for the CCC Tracker. Find the campaign code on the map for your state and sign up. .

Date	AM	PM	Date	AM	PM

Appendix II: Oral Antihypertensive Drugs

Class	Drug	Usual Dose, Range (mg per day)*	Daily Frequency	Comments
Primary Agents				
Thiazide or thiazide-type diuretics	**Chlorthalidone**	12.5–25	1	• Chlorthalidone preferred based on prolonged half-life and proven trial reduction of CVD • Monitor for hyponatremia and hypokalemia, uric acid and calcium levels. • Use with caution in patients with history of acute gout unless patient is on uric acid-lowering therapy.
	Hydrochlorothiazide	25–50	1	
	Indapamide	1.25–2.5	1	
	Metolazone	2.5–10	1	
ACE Inhibitors	**Benazepril**	10–40	1 or 2	• Do not use in combination with ARBs or direct renin inhibitor • Increased risk of hyperkalemia, especially in patients with CKD or in those on K+ supplements or K+-sparing drugs • May cause acute renal failure in patients with severe bilateral renal artery stenosis • Do not use if history of angioedema with ACE inhibitors. • Avoid in pregnancy
	Captopril	12.5–150	2 or 3	
	Enalapril	5–40	1 or 2	
	Fosinopril	10–40	1	
	Lisinopril	10–40	1	
	Moexipril	7.5–30	1 or 2	
	Perindopril	4–16	1	
	Quinapril	10–80	1 or 2	
	Ramipril	2.5–10	1 or 2	
	Trandolapril	1–4	1	
ARBs	**Azilsartan**	40–80	1	• Do not use in combination with ACE inhibitors or direct renin inhibitor • Increased risk of hyperkalemia in CKD or in those on K+ supplements or K+-sparing drugs • May cause acute renal failure in patients with severe bilateral renal artery stenosis • Do not use if history of angioedema with ARBs. Patients with a history of angioedema with an ACEI can receive an ARB beginning 6 weeks after ACEI discontinued. • Avoid in pregnancy
	Candesartan	8–32	1	
	Eprosartan	600–800	1 or 2	
	Irbesartan	150–300	1	
	Losartan	50–100	1 or 2	
	Olmesartan	20–40	1	
	Telmisartan	20–80	1	
	Valsartan	80–320	1	
CCB—dihydropyridines	**Amlodipine**	2.5–10	1	• Avoid use in patients with HFrEF; amlodipine or felodipine may be used if required • Associated with dose-related pedal edema, which is more common in women than men
	Felodipine	5–10	1	
	Isradipine	5–10	2	
	Nicardipine SR	5–20	1	
	Nifedipine LA	60–120	1	
	Nisoldipine	30–90	1	
CCB—nondihydropyridines	**Diltiazem SR**	180–360	2	• Avoid routine use with beta blockers due to increased risk of bradycardia and heart block • Do not use in patients with HFrEF • Drug interactions with diltiazem and verapamil (CYP3A4 major substrate and moderate inhibitor)
	Diltiazem ER	120–480	1	
	Verapamil IR	40-80	3	
	Verapamil SR	120–480	1 or 2	
	Verapamil-delayed onset ER (various forms)	100–480	1 (in the evening)	

Table is continued in the next two pages

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Appendix II: Oral Antihypertensive Drugs (cont.)

Class	Drug	Usual Dose, Range (mg per day)*	Daily Frequency	Comments
Secondary Agents				
Diuretics—loop	**Bumetanide**	0.5–4	2	• Preferred diuretics in patients with symptomatic HF. Preferred over thiazides in patients with moderate-to-severe CKD (e.g., GFR <30 mL/min)
	Furosemide	20–80	2	
	Torsemide	5–10	1	
Diuretics—potassium sparing	**Amiloride**	5–10	1 or 2	• Monotherapy agents minimally effective antihypertensives • Combination therapy of potassium sparing diuretic with a thiazide can be considered in patients with hypokalemia on thiazide monotherapy • Avoid in patients with significant CKD (e.g., GFR <45 mL/min)
	Triamterene	50–100	1 or 2	
Diuretics—aldosterone antagonists	**Eplerenone**	50–100	12	• Preferred agents in primary aldosteronism and resistant hypertension • Spironolactone associated with greater risk of gynecomastia and impotence compared to eplerenone • Common add-on therapy in resistant hypertension • Avoid use with K+ supplements, other K+-sparing diuretics or significant renal dysfunction • Eplerenone often requires twice daily dosing for adequate BP lowering
	Spironolactone	25–100	1	
Beta blockers—cardioselective	**Atenolol**	25–100	12	• Beta blockers are not recommended as first-line agents unless the patient has IHD or HF • Preferred in patients with bronchospastic airway disease requiring a beta blocker • Bisoprolol and metoprolol succinate preferred in patients with HFrEF • Avoid abrupt cessation
	Betaxolol	5–20	1	
	Bisoprolol	2.5–10	1	
	Metoprolol tartrate	100–400	2	
	Metoprolol succinate	50–200	1	
Beta blockers—cardioselective and vasodilatory	**Nebivolol**	5–40	1	• Induces nitric oxide-induced vasodilation • Avoid abrupt cessation
Beta blockers—noncardioselective	**Nadolol**	40–120	1	• Avoid in patients with reactive airways disease • Avoid abrupt cessation
	Propranolol IR	160–480	2	
	Propranolol LA	80–320	1	
Beta blockers—intrinsic sympathomimetic activity	**Acebutolol**	200–800	2	• Generally avoid, especially in patients with IHD or HF • Avoid abrupt cessation
	Carteolol	2.5–10	1	
	Penbutolol	10–40	1	
	Pindolol	10–60	2	

Table is continued in the next page

Appendix II: Oral Antihypertensive Drugs (cont.)

Class	Drug	Usual Dose, Range (mg per day)*	Daily Frequency	Comments
Secondary Agents *(continued from previous page)*				
Beta blockers—combined alpha- and beta-receptor	**Carvedilol**	12.5–50	2	• Carvedilol preferred in patients with HFrEF • Avoid abrupt cessation
	Carvedilol phosphate	20–80	1	
	Labetalol	200–800	2	
Direct renin inhibitor	**Aliskiren**	150–300	1	• Do not use in combination with ACE inhibitors or ARBs • Aliskiren is very long acting • Increased risk of hyperkalemia in CKD or in those on K+ supplements or K+ sparing drugs • May cause acute renal failure in patients with severe bilateral renal artery stenosis • Avoid in pregnancy
Alpha-1 blockers	**Doxazosin**	1–8	1	• Associated with orthostatic hypotension, especially in older adults • May consider as second-line agent in patients with concomitant BPH
	Prazosin	2–20	2 or 3	
	Terazosin	1–20	1 or 2	
Central alpha1-agonist and other centrally acting drugs	**Clonidine oral**	0.1–0.8	2	• Generally reserved as last-line due to significant CNS adverse effects, especially in older adults • Avoid abrupt discontinuation of clonidine, which may induce hypertensive crisis; clonidine must be tapered to avoid rebound hypertension
	Clonidine patch	0.1–0.3	1 weekly	
	Methyldopa	250–1000	2	
	Guanfacine	0.5–2	1	
Direct vasodilators	**Hydralazine**	250-200	2 or 3	• Associated with sodium and water retention and reflex tachycardia; use with a diuretic and bet a blocker • Hydralazine associated with drug-induced lupus-like syndrome at higher doses • Minoxidil associated with hirsutism and requires a loop diuretic. Can induce pericardial effusion
	Minoxidil	5–100	1 -3	

*Dosages may vary from those listed in the FDA approved labeling (available at http://dailymed.nlm.nih.gov/dailymed/index.cfm).

Adapted with permission from Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003; 289:2560-72