VA/DoD Clinical Practice Guidelines

THE DIAGNOSIS AND MANAGEMENT OF HYPERTENSION IN THE PRIMARY CARE SETTING

Provider Summary

Version 4.0 | 2020

VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE DIAGNOSIS AND MANAGEMENT OF HYPERTENSION IN THE PRIMARY CARE SETTING

Department of Veterans Affairs

Department of Defense

Provider Summary

QUALIFYING STATEMENTS

The Department of Veterans Affairs and the Department of Defense guidelines are based upon the best information available at the time of publication. They are designed to provide information and assist decision making. They are not intended to define a standard of care and should not be construed as one. Neither should they be interpreted as prescribing an exclusive course of management.

This Clinical Practice Guideline is based on a systematic review of both clinical and epidemiological evidence. Developed by a panel of multidisciplinary experts, it provides a clear explanation of the logical relationships between various care options and health outcomes while rating both the quality of the evidence and the strength of the recommendation.

Variations in practice will inevitably and appropriately occur when clinicians take into account the needs of individual patients, available resources, and limitations unique to an institution or type of practice. Every healthcare professional making use of these guidelines is responsible for evaluating the appropriateness of applying them in the setting of any particular clinical situation.

These guidelines are not intended to represent Department of Veterans Affairs or TRICARE policy. Further, inclusion of recommendations for specific testing and/or therapeutic interventions within these guidelines does not guarantee coverage of civilian sector care. Additional information on current TRICARE benefits may be found at www.tricare.mil or by contacting your regional TRICARE Managed Care Support Contractor.

Version 4.0 – 2020

Table of Contents

Introduction

The Department of Veterans Affairs (VA) and Department of Defense (DoD) Evidence-Based Practice Work Group (EBPWG) was established and first chartered in 2004, with a mission to advise the Health Executive Committee (HEC) "…on the use of clinical and epidemiological evidence to improve the health of the population…" across the Veterans Health Administration (VHA) and Military Health System (MHS), by facilitating the development of clinical practice guidelines (CPGs) for the VA and DoD populations.[1] The CPG is intended to provide healthcare providers with a framework by which to evaluate, treat, and manage the individual needs and preferences of patients with hypertension (HTN), thereby leading to improved clinical outcomes.

In 2014, the VA and DoD published a CPG for the Diagnosis and Management of Hypertension in the Primary Care Setting (2014 VA/DoD HTN CPG), which was based on evidence reviewed through April 2014. Since the release of that guideline, a growing body of research has expanded the general knowledge and understanding of HTN. Consequently, a recommendation to update the 2014 VA/DoD HTN CPG was initiated in 2018. The updated 2020 HTN CPG includes objective, evidence-based information on the diagnosis and management of HTN. It is intended to assist healthcare providers in all aspects of patient care, including, but not limited to, screening, diagnosis, and management. The system-wide goal of evidence-based guidelines is to improve the patient's health and well-being by guiding health providers who are caring for patients with HTN along management pathways that are supported by the evidence. The expected outcome of successful implementation of the guideline is to:

- Assess the individual's condition and determine the best treatment method, in collaboration with the patient
- Optimize health outcomes and improve quality of life
- Minimize preventable complications and morbidity
- Emphasize the use of patient centered care (PCC)

Recommendations

The following recommendations were made using a systematic approach considering four domains as per the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach as detailed in the section on Methods and Appendix A in the full text HTN CPG. These domains include: confidence in the quality of the evidence, balance of desirable and undesirable outcomes (i.e., benefits and harms), patient or provider values and preferences, and other implications, as appropriate (e.g., resource use, equity, acceptability).

Topic	Sub-topic	#	Recommendation	Strength[a]	Category[b]
Screening, Diagnosis, and Monitoring	*a. Screening*	1.	We recommend screening adults for elevated blood pressure periodically.	Strong for	Not Reviewed, Amended
	b. Measurement Techniques	2.	We suggest using attended or unattended, fully automated office blood pressure measurement (programmed to wait five minutes and record the average of three measurements separated by at least 30 seconds).	Weak for	Reviewed, New-added
		3.	When fully automated blood pressure measurement is not available, we suggest measurement of blood pressure using standard technique and a properly calibrated and validated sphygmomanometer.	Weak for	Reviewed, New-replaced
		4.	We suggest using out-of-office blood pressure monitoring methods (ambulatory 24-hour monitoring or home blood pressure measurements) to inform the diagnosis and management of hypertension.	Weak for	Reviewed, New-replaced
	c. Monitoring	5.	Among patients treated for hypertension, we suggest offering home blood pressure self-monitoring with co-interventions for lowering systolic and diastolic blood pressure.	Weak for	Reviewed, New-added
Treatment Goals and General Approaches to Hypertension Management	*a. Blood Pressure Goals*	6.	For all patients, including those with type 2 diabetes, we suggest treating to a systolic blood pressure goal of <130 mm Hg.	Weak for	Reviewed, New-added
		7.	For patients 60 years and over, we recommend treating to a systolic blood pressure goal of <150 mm Hg with added benefit to lowering systolic blood pressure further for those between 130 mm Hg and 150 mm Hg.	Strong for	Reviewed, Amended
		8.	For patients 60 years and over with type 2 diabetes, we recommend treating to a systolic blood pressure goal of <140 mm Hg with added benefit to lowering systolic blood pressure further for those between 130 mm Hg and 140 mm Hg.	Strong for	Reviewed, Amended
		9.	For patients 30 years and over, we recommend treating to a diastolic blood pressure goal of <90 mm Hg.	Strong for	Reviewed, Amended

Topic	Sub-topic	#	Recommendation	Strength[a]	Category[b]
Treatment Goals and General Approaches to Hypertension Management (cont.)	*b. General Approaches to HTN Management*	10.	We recommend offering pharmacist-led medication management as an option for patients with hypertension.	Strong for	Reviewed, New-replaced
		11.	We suggest offering nurse-led interventions as an option for patients treated for hypertension.	Weak for	Reviewed, New-replaced
		12.	We suggest offering registered dietitian-led nutrition interventions as an option for patients with hypertension who are or are not on medication.	Weak for	Reviewed, New-replaced
		13.	We suggest technology-based interventions (e.g., e-counseling, electronic transmission of data, telemonitoring, mobile applications) for improving control of hypertension.	Weak for	Reviewed, New-replaced
Non-Pharmacological Treatment	*a. Weight Reduction*	14.	We suggest advising patients with hypertension and overweight/obesity to lose weight to improve blood pressure.	Weak for	Reviewed, Amended
		15.	For patients with hypertension and overweight/obesity, we suggest offering a diet directed at weight loss for the treatment of hypertension.	Weak for	Reviewed, New-added
		16.	For the treatment of hypertension, there is insufficient evidence for or against offering weight loss medications for patients with obesity and hypertension.	Neither for nor against	Reviewed, New-added
		17.	For the treatment of hypertension, there is insufficient evidence to suggest for or against bariatric surgery for patients with obesity and hypertension.	Neither for nor against	Reviewed, New-added
	b. Exercise/ Physical Activity	18.	We suggest offering individual or group-based exercise for the treatment of hypertension to reduce blood pressure.	Weak for	Reviewed, Amended
		19.	We recommend a target for aerobic exercise of at least 120 minutes per week for reduction in blood pressure.	Strong for	Not Reviewed, Amended
	c. Dietary Modifications	20.	We recommend a dietitian-led Dietary Approaches to Stop Hypertension Diet for the treatment or prevention of hypertension for patients with hypertension or interested patients with other cardiovascular risk factors.	Strong for	Not Reviewed, Amended
		21.	In patients with hypertension, we recommend that sodium intake be limited to no more than 2,300 mg/day (100 mmol/day), with referral to a dietitian or other support as appropriate.	Strong for	Not Reviewed, Not Changed
		22.	In patients with additional cardiovascular risk factors, such as dyslipidemia, we suggest considering a dietitian-led Mediterranean Diet as an alternative to the Dietary Approaches to Stop Hypertension Diet.	Weak for	Not Reviewed, Not Changed

Topic	Sub-topic	#	Recommendation	Strength[a]	Category[b]
Pharmacological Treatment	*a. For Hypertension*	23.	We recommend offering a thiazide-type diuretic, calcium channel blocker, or either an angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker as primary pharmacologic therapy for hypertension for reduction in composite cardiovascular outcomes.	Strong for	Reviewed, New-replaced
		24.	In African American patients with hypertension, we recommend against using an angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker as monotherapy.	Strong against	Not Reviewed, Not Changed
		25.	In hypertensive patients 65 years and over, we suggest a thiazide-type diuretic for reduction in composite cardiovascular outcomes.	Weak for	Reviewed, New-added
		26.	We recommend against more than one of the following three drug classes together in the same patient: angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, or direct renin inhibitors.	Strong against	Not Reviewed, Not Changed
		27.	For the treatment of hypertension, there is insufficient evidence to recommend for or against initiating combination therapy over initiating monotherapy with the sequential addition of another medication.	Neither for nor against	Reviewed, New-replaced
	b. For Resistant Hypertension	28.	For patients with resistant hypertension (defined as those who are not adequately controlled with maximally tolerated dose of triple therapy [i.e., a thiazide-type diuretic, calcium channel blockers, and angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker]), we suggest adding spironolactone in those patients without contraindications.	Weak for	Reviewed, New-replaced

[a] For additional information, please refer to the section on Grading Recommendations in the full text HTN CPG.

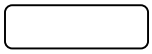
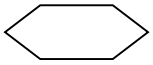
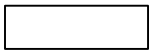
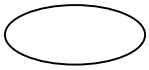
[b] For additional information, please refer to the section on Recommendation Categorization and Appendix D in the full text HTN CPG.

Algorithm

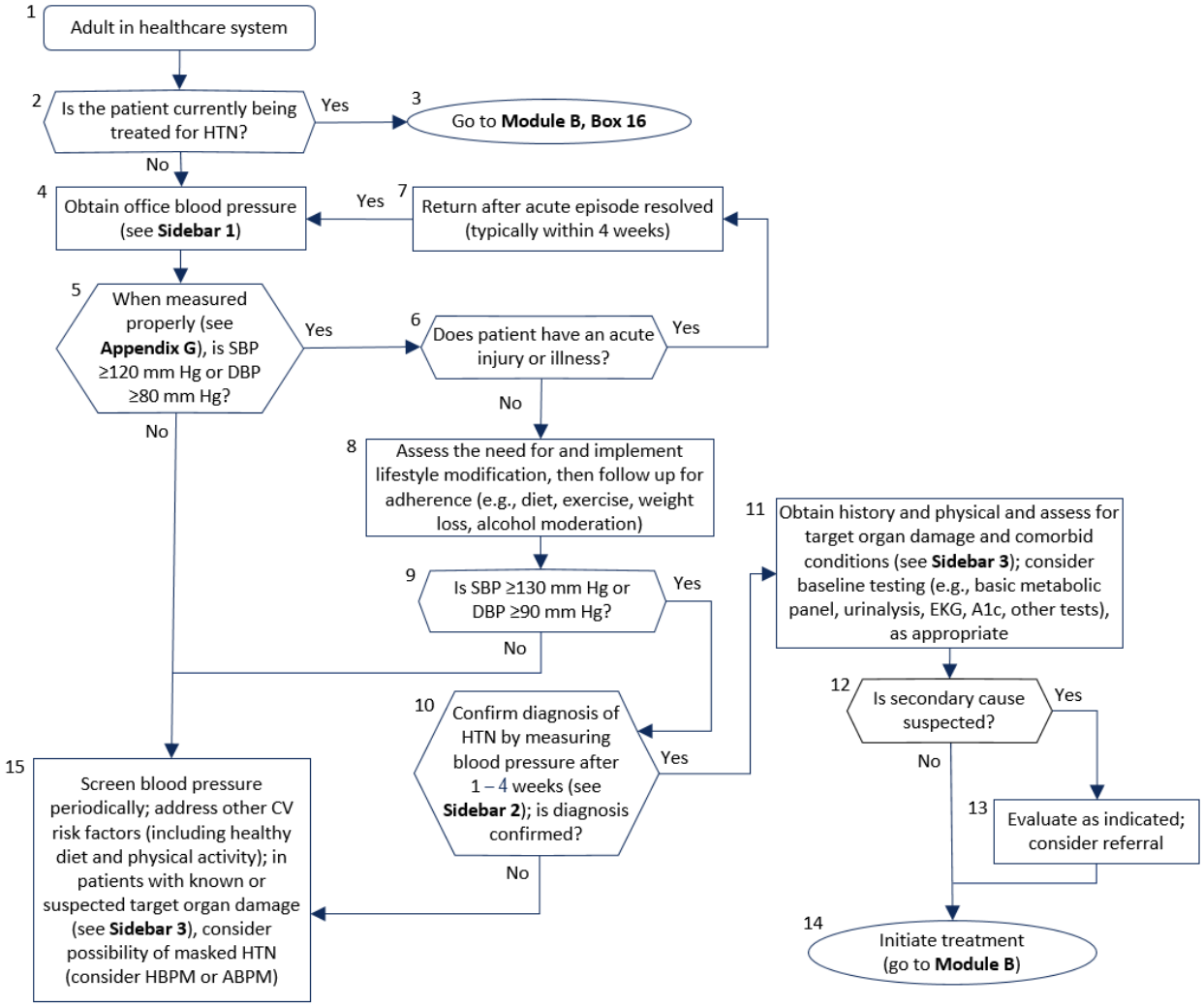
The CPG includes an algorithm that is designed to facilitate understanding of the clinical pathways and decision-making processes used in managing patients with HTN. The use of the algorithm format as a way to represent patient management was chosen based on the understanding that such a format may promote more efficient diagnostic and therapeutic decision making; it also has potential to change patterns of resource use. Although the Work Group recognizes that not all clinical practices are linear, the simplified linear approach depicted through the algorithm and its format allows the provider to assess the critical information needed at the major decision points in the clinical process. It includes:

- An ordered sequence of steps of care
- Recommended observations and examinations
- Decisions to be considered
- Actions to be taken

For each VA/DoD CPG, there is a corresponding clinical algorithm that is depicted by a step-by-step decision tree. Standardized symbols are used to display each step in the algorithm, and arrows connect the numbered boxes indicating the order in which the steps should be followed.[2]

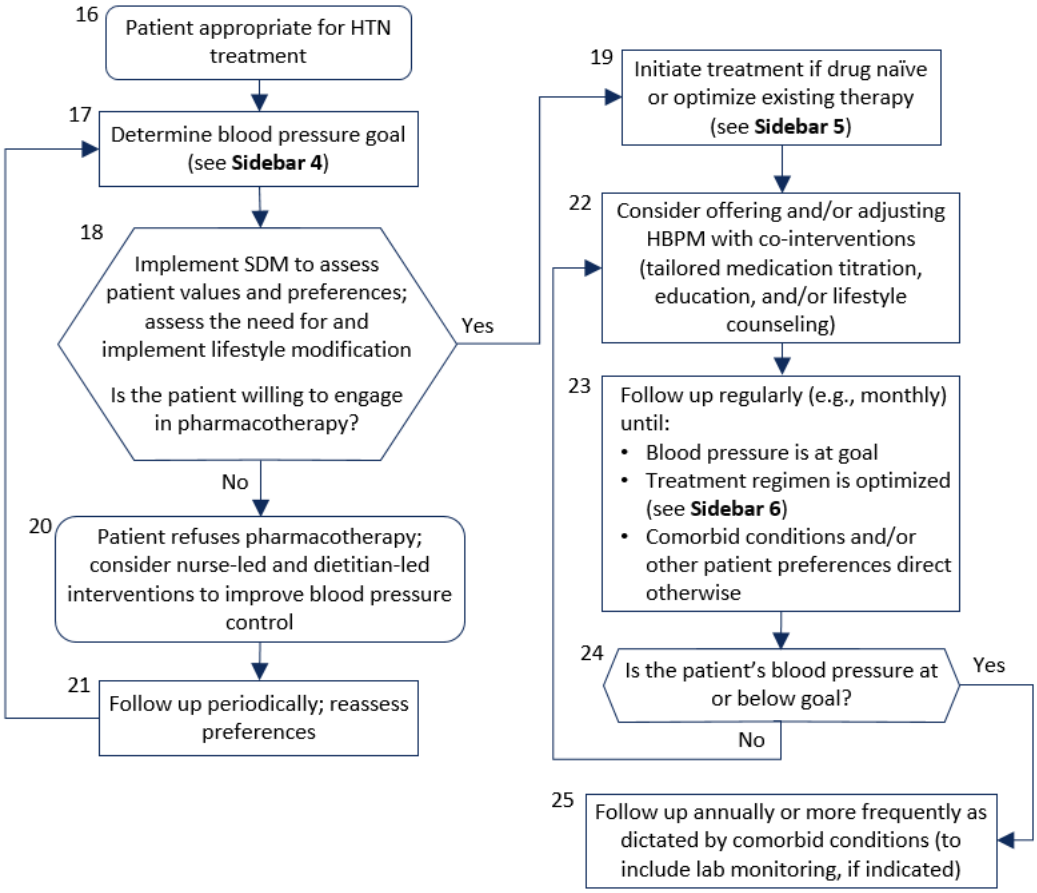
Shape	Description
	Rounded rectangles represent a clinical state or condition
	Hexagons represent a decision point in the guideline, formulated as a question that can be answered Yes or No
	Rectangles represent an action in the process of care
	Ovals represent a link to another section within the guideline

Module A: Screening and Diagnosis



Abbreviations: ABPM: ambulatory blood pressure monitoring; CV: cardiovascular; DBP: diastolic blood pressure; EKG: electrocardiogram; HBPM: home blood pressure monitoring; HTN: hypertension; SBP: systolic blood pressure

Module B: Treatment



Abbreviations: HBPM: home blood pressure monitoring; HTN: hypertension; SDM: shared decision making

Sidebar 1: Office Blood Pressure Measurement

See Additional Information on Guidance for Conducting Office Blood Pressure Measurement for appropriate blood pressure cuff selection, patient preparation, and proper technique

AOBP (preferred)

- Fully automated machine programmed to wait five minutes and record the average of three measurements separated by at least 30 seconds

Standard Technique (alternative)

- Use a properly calibrated and validated sphygmomanometer
- Use an average of ≥2 readings

Abbreviations: AOBP: automated office blood pressure; CPG: clinical practice guideline; HTN: hypertension

Sidebar 2: Confirm Diagnosis

- If the follow-up clinic blood pressure value is ≥130 mm Hg SBP or ≥90 mm Hg DBP, make diagnosis of HTN without further testing
- Consider HBPM or ABPM to inform the diagnosis in select patients (see Recommendation 4 in the full HTN CPG)
- If blood pressure is <130 mm Hg SBP and <90 mm Hg DBP, yet there is evidence of target organ damage, which may suggest the presence of masked HTN, consider HBPM or ABPM to inform the diagnosis (see Recommendation 4 in the full HTN CPG)

Abbreviations: ABPM: ambulatory blood pressure monitoring; DBP: diastolic blood pressure; HBPM: home blood pressure monitoring; HTN: hypertension; SBP: systolic blood pressure

Sidebar 3: Examples of Target Organ Damage and Co-morbid Conditions*

- Target organ damage: stroke, MI, peripheral arterial diseases, LVH, CHF, CKD, and retinopathy
- Co-morbid conditions: CKD, dyslipidemia, diabetes, obesity/overweight, OSA, and tobacco dependence

*If patient has co-morbid conditions, engage relevant VA/DoD CPGs, when available (e.g., CKD[1], lipids[2], diabetes[3], obesity[4])

Abbreviations: CHF: chronic heart failure; CKD: chronic kidney disease; CPGs: clinical practice guidelines; LVH: left ventricular hypertrophy; MI: myocardial infarction; OSA: obstructive sleep apnea

Sidebar 4: Goals for Blood Pressure

Systolic Goal (see Recommendations 6 – 8 in the full HTN CPG)

<130 mm Hg

- If less stringent goal is desired per clinical judgment and/or patient preferences, aim for at least:
  - <150 mm Hg for patients age 60 and over
  - <140 mm Hg for patients age 60 and over with type 2 diabetes

Diastolic Goal (see Recommendation 9 in the full HTN CPG)

<90 mm Hg for patients age 30 and over

[1] See the VA/DoD Clinical Practice Guideline for the Management of Chronic Kidney Disease. Available at: https://www.healthquality.va.gov/guidelines/CD/CKD/

[2] See the VA/DoD Clinical Practice Guideline for the Management of Dyslipidemia for Cardiovascular Risk Reduction. Available at: https://www.healthquality.va.gov/guidelines/CD/lipids/

[3] See the VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus in Primary Care. Available at: https://www.healthquality.va.gov/guidelines/CD/diabetes/

[4] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/CD/obesity/

Sidebar 5: Initiate Drug Therapy

General Population:

- Recommend one or more of the following:
  - Thiazide-type diuretics
  - ACEIs or ARBs*
  - Long-acting CCBs
- For patients unlikely to achieve goal with monotherapy (e.g., patients with SBP/DBP of >20/10 mm Hg above goal), consider initiating treatment with combination therapy or monotherapy with close follow-up for titration and/or addition of medications based on blood pressure response

Specific Populations:

- For patients age 65 and over, we suggest a thiazide-type diuretic for reduction in composite cardiovascular outcomes
- For African American patients, we recommend against using ACEIs or ARBs as monotherapy
- For patients with CKD, see the VA/DoD CKD CPG[5]

*We recommend against more than one of the following three drug classes together in the same patient: ACEIs, ARBs, or direct renin inhibitors

Abbreviations: ACEI: angiotensin-converting enzyme inhibitor; ARB: angiotensin II receptor blocker; CCB: calcium channel blocker; CKD: chronic kidney disease; CPG: clinical practice guideline

Sidebar 6: Optimize Treatment

- Assess adherence
- Consider evaluating for interfering substances (some prescription medications, NSAIDs, alcohol, recreational drugs)
- Consider evaluating and addressing contributing lifestyle factors
- Optimize treatment (refer to Additional Information on Drugs Used in Treatment of HTN)
  - Titrate initial drug
  - Add another agent from a different class
- Reevaluate diagnosis (resistant HTN, secondary causes of HTN)
- Consider specialty consultation for patients with resistant HTN
- Consider co-interventions to enhance management of HTN and improve blood pressure:
  - Pharmacist-led
  - Nurse-led
  - Dietitian-led

Abbreviations: HTN: hypertension; NSAIDs: nonsteroidal anti-inflammatory drug

[5] See the VA/DoD Clinical Practice Guideline for the Management of Chronic Kidney Disease. Available at: https://www.healthquality.va.gov/guidelines/CD/CKD/

Additional Dietary Information for the Treatment of Hypertension

Table 1: Nutrient Composition of the Dietary Approaches to Stop Hypertension (DASH) Diet[a,b] [3]

Nutrient	Recommended Intake
Saturated fat	6% of total calories
Total fat	27% of total calories
Carbohydrate	55% of total calories
Dietary fiber	30 grams/day
Protein	18% of total calories
Cholesterol	150 mg/day
Total calories (energy)	Balance energy intake and expenditure to maintain desirable body weight/prevent weight gain

[a] Additional information on the DASH diet is available at: http://www.nhlbi.nih.gov/health/health-topics/topics/dash/.[3]

[b] The DASH diet was shown to be most effective in lowering blood pressure when combined with sodium restriction.[4]

Table 2: Summary of Dietary Recommendations in the Mediterranean Diet[a] [5,6]

	Food	Goal
Recommended	Olive oil	≥4 tbsp. per day
	Tree nuts and peanuts	≥3 servings per week
	Fresh fruits including natural fruit juices	≥3 servings per day
	Vegetables	≥2 servings per day
	Seafood (primarily fatty fish)	≥3 servings per week
	Legumes	≥3 servings per week
	Sofrito[b]	≥2 servings per week
	White meat	In place of red meat
	Wine with meals	≥7 glasses per week, for those who drink[c]
Discouraged	Soda drinks	<1 drink per day
	Commercial baked goods, sweets, pastries[d]	<3 servings per week
	Spread fats	<1 serving per day
	Red and processed meats	<1 serving per day

[a] Dietary patterns vary both within and among countries in the Mediterranean region, precluding a single standardized definition of the Mediterranean diet, though certain characteristic features are generally agreed upon by those studying its potential health effects; the table above represents the specific dietary recommendations used in the research study constituting our evidence base for this section of the guideline

[b] Sofrito is a sauce made with tomato and onion, and often includes garlic, herbs, and olive oil

[c] Recommended wine volume per glass: 100 mL for women, 150 mL for men

[d] Commercial baked goods, sweets, and pastries included cakes, cookies, biscuits, and custard, and did not include those that are homemade

Abbreviations: mL: milliliter; tbsp: tablespoon

Additional Information on Drugs Used in Treatment of Hypertension

Table 3. Recommended Dosage for Selected Hypertension Drug Therapy

	Drug	Usual Dose Range	Comments[a]
Thiazide-type Diuretics	Chlorthalidone[b] HCTZ[b] Indapamide	12.5-25 mg daily 25-50 mg daily[c] IR: 2.5 mg daily	• May cause hyperuricemia/ gout • Monitor K+ levels • May cause photosensitivity (rare) • May cause hyponatremia (1-2%) • May be less effective in eGFR <30 mL/minute
Angiotensin-Converting Enzyme Inhibitors (ACEI)	Benazepril Enalapril Fosinopril Lisinopril[b] Ramipril[b]	10-40 mg/day (daily or divided bid) 5-40 mg/day (daily or divided bid) 10-40 mg daily 10-40 mg daily 2.5-20 mg/day (daily or divided bid) (10 mg daily for CV risk prevention)	• Avoid in women who are planning to become pregnant or who are pregnant; when pregnancy is contemplated or detected, discontinue as soon as possible, due to potential for fetal and neonatal morbidity and death; patients of child-bearing potential should also be educated about the risks • Do not use if history of angioedema • Avoid concomitant use of ACEI with ARB or direct renin inhibitor due to increased risk of hypotension, syncope, increased K+, and changes in kidney function (see Recommendation 26) • Monitor K+ and kidney function; use caution if combined with, K+ sparing diuretic, or K+ supplement • Consider interruption or discontinuation in patients who develop clinically significant decline in kidney function after initiation of therapy, until further work-up, as indicated (e.g., kidney artery stenosis) • Compelling indications include: CKD with albuminuria (refer to VA/DoD CKD CPG[6]); HFrEF; recent MI

[6] See the VA/DoD Clinical Practice Guideline for the Management of Chronic Kidney Disease. Available at: https://www.healthquality.va.gov/guidelines/CD/CKD/

	Drug	Usual Dose Range	Comments[a]
Angiotensin II Receptor Blockers (ARB)	Azilsartan[d] Candesartan[d] Eprosartan[d] Irbesartan[d] Losartan[b] Olmesartan[d] Telmisartan[d] Valsartan[b,e]	40-80 mg daily (40 mg with diuretic) 8-32 mg daily 400-800 mg/daily (daily or divided bid) 75-300 mg daily 25-100 mg/day (daily or divided bid) 20-40 mg daily 20-80 mg daily 80-320 mg daily	• Avoid in women who are planning to become pregnant or who are pregnant; when pregnancy is contemplated or detected, discontinue as soon as possible; drugs that act directly on the renin angiotensin system can cause injury and death to the developing fetus; patients of child-bearing potential should also be educated about the risks • Avoid concomitant use of ACEI with an ARB or direct renin inhibitor due to increased risk of hypotension, syncope, increased K+, and changes in kidney function (see Recommendation 26) • In general, the lower doses should be considered in patients receiving diuretics • Monitor K+ and kidney function; use caution if combined with, K+ sparing diuretic, or K+ supplement • Consider interruption or discontinuation in patients who develop clinically significant decline in kidney function after initiation of therapy, until further work-up, as indicated (e.g., kidney artery stenosis) • Compelling indications include: CKD with albuminuria (refer to VA/DoD CKD CPG[7]); HFrEF; recent MI
Long-Acting Calcium Channel Blockers (CCB)	**DHP CCBs** Amlodipine[b] Felodipine Nifedipine sustained release[b] **Non-DHP CCBs** Verapamil sustained release[b] Diltiazem sustained release[b]	 2.5-10 mg daily 2.5-10 mg daily 30-120 mg daily 120-480 mg divided daily-bid 120-540 mg daily	• Monitor AEs (DHP CCBs may cause ankle edema, dizziness, flushing, headache, constipation) • Use with caution in patients with hepatic (CCBs) or kidney (non-DHP CCBs) dysfunction • Non-DHP CCBs may be considered for rate control in supraventricular tachycardia or atrial fibrillation/flutter • Verapamil may cause constipation; verapamil is contraindicated 2nd or 3rd degree AV block, severe LV dysfunction • Diltiazem may decrease sinus rate; diltiazem is contraindicated in 2nd or 3rd degree AV block; use with caution in LV dysfunction • Verapamil or diltiazem should not usually be used with a beta-blocker due to risk of severe bradycardia or heart block

[7] See the VA/DoD Clinical Practice Guideline for the Management of Chronic Kidney Disease. Available at: https://www.healthquality.va.gov/guidelines/CD/CKD/

	Drug	Usual Dose Range	Comments[a]
Aldosterone/ Mineralocorticoid Receptor Antagonists	Eplerenone[d] Spironolactone[b]	50-100 mg/day (daily or divided bid) 25-50 mg/daily	• Avoid use if hyperkalemia or severe kidney dysfunction • Monitor K+ and kidney function; consider risk vs. benefit if combined with ACEI, ARB, K+ sparing diuretic, or K+ supplement • Higher risk of gynecomastia with spironolactone (9%) than eplerenone (≤1%) • Compelling indications include: HFrEF • Effective in resistant hypertension
Other Potassium-Sparing Diuretics	Amiloride	5-10 mg/daily	• Avoid use if hyperkalemia or severe kidney dysfunction • Helpful in reducing hypokalemia caused by thiazide diuretics • Effective in resistant hypertension
Alpha-Adrenergic Blockers	Doxazosin Prazosin Terazosin[b]	1-16 mg/daily 2-20 mg/day (divided bid or tid) 1-20 mg daily	• Initiate at low doses (1 mg) • Administer 1st dose at bedtime to avoid syncope • Avoid use as monotherapy • May be considered for use in patients with symptomatic BPH
Beta-Adrenergic Blockers	**Noncardioselective** Propranolol **Cardioselective** Atenolol[b] Metoprolol tartrate[b] Metoprolol succinate (XL)[b] **Combined alpha-beta adrenergic blockers** Carvedilol Labetalol[d]	 Immediate release: 80-160 mg/day (divided bid) Sustained release: 80-160 mg daily 25-100 mg daily (adjust dose in CKD) Immediate release: 50-300 mg/day (daily or divided bid) Sustained release: 25-200 mg/day Immediate release[b]: 12.5-50 mg/day (divided bid) Sustained release[d]: 20-80 mg/day 200-800 mg/day (divided bid)	• Discontinue with slow taper over one week • Avoid combination with non-DHP CCB due to increased risk of bradycardia or heart attack • As doses increase, cardioselectivity decreases • Beta-blockers should be used cautiously in asthma • Compelling indications include: HFrEF (evidence available for reduction in morbidity and mortality with bisoprolol, carvedilol, metoprolol succinate in HFrEF); recent MI; angina; rate control in atrial fibrillation/flutter; data available for select beta-blockers for migraine prevention

	Drug	Usual Dose Range	Comments[a]
Direct Acting Vasodilators	Minoxidil Hydralazine[b]	2.5-100 mg/day (daily or divided bid) 50-200 mg/day (divided bid)	• Monitor for hypertrichosis, volume retention, and pericardial effusions with minoxidil • Monitor for headache and SLE (dose-related) with hydralazine • Direct acting vasodilators often require concomitant use of diuretic and beta-blocker to reduce edema and reflex tachycardia
Centrally Acting Antiadrenergic Drugs	Clonidine Tablet[b] Clonidine Patch Methyldopa	0.1-0.8 mg/day (divided bid) mg patch weekly 500-2,000 mg/day (divided bid)	• Monitor for bradycardia, somnolence, and dry mouth. Taper dose to discontinue • Clonidine patches may be useful in select patients • May rarely cause bone marrow depression, positive Coombs test, hemolytic anemia and liver disorders (hepatitis, jaundice)

[a] For complete drug information, review the manufacturer's prescribing information

[b] DoD Basic Core Formulary item

[c] HCTZ 12.5 mg may be considered as an initial dose with titration recommended to 25 to 50mg daily; refer to Recommendation 26 in the full HTN CPG and associated discussion for further information

[d] Item not on VA National Formulary

[e] Restricted to treatment of patients with systolic heart failure in VA

Abbreviations: ACEI: angiotensin-converting enzyme inhibitor; AE: adverse effect; ARB: angiotensin II receptor blocker; AV: atrioventricular; bid: twice daily; BPH: benign prostatic hyperplasia; CCB: calcium channel blockers; CKD: chronic kidney disease; CV: cardiovascular; DHP: dihydropyridine; eGFR: estimated glomerular filtration rate; HCTZ: hydrochlorothiazide; HFrEF: heart failure with reduced ejection fraction; K+: potassium; LV: left ventricular; mL: milliliter; SLE: systemic lupus erythematosus

Additional Information on Guidance for Conducting Office Blood Pressure Measurement

The following information has been adapted from the 2019 AHA Measurement of Blood Pressure in Humans.[7]

Properly prepare the patient

- Have the patient relax, sitting in a chair with feet flat on floor and back supported; the patient should be seated for 3-5 minutes without talking or moving around before recording the first blood pressure reading
- The patient should avoid caffeine, exercise, and smoking for at least 30 minutes before measurement
- Ensure that the patient has emptied his/her bladder
- Neither the patient nor the observer should talk during the rest period or during the measurement
- Remove clothing covering the location of cuff placement
- Measurements made while the patient is sitting on an examining table do not fulfill these criteria

Use proper technique for blood pressure measurements

- Use an upper-arm cuff blood pressure measurement device that has been validated and ensure that the device is calibrated periodically
- Support the patient's arm (e.g., resting on a desk); the patient should not be holding his/her arm because isometric exercise will affect the blood pressure levels
- Position the middle of the cuff on the patient's upper arm at the level of the right atrium (midpoint of the sternum)
- Use the correct cuff size such that the bladder encircles 75%-100% of the arm

Table 4. Proper Blood Pressure Cuff Sizes

Cuff Size	Arm Circumference (cm)	Bladder Dimension (width x length, cm)
Small adult	22-26	12×22
Adult	27-34	16×30
Large adult	35-44	16×36
Extra-large adult	45-52	16×42

Abbreviation: cm: centimeter

Take the proper measurements needed for diagnosis and treatment of elevated blood pressure/hypertension

- At the first visit, record blood pressure in both arms; use the arm that gives the higher reading for subsequent readings (if consistently 10-15 mm Hg higher)
- Separate repeated measurements by at least 30 seconds

Properly document accurate blood pressure readings

- Record SBP and DBP
- Note the time that the most recent blood pressure medication was taken before measurements

Use average the readings

- Use an average of ≥2 readings for the visit blood pressure
- For initial documentation of the patient's blood pressure, use an average of the visit blood pressures obtained on ≥2 occasions to estimate the individual's blood pressure

Provide blood pressure readings to patient

- Provide patients their SBP/DBP readings both verbally and in writing; someone should help the patient interpret the results

What is above should be common to each appropriate standardized office blood pressure measurement technique. The following are additional guidance specific for each technique:

For fully automated office oscillometric manometer readings:

- Preprogram the manometer to wait five minutes before inflation begins and to take and average 2-3 readings at least 30 seconds apart; the most common intervals are 30 seconds, one minute, and two minutes
- Position the patient and place the proper sized cuff on the upper arm before initiating the wait time and blood pressure readings
- Turn the manometer on and set controls to take inflate to proper level (above sensed SBP) automatically and measure and average multiple readings; press the button to initiate wait period and automated readings (fully automated)
- Patient should remain quiet and not use electronic devices (e.g., phones) during the rest period and readings; person measuring the blood pressure may remain in the room (attended) or leave the patient alone in the room (unattended), but no one should interact or speak with the patient during the rest period and readings
- After the rest and measurements are completed, record the average blood pressure reading displayed; manometer should display the average of the 2-3 readings (as preset)

For standard technique with automated oscillometric device:

- Use an upper-arm cuff oscillometric device that has been validated
- Position the patient and place the proper sized cuff on the upper arm before initiating the wait time and blood pressure readings
- Turn the manometer on and set controls to take/inflate to proper level (above sensed SBP) automatically
- Patient should remain quiet and not use electronic devices (e.g., phones), and no one should speak with the patient during the rest period and readings
- After the five minute rest period, push the button to initiate the first inflation/reading; record SBP and DBP reading
- Take the next reading(s) with at least a 30 second interval between readings and record SBP and DBP readings displayed for each reading; record the average or median SBP and average or median DBP as the patient's blood pressure

For standard auscultatory technique with manual manometer:

- Use an upper-arm cuff manual device that has been validated and recently calibrated; this includes a mercury manometer, an aneroid manometer, or an electronic manual non-oscillometric manometer for auscultatory determinations
- Position the patient and place the proper sized cuff on the upper arm before initiating the wait time and blood pressure readings
- Patient should remain quiet and not use electronic devices (e.g., phones), and no one should speak with the patient during the rest period and readings
- Use a palpated estimate of radial pulse obliteration pressure (disappearance or resumption of pulse when cuff is inflated/deflated) to estimate SBP; inflate the cuff 20-30 mm Hg above this level to perform the auscultatory determination of the blood pressure level
- Use either the stethoscope diaphragm or bell for auscultatory readings
- After the five minute rest period, inflate the cuff and use auscultation to determine SBP and DBP; determine SBP and DBP as the onset of the first of at least two consecutive Korotkoff sounds (beats) and the last audible Korotkoff sound, respectively
- Record the SBP and DBP reading
- Take the next reading(s) with at least a 30 second interval between readings and record SBP and DBP readings for each reading; record the average or median SBP and average or median DBP as the patient's blood pressure

Additional Information on Guidance for Conducting Home Blood Pressure Measurement

The following information has been adapted from the 2019 AHA Measurement of Blood Pressure in Humans.[7]

Patient training provided by healthcare staff or providers:

- Provide information about hypertension diagnosis and treatment
- Provide information on the proper selection of a device
- Provide instruction on how patients can measure their own blood pressure (if possible, demonstrate the procedure or instruct how to access training video)
- Provide instruction that the HBPM device and blood pressure readings (log or electronic recording) should be brought to healthcare visits
- Provide education that individual blood pressure readings may vary greatly (high and low) across the monitoring period

Preferred devices and cuffs:

- Use an upper-arm cuff oscillometric device that has been validated
- Use a device that is able to automatically store all readings, if possible
- Use a device that can print results or can send blood pressure values electronically to the healthcare provider, if possible
- Use a cuff that is appropriately sized for the patient's arm circumference

Table 5. Proper Blood Pressure Cuff Sizes

Cuff Size	Arm Circumference (cm)	Bladder Dimension (width x length, cm)
Small adult	22-26	12×22
Adult	27-34	16×30
Large adult	35-44	16×36
Extra-large adult	45-52	16×42

Abbreviation: cm: centimeter

Best practices for the patient:

- Preparation
  - Have an empty bladder
  - Rest quietly in seated position with back supported (e.g., leaning back in chair) for at least five minutes
  - Do not talk or text

- Position
    - Sit with back supported
    - Keep both feet flat on the floor
    - Legs should not be crossed
    - Blood pressure cuff should be placed on bare arm (not over clothes)
    - Blood pressure cuff should be placed directly above the antecubital fossa (bend of the arm)
    - Center of the bladder of the cuff (commonly marked on the cuff by the manufacturer) should be placed over the arterial pulsation of the patient's bare upper arm
    - Cuff should be pulled taut, with comparable tightness at the top and bottom edges of the cuff, around the bare upper arm
    - The arm with the cuff should be supported on a flat surface such as a table
- Number of readings
    - Take two readings at least one minute apart in the morning before taking any antihypertensive medications and two readings at least one min apart in the evening before going to bed; some recommend only recording the second measurement
- Duration of monitoring
    - Preferred monitoring period is ≥7 days (i.e., 28 readings or more scheduled readings); a minimum period of three days (i.e., 12 readings) may be sufficient, ideally in the period immediately before the next appointment with provider
    - Monitoring conducted over consecutive days is ideal; however, readings taken on nonconsecutive days may also provide valid data
- Analyzing readings
    - For each monitoring period, the average of all readings should be obtained
    - some guidelines and scientific statements recommend excluding the first day of readings; if the first day of readings is excluded, the minimum and preferred periods of HBPM should be four and eight days, respectively

For a video developed for patients by the VA and DoD with instructions on measuring blood pressure at home, please visit https://www.healthquality.va.gov/guidelines/CD/htn/ and click on the "Home Blood Pressure Monitoring" video.

Scope of the CPG

Regardless of setting, any patient in the VA and DoD healthcare system should ideally have access to the interventions that are recommended in the guideline after taking into consideration the patient's specific circumstances.

Guideline recommendations are intended to be patient centered. Thus, treatment and care should consider a patient's needs and preferences. Effective, open communication between healthcare professionals and the patient is essential and should be supported by evidence-based information tailored to the patient's needs. Use of an empathetic and non-judgmental approach facilitates discussions sensitive to sex, culture, ethnic, and other considerations. The information that patients are given about treatment and care should be culturally appropriate and available to people with limited literacy skills. Treatment information should also be accessible to people with additional needs such as physical, sensory, or learning disabilities. Family and caregiver involvement should be considered, if appropriate.

The CPG is designed to assist in managing or co-managing patients with HTN. Moreover, the patient population of interest for the CPG is patients with HTN who are eligible for care in the VA and DoD healthcare delivery systems and those who are in the community receiving care from community-based clinicians. It includes Veterans as well as deployed and non-deployed active duty Service, Guard, and Reserve Members and their dependents.

Methods

The 2020 VA/DoD HTN CPG is an update to the 2014 VA/DoD HTN CPG. The methodology used in developing the 2020 CPG follows the *Guideline for Guidelines*, an internal document of the VA and DoD EBPWG.[8] The *Guideline for Guidelines* can be downloaded from http://www.healthquality.va.gov/policy/index.asp. The guideline development process for the 2020 CPG update consisted of the following steps: formulating and prioritizing KQs and defining critical outcomes; convening a patient focus group; conducting the systematic evidence review; convening a face-to-face meeting with the CPG Champions and Work Group members to develop recommendations; and drafting and submitting a final CPG on the primary care management of HTN to the VA/DoD EBPWG.

The Champions and Work Group used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to assess the quality of the evidence base and assign a strength for each recommendation. The GRADE system uses the following four domains to assess the strength of each recommendation: balance of desirable and undesirable outcomes; confidence in the quality of the evidence; patient or provider values and preferences; other implications, as appropriate (e.g., resource use, equity).[9] Using these four domains, the Work Group determined the relative strength of each recommendation ("Strong" or "Weak"). Generally, a "Strong" recommendation indicates a high confidence in the quality of the available scientific evidence, a clear difference in magnitude between the benefits and harms of an intervention, similar patient or provider values and preferences, and understood influence of other implications (e.g., resource use, feasibility). Generally, if the Work Group has less confidence after the assessment across these domains and believes that additional evidence may change the recommendation, it assigns a "Weak" recommendation. It is important to note that the GRADE terminology used to indicate the assessment across the four domains (i.e., "Strong" versus "Weak") should

not be confused with the clinical importance of the recommendation. A "Weak" recommendation may still be important to the clinical care of a patient with HTN.

Occasionally, instances may occur when the Work Group feels there is insufficient evidence to make a recommendation for or against a particular therapy or preventive measure. This can occur when there is an absence of studies on a particular topic that met the evidence review inclusion criteria, studies included in the evidence review report conflicting results, or studies included in the evidence review report inconclusive results regarding the desirable and undesirable outcomes.

Using these elements, the grade of each recommendation is presented as part of a continuum:

- Strong for (or "We recommend offering this option …")
- Weak for (or "We suggest offering this option …")
- No recommendation for or against (or "There is insufficient evidence…")
- Weak against (or "We suggest not offering this option …")
- Strong against (or "We recommend against offering this option …")

The grade of each recommendation made in the 2020 CPG can be found in the section on Recommendations. Additional information regarding the use of the GRADE system can be found in Appendix A in the full text HTN CPG.

The HTN CPG Work Group largely focused on developing new and updated recommendations based on the evidence review conducted for the priority areas addressed by the KQs. In addition to those new and updated recommendations, the Work Group considered, without complete review of the relevant evidence, the current applicability of other recommendations that were included in the 2014 VA/DoD HTN CPG, subject to evolving practice in today's environment.

A set of recommendation categories was adapted from those used by the National Institute for Health and Care Excellence (NICE).[10,11] These categories, along with their corresponding definitions, were used to account for the various ways in which recommendations could have been updated. The categories and definitions can be found in Table 6.

Table 6. Recommendation Categories and Definitions*

Evidence Reviewed*	Recommendation Category	Definition
Reviewed	New-added	New recommendation following review of the evidence
	New-replaced	Recommendation from previous CPG that has been carried over to the updated CPG that has been changed following review of the evidence
	Not changed	Recommendation from previous CPG that has been carried forward to the updated CPG where the evidence has been reviewed but the recommendation is not changed
	Amended	Recommendation from the previous CPG that has been carried forward to the updated CPG where the evidence has been reviewed and a minor amendment has been made
	Deleted	Recommendation from the previous CPG that has been removed based on review of the evidence
Not reviewed	Not changed	Recommendation from previous CPG that has been carried forward to the updated CPG, but for which the evidence has not been reviewed
	Amended	Recommendation from the previous CPG that has been carried forward to the updated CPG where the evidence has not been reviewed and a minor amendment has been made
	Deleted	Recommendation from the previous CPG that has been removed because it was deemed out of scope for the updated CPG

*Adapted from the NICE guideline manual (2012) [10] and Garcia et al. (2014) [11]
Abbreviation: CPG: clinical practice guideline

Guideline Work Group

Organization	Names[a]
Department of Veterans Affairs	**William Cushman, MD (Champion)**
	Dan Berlowitz, MD, MPH (Champion)
	Jennifer Ballard-Hernandez, DNP, NP, CCRN
	Elaine Furmaga, PharmD
	Peter Glassman, MBBS, MSc, FACP
	Elvira O. Gosmanova, MD, FASN
	Lillian Pinault, MS, RD, CSG, CDE
	Pedro Roldan, MD, FAAFP
	Addison Taylor, MD, PhD
Department of Defense	**CDR Travis E. Harrell, MD, FACC, FACP (Champion)**
	CDR Mark P. Tschanz, DO, MACM, FACP (Champion)
	Angela A. Allerman, PharmD, BCPS
	Asha Jain, MA, RD, CDE
	Lt Col Joseph Sky, MD, FACP, FACC
	LTC Tommy L. Thompson, DNP, FNP-C
	Lt Col Jesse Wickham, DO, FACP
Office of Quality, Safety and Value Veterans Health Administration	M. Eric Rodgers, PhD, FNP-BC
	James Sall, PhD, FNP-BC
	Rene Sutton, BS, HCA, FAC-COR II
Office of Evidence Based Practice U.S. Army Medical Command	Corinne K. B. Devlin, MSN, RN, FNP-BC
	Lisa D. Jones, BSN, RN, MHA, CPHQ
The Lewin Group	Clifford Goodman, PhD
	Christine Jones, MS, MPH, PMP
	Helen Dawson, MPH
	Nicolas Stettler-Davis, MD, MSCE
	Erika Beam, MS
ECRI Institute	Kristen D'Anci, PhD
	Kelley Tipton, MPH
	Linnea Hermanson, MA
	Joann Fontanarosa, PhD
	Benjamin Rouse, MHS
	Allison Hedden-Gross, MS, MLS
Sigma Health Consulting	Frances Murphy, MD, MPH
Duty First Consulting	Rachel Piccolino, BA
	Megan McGovern, BA
Anjali Jain Research & Consulting	Anjali Jain, MD

*Additional contributor contact information is available in Appendix I in the full text HTN CPG.

Patient-centered Care

VA/DoD CPGs encourage providers to use a PCC approach that is individualized based on patient needs, characteristics, and preferences. Regardless of setting, all patients in the healthcare system should be able to access evidence-based care appropriate to their specific needs or condition. When properly executed, PCC may decrease patient anxiety, increase trust in clinicians, and improve treatment adherence.[12,13] Improved patient-clinician communication and a PCC approach conveys openness and supports disclosure of current and future concerns. As part of the PCC approach, providers should ask each patient about any concerns he or she has or barriers to high quality care he or she has experienced.

Shared Decision Making

Throughout the VA/DoD CPG, the authors encourage clinicians to focus on shared decision making (SDM). The SDM model was introduced in *Crossing the Quality Chasm*, an Institute of Medicine (IOM) (now called the National Academy of Medicine [NAM]) report, in 2001.[14] It is readily apparent that patients, together with their clinicians, make decisions regarding their plan of care and management options. Patients with HTN require sufficient information and time to be able to make informed decisions. Clinicians must be adept at presenting information to their patients regarding treatments, expected outcomes, and levels and/or locations of care. Clinicians are encouraged to use SDM to individualize treatment goals and plans based on patient capabilities, needs, goals, and preferences.

References

1. U.S. Department of Veterans Affairs/Department of Defense Health Executive Committe (HEC). *Evidence Based Practice Work Group charter*. https://www.healthquality.va.gov/documents/EvidenceBasedPracticeWGCharter123020161.pdf. Updated January 9, 2017.
2. Society for Medical Decision Making Committee on Standardization of Clinical Algorithms. Proposal for clinical algorithm standards. *Med Decis Making.* Apr-Jun 1992;12(2):149-154. PMID: 1573982.
3. National Heart Lung and Blood Institute. *Your guide to lowering your blood pressure with DASH electronic resource: DASH eating plan: Lower your blood pressure.* Bethesda, Md. U.S. Dept. of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute; 2006.
4. Vollmer WM, Sacks FM, Ard J, et al. Effects of diet and sodium intake on blood pressure: Subgroup analysis of the DASH-Sodium trial. *Ann Intern Med.* Dec 18 2001;135(12):1019-1028. PMID: 11747380.
5. Martinez-Gonzalez MA, Corella D, Salas-Salvado J, et al. Cohort profile: Design and methods of the PREDIMEN study. *Int J Epidemiol.* Apr 2012;41(2):377-385. PMID: 21172932.
6. Toledo E, Hu FB, Estruch R, et al. Effect of the mediterranean diet on blood pressure in the PREDIMED trial: Results from a randomized controlled trial. *BMC Med.* Sep 19 2013;11:207. PMID: 24050803.
7. Muntner P, Shimbo D, Carey RM, et al. Measurement of blood pressure in humans: A scientific statement from the American Heart Association. *Hypertension.* May 2019;73(5):e35-e66. PMID: 30827125.
8. U.S. Department of Veteran Affairs, Department of Defense. *Guideline for guidelines*. Veterans Health Administration, Office of Quality & Performance, Evidence Review Subgroup; Revised January 29, 2019.
9. Andrews J, Guyatt G, Oxman AD, et al. Grade guidelines: 14. Going from evidence to recommendations: The significance and presentation of recommendations. *J Clin Epidemiol.* Jul 2013;66(7):719-725. PMID: 23312392.
10. *The guidelines manual.* London: National Institute for Health and Care Excellence;2012. http://www.nice.org.uk/article/pmg6/resources/non-guidance-the-guidelines-manual-pdf.
11. Martinez Garcia L, McFarlane E, Barnes S, Sanabria AJ, Alonso-Coello P, Alderson P. Updated recommendations: An assessment of NICE clinical guidelines. *Implement Sci.* 2014;9:72. PMID: 24919856.
12. Robinson JH, Callister LC, Berry JA, Dearing KA. Patient-centered care and adherence: Definitions and applications to improve outcomes. *J Am Acad Nurse Pract.* Dec 2008;20(12):600-607. PMID: 19120591.
13. Stewart M, Brown JB, Donner A, et al. The impact of patient-centered care on outcomes. *J Fam Pract.* Sep 2000;49(9):796-804. PMID: 11032203.
14. *Crossing the quality chasm: A new health system for the 21st century.* Washington DC: National Academies Press; 2001.

Access to the full guideline and additional resources is available at the following link:
https://www.healthquality.va.gov/guidelines/CD/htn/