



Complete Summary

GUIDELINE TITLE

VHA/DoD clinical practice guideline for the diagnosis and management of hypertension in the primary care setting.

BIBLIOGRAPHIC SOURCE(S)

Veterans Administration, Department of Defense. VA/DoD clinical practice guideline for diagnosis and management of hypertension in the primary care setting. Washington (DC): Veterans Administration, Department of Defense; 2004 Aug. 99 p.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Diagnosis and management of hypertension in the primary care setting. Washington (DC): Department of Veterans Affairs (U.S.); 1999 May. Various p.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
CONTRAINDICATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Hypertension

GUIDELINE CATEGORY

Diagnosis
Evaluation

Management
Screening
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Internal Medicine

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To describe the critical decision points in the management of hypertension
- To provide a clear and comprehensive guideline incorporating current information and practices for practitioners throughout the Department of Defense (DoD) and Veterans Health Administration system
- To improve local management of patients with hypertension and patient outcomes

TARGET POPULATION

Veterans and Department of Defense beneficiaries 17 years and older with hypertension

This guideline is not directed to the treatment of pregnant patients.

INTERVENTIONS AND PRACTICES CONSIDERED

Screening/Evaluation/Diagnosis

1. Blood pressure measurements using properly calibrated and validated instruments
2. Screening for hypertension at appropriate intervals based on risk factors (at least annually in adults)
3. Follow-up at appropriate intervals (1 year, 2 months, 1 month, within 1 week, and immediately, depending on initial blood pressure measurements)
4. Staging of patients based on blood pressure reading
5. Patient history pertinent to hypertension
6. Physical examination to evaluate for signs of secondary hypertension or hypertensive organ damage
7. Laboratory and other diagnostic procedures (urinalysis, complete blood cell count, blood chemistry, lipid profile, 12-lead electrocardiography, creatinine clearance, microalbuminuria, 24-hour urine protein, blood calcium, uric acid, fasting triglycerides, glycosylated hemoglobin, low-density lipoprotein

- cholesterol, thyroid-stimulating hormone levels, limited or standard echocardiography)
8. Testing for identification of secondary causes (thyroid stimulating hormone level, 24-hour urine, serum potassium, serum calcium and parathyroid hormone levels, urinalysis, urine sediment, serum creatinine, estimated glomerular filtration rate)
 9. Assessment of risk factors for cardiovascular disease and target organ damage

Management/Treatment

1. Diet and lifestyle modification:
 - Weight reduction
 - Limitation of alcohol intake
 - Limitation of sodium intake
 - Patient education
 - Aerobic exercise
 - Diet modification (Dietary Approaches to Stop Hypertension [DASH] diet)
 - Cessation of tobacco use
2. Pharmacologic therapy:
 - Thiazide diuretics
 - Beta-blockers
 - Nondihydropyridine calcium channel blockers (NCCBs)
 - Dihydropyridine (DHPs) calcium channel blockers
 - Angiotensin-converting enzyme inhibitors (ACEI)
 - Angiotensin receptor blockers (ARBs)
 - Alpha blockers
 - Alpha-beta blockers
 - Centrally acting drugs
 - Clonidine (tablet and patch)
 - Methyldopa
 - Peripherally acting drugs
 - Reserpine
 - Vasodilators
 - Minoxidil
 - Hydralazine
 - Aldosterone antagonists
 - Eplerenone
 - Spironolactone
 - Fixed dose combinations
3. Treatment follow-up (3 to 6 month intervals)
4. Adjustment of therapy and identification of causes if inadequate response
5. Strategies to promote treatment adherence
6. Special considerations for patients with comorbid conditions (diabetes mellitus, kidney disease, chronic heart failure); stroke prevention; and patients exposed to high ambient temperatures and/or extreme conditions

Interventions Considered But Not Recommended

Short acting calcium channel blockers

MAJOR OUTCOMES CONSIDERED

- Blood pressure readings
- Incidence of hypertension and prehypertension
- Tolerability of therapy (e.g., patient satisfaction with care, quality of life, and adherence to treatment regimen)
- Side effects of drug therapy
- Racial difference in incidence of drug side effects
- Morbidity and mortality due to hypertension

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Selection of Evidence

Published, peer-reviewed, randomized controlled trials (RCTs) were considered to constitute the strongest level of evidence in support of guideline recommendations. This decision was based on the judgment that RCTs provide the clearest, scientifically sound basis for judging comparative efficacy. The Working Group made this decision recognizing the limitations of RCTs, particularly considerations of generalizability with respect to patient selection and treatment quality. Meta-analyses that included random controlled studies were also considered to be the strongest level of evidence, as well as reports of evidence-based systematic reviews.

A systematic search of the literature was conducted. It focused on the best available evidence to address each key question and ensured maximum coverage of studies at the top of the hierarchy of study types: evidence-based guidelines, meta-analyses, and systematic reviews. When available, the search sought out critical appraisals already performed by others that described explicit criteria for deciding what evidence was selected and how it was determined to be valid. The sources that have already undergone rigorous critical appraisal include Cochrane Reviews, Best Evidence, Technology Assessment, and Evidence-based Practice Center (EPC) reports.

The search continued using well-known and widely available databases that were appropriate for the clinical subject. In addition to Medline/PubMed, the following databases were searched: Database of Abstracts of Reviews of Effectiveness (DARE) and Cochrane Central Register of Controlled Trials (CCTR). For Medline/PubMed, limits were set for language (English), date of publication (1999 through May 2002), and type of research (RCT and meta-analysis). For the CCTR, limits were set for date of publication (1990 through 2002). Once definitive reviews or clinical studies that provided valid relevant answers to the question were identified, the search ended. The search was extended to studies/reports of lower quality (observational studies) only if there were no high quality studies.

Exclusion criteria included reviews that omitted clinical course or treatment. Some retrieved studies were rejected on the basis of published abstracts, and a few were rejected after the researchers scanned the retrieved citation for inclusion criteria. Typical exclusions included studies with physiological endpoints or studies of populations that were not comparable to the population of interest (e.g., studies of hypertension in children or pregnancy).

The results of the search were organized and reported using reference manager software. At this point, additional exclusion criteria were applied. The bibliographies of the retrieved articles were hand-searched for articles that may have been missed by the computer search. Additional experts were consulted for articles that may also have been missed.

Literature Review and Inclusion Criteria

As a result of the original and updated literature reviews, articles were identified for possible inclusion. These articles formed the basis for formulating the guideline recommendations. The literature search for the guideline update was validated by: (1) comparing the results to a search conducted by the independent research and appraisal team; (2) a review of the database by the expert panel; and (3) requesting articles pertaining to special topics from the experts in the working group.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Quality of Evidence

I: Evidence obtained from at least one properly done randomized controlled trial

II-1: Evidence obtained from well designed controlled trails without randomization

II-2: Evidence obtained from well designed cohort or case-control analytic study

II-3: Evidence obtained from multiple time series; dramatic results of uncontrolled experiments

III: Opinion of respected authorities, case reports, and expert committees

Overall Quality

Good: High grade evidence (I or II-1) directly linked to health outcome

Fair: High grade evidence (I or II-1) linked to intermediate outcome; or moderate grade evidence (II-2 or II-3) directly linked to health outcome

Poor: Level III evidence or no linkage of evidence to health outcome.

Net Effect of Intervention

Substantial:

- More than a small relative impact on a frequent condition with a substantial burden of suffering, *or*
- A large impact on an infrequent condition with a significant impact on the individual patient level

Moderate:

- A small relative impact on a frequent condition with a substantial burden of suffering, *or*
- A moderate impact on an infrequent condition with a significant impact on the individual patient level

Small:

- A negligible relative impact on a frequent condition with a substantial burden of suffering, *or*
- A small impact on an infrequent condition with a significant impact on the individual patient level

Zero or Negative:

- Negative impact on patients, *or*
- No relative impact on either a frequent condition with a substantial burden of suffering, *or*
- An infrequent condition with a significant impact on the individual patient level

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Preparation of Evidence Tables (reports)

A group of clinician reviewers and other researchers in health care, with experience in evidence-based appraisal, independently read and coded each article that met inclusion criteria. Each article was turned into a one-page

summary of the critical appraisal by the research team and added to a central electronic database. Clinicians from the Center for Evidence-Based Practice at the State University of New York, Upstate Medical University, Department of Family Medicine [SUNY] contributed several of the appraisal reports. Each of the evidence reports covered:

- Summary of findings
- Methodology
- Search terms
- Resources searched
- Summary table of findings
- Critical appraisal of each study

Quality ratings were made for each evidence using the grading scale presented in the "Rating Scheme for the Strength of the Evidence" field in this summary. The quality rating procedure used in this update was different from the rating scale used in the development of the original guideline in 1999. Where adjustments to the update process were made, articles from the original process were re-graded to reflect the changed rating scale (e.g., the level of recommendation [R] was assigned for each evidence, based on study design and significance of the quality of the evidence).

Lack of Evidence - Consensus of Experts

The majority of the literature supporting the science for these guidelines is referenced throughout the document and is based upon key randomized controlled trials (RCTs) and longitudinal studies published from 1999 through 2003. Following the independent review of the evidence, a consensus meeting was held to discuss discrepancies in ratings and formulate recommendations. Where existing literature was ambiguous or conflicting, or where scientific data was lacking on an issue, recommendations were based on the clinical experience of the Working Group. These recommendations are indicated in the evidence tables as based on "Working Group Consensus."

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Guideline Development Process

The Offices of Quality and Performance and Patient Care Service, in collaboration with the network Clinical Managers, the Deputy Assistant Under Secretary for Health, and the Medical Center Command of the Department of Defense (DoD) identified clinical leaders to champion the guideline development process. During a preplanning conference call, the clinical leaders defined the scope of the guideline and identified a group of clinical experts from the Veterans Administration (VA) and DoD that formed the Guideline Development Working Group.

At the start of the update process, the clinical leaders, guideline panel members, outside experts, and experts in the field of guideline and algorithm development were consulted to determine which aspects of the 1999 guideline required updating. These consultations resulted in the following recommendations that guided the update efforts: (1) update any recommendations from the original guideline likely to be effected by new research findings; (2) provide information and recommendations on health systems changes relevant to hypertension care; (3) address content areas and models of treatment for which little data existed during the development of the original guideline; and (4) review the performance and lessons learned since the implementation of the original guideline.

The Working Group participated in a face-to-face session to reach a consensus about the guideline recommendations and to prepare a draft document. The draft was revised by the experts through numerous conference calls and individual contributions to the document.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Overall Quality of Evidence	Net Benefit of the Intervention			
	Substantial	Moderate	Small	Zero or Negative
Good	A	B	C	D
Fair	B	B	C	D
Poor	I	I	I	I

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Experts from the Veteran Administration (VA) and Department of Defense (DoD) internal medicine, cardiology, and primary care reviewed the final draft, and their feedback was integrated.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations for the diagnosis and management of hypertension (HTN) in the primary care setting are organized into 2 major algorithms. Each algorithm, the objectives and recommendations or annotations that accompany it, and the evidence supporting the recommendations are presented below. The quality of evidence (**QE**) grading (I-III); **overall quality** (Good, Fair, Poor); and final grade of recommendations (**R**) (A-D, I) are provided for specific statements. These

grades, along with "net effect of the interventions" are defined at the end of the "Major Recommendations" field.

- Screening for Elevated Blood Pressure
- Management of Elevated Blood Pressure

A. **Any Adult in the Health Care System**

Recommendation

1. Screen adults for elevated blood pressure (BP)

B. **Obtain Blood Pressure**

Recommendation

1. Blood pressure should be measured with a technique using a properly calibrated and validated instrument:
 - Patient should be seated quietly for 5 minutes with back supported, feet on the floor, and arm bared, unrestricted by clothing, and supported at heart level. Measurement of BP in the standing position may be indicated for patients at risk for postural hypotension or at the discretion of the clinician.
 - Smoking, exercise, or caffeine ingestion should not have occurred within 30 minutes prior to the BP measurement.
 - The appropriate blood pressure cuff size should be chosen for the patient. The cuff should be wrapped snugly around the arm with the bladder centered over the brachial artery. The bladder should encircle at least 80% of the arm.

For Auscultatory Measurements Only:

- Palpated radial pulse obliteration pressure should be used to estimate the systolic BP (SBP). The cuff should then be inflated 20 to 30 mm Hg above this level for the auscultatory determinations.
- Position the stethoscope over the brachial artery and rapidly inflate the cuff. Deflate the cuff at a rate of 2 to 3 mm Hg per second, listening for Phase 1 and Phase 5 Korotkoff sounds. The first appearance of sound (Phase 1) is used to record the SBP. Phase 5, at the disappearance of sound, is the diastolic BP (DBP) in adults. Listen 10 to 20 mm Hg below Phase 5 for any further sound then deflate the cuff completely.
- The BP should be recorded in even numbers with the patient's position, arm used, and cuff size documented.
- BP readings should be repeated in the same arm and averaged, if different. Two minutes should elapse before repeating the BP measurement. If the readings differ by more than 5 mm Hg, additional measurements should be obtained.

2. Measurements can be taken with a mercury sphygmomanometer, but a recently calibrated aneroid manometer or a validated electronic device is an acceptable alternative.

	Recommendations	Sources	QE	Overall Quality	R
1	Use the standardized technique to measure blood pressure.	Systolic Hypertension in the Elderly Program (SHEP) Cooperative Research Group, 1991 "Major outcomes," 2002	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

C. Is SBP >120 or DBP >80 mm Hg?

Objective

Identify patients with abnormal elevated blood pressure.

Recommendation

1. Screen adults for elevated blood pressure, defined as a systolic blood pressure 120 mm Hg and above or a diastolic blood pressure 80 mm Hg and above.

	Recommendations	Sources	QE	Overall Quality	R
1	Blood pressure measurement can identify adults at increased risk for cardiovascular disease due to high blood pressure.	Sheridan, Pignone, & Donahue, 2003	I	Good	A
2	The treatment of high blood pressure substantially decreases the incidence of cardiovascular disease and causes few major harms.	Sheridan, Pignone, & Donahue, 2003	I	Good	A
3	SBP>120 mm Hg or DBP > 80 mm Hg is higher than optimal in terms of vascular risks.	Lewington et al., 2002	I	Fair to Good	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

D. Annually Screen For Blood Pressure

Objective

Screen for future elevation of blood pressure.

Recommendations

1. Blood pressure screening should occur periodically.
2. Blood pressure screening is recommended annually for adults 50 years of age and older and/or for those who have prehypertension and/or other cardiovascular risk factors.
3. Blood pressure screening is recommended at indeterminate intervals, preferably annually. This may occur at the time of routine preventive care or routine health assessments.

	Recommendations	Sources	QE	Overall Quality	R
1	Blood pressure screening should occur periodically.	Sheridan, Pignone, & Donahue, 2003	II-1	Fair	B
2	Blood pressure screening annually for adults older than 50 and/or for adults with prehypertension and/or other cardiovascular risk factors	Franklin et al., 1997	II-3	Fair	B
3	Annual screening for healthy adults	Experts Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

E. Address Other Cardiovascular Risk Factors

Objective

Evaluate and address all modifiable cardiovascular risk factors.

Recommendations

1. Screening lipid profile should be done per the [VHA/DoD Clinical Practice Guideline for the Management of Dyslipidemia](#)
2. Screening for diabetes mellitus should be done per the [VA/DoD Clinical Practice Guideline for the Management of Diabetes Mellitus](#)

3. Reduction/cessation of the use of tobacco and cigarette should be addressed per the [VA/DoD Clinical Practice Guideline for the Management of Tobacco Use](#)
4. A heart-healthy lifestyle including optimum weight maintenance (and/or weight loss, when needed), diet rich in fruits, vegetables, and low fat dairy products, and an exercise program emphasizing daily or near daily aerobic activity should be recommended.
5. Aspirin should be recommended to patients who have hypertension and diabetes mellitus (DM) (see the [VA/DoD Clinical Practice Guideline for the Management of Diabetes Mellitus](#)) or ischemic heart disease (IHD) (see the [VA/DoD Clinical Practice Guideline for Management of Ischemic Heart Disease](#)) and should be recommended to patients who already have vascular disease (e.g., cerebrovascular disease or cardiovascular disease).

F. **SBP >140 or DBP >90 or DBP >80 with DM?**

Recommendation

1. The diagnosis of hypertension (HTN) should be determined by BP readings on two separate patient visits. A minimum of two BP measurements should be performed during a patient visit:
 - Patients with SBP \geq 140 or DBP \geq 90 (Stage 1 hypertension) or with DBP \geq 80 mm Hg and concomitant diabetes mellitus or chronic kidney disease should have their blood pressure confirmed generally within 1 to 2 months.
 - Patients with SBP \geq 160 or DBP \geq 100 (Stage 2 hypertension) should be appropriately evaluated by a healthcare provider, typically within 1 month--or sooner if the clinical situation warrants.

G. **Initiate Lifestyle Modification**

Objective

Provide dietary and lifestyle changes to help treat HTN and assist in reducing risk factors for cardiovascular disease.

Recommendations

1. Lifestyle modifications (LSM) aimed at controlling hypertension should be recommended in all cases. These methods can be used by themselves or in combination with drugs. **(B)**
2. Individual LSM are effective; however, addressing multiple modifications may have a greater effect on reducing blood pressure. **(B)**
3. Successful implementation will require multiple visits and close follow-up. **(B)**
4. Education may take place in either individual or group settings involving allied health professionals. **(B)**
5. Clinician empathy increases patient trust, motivation, and adherence to therapy.

6. Physicians should consider their patients' cultural beliefs and individual attitudes in formulating therapy.

	Recommendations	Sources	QE	Overall Quality	R
1	Initiate LSM for prehypertension	Staessen et al., 2004 Obarzanek et al., 2003	I	Good	A
2	Addressing multiple modification	Appel et al., 2003 Miller, 2002 Staessen et al., 2004	I	Fair	B
3	Reduce sodium intake	Appel et al., 2003 Hooper et al, 2003 Jurgens & Graudal, 2004	I	Fair	B
4	Limit alcohol consumption	Xin et al., 2001	I	Fair	B
5	Reduce/maintain body weight (body mass index [BMI]<25)	Neter et al., 2003 Mulrow et al., 2004	I	Fair	B
6	Daily exercise	Whelton et al., 2002 Kelley, Kelley, & Tran, 2001	I	Fair	B
7	Dietary approaches rich in fruits, vegetables, and low-fat dairy products, with overall reduced saturated and total fat content	Stamler, 1997 Cappuccio et al., 1995 Appel et al., 2002	I	Fair	B
8	Dietary Approaches to Stop Hypertension (DASH) Diet	Obarzanek et al., 2003	I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

H. **Obtain History**

Objective

Elicit historical features that may influence clinical decision-making.

Recommendations

The patient's medical history pertinent to hypertension should include:

1. Duration, levels, and nature of BP elevation
2. History or symptoms to rule out coronary heart disease (CHD), heart failure, cerebrovascular disease, peripheral vascular disease, renal disease, DM, dyslipidemia, and gout
3. Survey for baseline symptoms of sexual dysfunction, depression, cough, and angioedema
4. Family history of hypertension, premature CHD, cerebrovascular accident (CVA), DM, dyslipidemia, or renal disease
5. Other symptoms suggesting other causes of elevated BP
6. Results and adverse effects of any previous antihypertensive therapy
7. History of recent change in weight, physical activity, tobacco use
8. Dietary assessment, including intake of sodium, saturated fat, and caffeine
9. History of all prescribed and over-the-counter medications, herbal remedies, and dietary supplements, some of which may raise blood pressure or interfere with the effectiveness of antihypertensive medications
10. History of alcohol and illicit drug use (especially cocaine and other stimulants)
11. Psychosocial and environmental factors (e.g., family situation, employment status and working conditions, level of comprehension) that may influence HTN control

The following major risk factors are the components of cardiovascular risk in patients with hypertension:

1. Tobacco use
2. Dyslipidemia
3. Diabetes Mellitus
4. Obesity (body mass index [BMI] ≥ 30)
5. Physical inactivity
6. Microalbuminuria or estimated glomerular filtration rate (GFR) <60 mL/min
7. Age (>55 years for men, >65 years for women)
8. Family history of cardiovascular disease for women younger than 65 or men younger than 55

I. **Perform Physical Examination**

Objective

Elicit physical signs that may influence clinical decision-making.

Recommendation

A physical exam should evaluate for signs of secondary HTN or hypertensive organ damage. At a minimum, vital signs should include height, weight, and two or more blood pressure readings with the patient seated.

If the patient is at risk for postural hypotension or has symptoms of orthostasis, a standing blood pressure should also be measured in addition to

seated or supine. The two blood pressure measurements should be separated by 2-minute intervals.

A focused examination should include the following:

1. Fundoscopy
 - a. Arteriovenous (AV) nicking or arterial narrowing
 - b. Hemorrhages
 - c. Exudates
 - d. Papilledema
2. Neck
 - a. Carotid bruits and pulses
 - b. Jugular venous distention
 - c. Thyromegaly
3. Heart
 - a. Normal rate and regular rhythm
 - b. Apical impulse
 - c. Precordial heave
 - d. Clicks, murmurs, third or fourth heart sounds
4. Lungs
 - a. Crackles
 - b. Wheezes or rhonchi
5. Abdomen
 - a. Masses (e.g., aortic aneurysm, polycystic kidneys)
 - b. Bruits
6. Extremities
 - a. Peripheral arterial pulses
 - b. Femoral bruits
 - c. Edema
7. Central and peripheral nervous systems
 - a. Signs of prior cerebrovascular accident (CVA)
 - b. Signs or symptoms of dementia

Target organ damage associated with clinical cardiovascular diseases includes:

1. Heart diseases
 - a. Left ventricular hypertrophy
 - b. Angina or prior myocardial infarction
 - c. Prior coronary revascularization
 - d. Heart failure
2. Stroke or transient ischemic attack
3. Chronic kidney disease (nephropathy)
4. Peripheral arterial disease
5. Retinopathy

J. Perform Laboratory and Other Diagnostic Procedures

Objective

Determine the baseline data on patient's health status, the existence of secondary causes of HTN, and the risk factors contributing to the disease process.

Recommendations

Routine laboratory tests for the investigation of all patients with hypertension

1. Urinalysis (UA)
2. Blood chemistry (potassium, sodium, blood urea nitrogen [BUN], creatinine, fasting glucose)
3. Fasting lipid profile (total cholesterol [TC], high-density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], triglycerides [TG])
4. 12-lead electrocardiography

Optional Laboratory Tests*

1. Hematocrit, complete blood cell count
2. Glomerular filtration rate (GFR) estimated by Modification of Diet in Renal Disease Study Group (MDRD) equation**
3. Blood calcium
4. Urinary protein excretion (24-hour urine collection or spot urine for protein/creatinine ratio)
5. Uric acid
6. Glycosylated hemoglobin (HbA1c)
7. Thyroid-stimulating hormone (thyrotropin) (TSH)
8. Transthoracic echocardiography to determine the presence of left ventricular hypertrophy

* May have clinical utility in certain instances

** Calculators and modeling aids. Available at:

http://www.nkdep.nih.gov/healthprofessionals/tools/gfr_adults.htm

Estimation of proteinuria and creatinine clearance (Clcr) may be done by single urine and blood tests instead of collecting 24-hour urines. To estimate urinary protein excretion, obtain a single urine specimen for protein concentration (in mg/dL) and creatinine concentration (in mg/dL). The protein-to-creatinine ratio (protein concentration divided by the creatinine concentration) estimates the 24-hour protein excretion in grams per day (see original guideline document for example).

There are now several formulas available to estimate Clcr. One of the simplest uses the patient's age, serum creatinine (Scr), weight in kilograms, and sex to estimate Clcr. Normal Clcr is >100 cc/min, but diminishes with

age. The estimation formula is $(140 - \text{age}) / \text{Scr} \times \text{wt} / 72 \times 1.0$ (if male) or 0.85 (if female) (see original guideline document for example).

	Recommendations	Sources	QE	Overall Quality	R
1	Routine tests: Urinalysis, Blood Chemistry, Fasting Lipid Profile, ECG	Chobanian et al., 2003	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

K. Is a Secondary Cause Suspected?

Objective

Detect underlying disease(s) responsible for secondary HTN using additional laboratory tests.

Recommendation

An early discussion or consultation with an appropriate specialist is encouraged when a patient is suspected of having secondary hypertension (see table below titled "Recommended Testing for Patients Suspected of Having Secondary Hypertension")

Recommended Testing for Patients Suspected of Having Secondary Hypertension

Disease	Features	Recommended Test/Referral
Cushing's syndrome and other glucocorticoid excess states including chronic steroid therapy	Amenorrhea Increased dorsal fat Diabetes mellitus Edema Hirsutism Moon facies Purple striae Truncal obesity	History 24- hour urine for free cortisol Dexamethasone suppression test
Hyperparathyroidism	Hypercalcemia Polyuria/polydipsia Renal stones	Serum calcium and parathyroid hormone (PTH) level
Hyperthyroidism	Anxiety Brisk reflexes Hyperdefecation Heat intolerance Tachycardia Tremor	Thyroid Stimulating Hormone (TSH) Free T4

Disease	Features	Recommended Test/Referral
	Weight loss Wide pulse pressure	
Pheochromocytoma	Labile BP Orthostatic hypotension Paroxysms (headaches, palpitations, sweating, pallor) Tachycardia	Plasma metanephrines or 24-hour urine for metanephrines and/or catecholamines Consider referral to specialist
Primary hyperaldosteronism	K ⁺ \leq 3.5 mEq/L in patients not on diuretic therapy; or K ⁺ \leq 3 mEq/L in patients on diuretic therapy Muscle cramps Polyuria Weakness	Plasma aldosterone and plasma renin activity 24 hour urinary aldosterone level on a high sodium diet
Kidney disease	Abnormal urine sediment Elevated serum creatinine Hematuria on two occasions or structural renal abnormality (e.g., abdominal or flank masses) Proteinuria	Urinalysis; estimation of urinary protein excretion and creatinine clearance by using a single random urine test; renal ultrasound may also be considered (See annotation H in original guideline document.) Consider referral to nephrology
Renovascular disease	Abdominal bruits over the renal arteries Abrupt onset of severe HTN Diastolic BP \geq 115 mm Hg Initial onset age \geq 50 years old Worsening BP control when previously stable Evidence of atherosclerotic vascular disease	There are a variety of screening tests for renovascular HTN, depending on equipment and expertise in institutions. Magnetic resonance angiography, renal artery Doppler, and post-captopril renograms are used. However, there is no single best test for renovascular HTN, and consultation with experts in your institution is recommended. Intravenous pyelogram is relatively contraindicated in diabetes and no longer recommended as screening test for renovascular disease.
Sleep apnea	Daytime somnolence Fatigue Obesity Snoring or observed apneic episodes	Referral for sleep study
Aortic Coarctation	Weak or delayed femoral pulses	Computerized tomography angiography
Drug or substance	Nonsteroidal anti-	History

Disease	Features	Recommended Test/Referral
induced	inflammatory drugs (NSAIDs), including Cox-2 Inhibitors Sympathomimetics (e.g., decongestants, anorectics) Oral contraceptives Adrenal steroids Erythropoietin Cyclosporine, tacrolimus Cocaine, amphetamines Excessive alcohol use Licorice Selected dietary supplements (e.g., ma huang, ephedra, bitter orange)	Urine toxicology as indicated

L. **Initiate Treatment for Hypertension**

Objective

Select the most effective therapy to control blood pressure.

Recommendations

Pharmacotherapy (see also Annotation M in the original guideline document)

1. According to the baseline blood pressure and the presence or absence of complications, it appears reasonable to initiate therapy either with a starting dose of a single agent or with starting-doses of two agents. (See Appendix B Recommended Dosage for Selected Hypertension Drug Therapy in the original guideline document).
2. To reach target blood pressure, it is likely that a large proportion of patients will require combination therapy with more than one agent.
3. Drug therapy should be initiated in conjunction with LSM.
4. Initial combination therapy with two drugs--particularly low-dose combinations--is more effective in achieving target level BP.
5. Initial combination therapy with two drugs maybe preferable for patients in STAGE 2 HTN.

Non-Pharmacologic Therapy (See also Annotation G in the original guideline document)

1. Prescribe LSM in all patients with prehypertension or HTN. Certain lifestyle modifications have been shown to decrease blood pressure in randomized clinical trials; other lifestyle modifications are also important in decreasing cardiovascular risk. These non-pharmacologic

measures can be sufficient to control BP or to decrease the amount of required medication.

2. If patients with stage 1 HTN do not adhere to LSM or are adherent to LSM and show no improvement in blood pressure level for 3 to 6 months, **initiate drug therapy**.
3. In addition to lifestyle modifications, drug therapy should be considered in patients with prehypertension and DM.
4. Additional compelling indications should be considered in determining non-pharmacologic, as well as pharmacologic treatment.

Management of Elevated Blood Pressure for Adults

BP Classification	SBP	DBP	LSM	Initial Drug Therapy
Prehypertension	120-139	80-89	Yes	Consider for those with DM when BP 140/80 or greater
Stage 1 Hypertension	140-159	90-99	Yes	Thiazide-type diuretic unless contraindicated or not tolerated (Consider angiotensin-converting enzyme inhibitors [ACEIs], angiotensin receptor blockers [ARBs], beta blocker [BB], calcium channel blocker [CCBs]) For compelling indication see Table "Preferred Agents in Patients with Comorbidities" below.
Stage 2 Hypertension	≥160	≥100	Yes	Drug therapy with 2 drugs for most patients. This should include a thiazide-type diuretic unless contraindicated or not tolerated (Consider ACEIs, ARBs, BB, CCB) For compelling indication see Table "Preferred Agents in Patients with Comorbidities" below.

M. Drug Treatment

Objective

Determine the most appropriate drug therapy regimen based on available evidence and patient comorbidities.

Recommendations

1. **Thiazide-type diuretics** are recommended as first line therapy for drug treatment of hypertension either as monotherapy or in combination with other agents. **(A)**
2. The following may be used as alternative or supplementary therapy:
 - a. ACEIs **(A)**
 - b. ARBs **(A)**
 - c. Beta-blockers **(A)**
 - d. Long-acting calcium channel blockers **(A)**

Other Supplemental Agents

3. **Reserpine** can be used as supplemental therapy when other agents do not provide clinical adequate response. **(A)**

4. Other agents may be used as additional therapy in refractory hypertension or as supplementary therapy when other drugs are contraindicated or limited by adverse effects. These include:
 - a. **Centrally acting drugs** (e.g., clonidine, methyldopa) **(B)**
 - b. **Vasodilators** (e.g., hydralazine, minoxidil) **(B)**
 - c. **Aldosterone antagonists** (e.g., spironolactone, eplerenone) **(B)**
 - d. **Combined alpha-beta blockers** **(B)**
 - e. **Alpha blockers** **(B)**

Avoid use of:

5. **Alpha-blockers** should be avoided as monotherapy **(D)**, may be used as supplemental therapy. **(B)**
6. **Short-acting calcium channel blockers** should not be used as there is no evidence of benefit. **(D)** **Short-acting dihydropyridine (DHP) calcium channel blockers** may cause harm. **(D)**

Preferred Agents In Patients With Uncomplicated Hypertension

Condition	Preferred Agents	Alternate Agents	Other Agents	Comments
HTN - without compelling indications	Thiazide-type diuretic	ACEI ARB Beta-blocker CCB	Aldosterone antagonist Alpha-blocker Clonidine Reserpine Vasodilator	<ol style="list-style-type: none"> 1. Immediate-release nifedipine should not be used. 2. An ARB may be considered in a patient who is intolerant to an ACEI. 3. Alpha-blockers are useful in treating symptomatic BPH, but are not recommended as monotherapy for treating HTN.

Compelling Indications for Individual Drug Classes

Recommendations for initial antihypertensive therapy in patients with HTN who also have certain compelling conditions may differ from other patients with HTN but in general, these patients should still be considered for thiazide-type diuretics--in addition to the compelling medication--based on the benefit seen in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) in patients on diuretics. More specifically, the recommendations in the Table below titled "Preferred Agents in Patients with Comorbidities" include medications that have demonstrated improved outcomes or provided clinical improvement in the treatment of patients with certain conditions that may or may not be directly related to hypertension itself. These conditions addressed include: post-myocardial infarction, systolic heart failure (HF), kidney disease, diabetes, and stroke prevention.

Other specific recommendations are for choice of agent in treatment of pilots and patients whose work/duty requires special consideration (pilots, and service person in extreme weather conditions).

MOST COMPELLING INDICATIONS SHOULD INCLUDE A THIAZIDE-TYPE DIURETIC

Preferred Agents in Patients with Comorbidities

	Preferred Agents	Additional/Alternative	Other Agents
DM*	Thiazide-type diuretic and/or ACEI	ARB CCB Beta-blocker	
Systolic HF	ACEI Beta-blocker	ARB Hydralazine-Nitrate Aldosterone antagonist	Diuretic (for treatment of volume overload) LADHP
CKD**	ACEI ARB Diuretic (thiazide or loop, based on kidney function)	Beta-blocker NCCB LADHP	
Post Stroke	Thiazide-type diuretic and ACEI		
Post-MI	Beta-blocker ACEI	NCCB Thiazide-type diuretic	LADHP

Other Special Populations

	Preferred Agents	Alternate Agents	Comments
African Americans	Thiazide-type diuretic ACEI		Differences in efficacy are not as apparent when diuretics are added to ACEIs and beta-blockers
High ambient temp and/or extreme conditions	ACEI ARB	CCB Low dose Thiazide-type diuretic	For patient already deployed consider CCB

* For patients with diabetes mellitus, please refer to the [VA/DoD Clinical Practice Guideline for the Management of Diabetes Mellitus](#).

**For patients with kidney disease.

ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; NCCB = nondihydropyridine calcium channel blocker; CKD = chronic kidney disease; LADHP = long-acting dihydropyridine calcium channel blocker

N. Is BP Control Adequate and Therapy Tolerable?

Objective

Assess adequacy of HTN control and adverse effects to treatment.

Recommendations

The primary objective in hypertension treatment is to decrease blood pressure to less than 140/90 mm Hg, or to lower goals in selected patient populations.

1. Patients should be seen within 1 month after the initiation of therapy to determine adequacy of HTN control, degree of patient adherence, and presence of adverse effects. (Allied health professional may be useful to conduct these follow-up visits.)
2. Earlier follow-up may be necessary for patients:
 - a. Requiring blood tests
 - b. At increased risk for adverse outcomes from HTN due to very high BP or target organ damage
 - c. At risk for postural hypotension
3. Assessment of blood pressure control should be based on measurement of BP in the clinic setting. Out of office measurements may provide useful clinical information.
4. Once the patient's BP is controlled, follow-up at 3 to 6 month intervals (depending on patient status) is generally appropriate.
5. Older persons, persons with diabetes, those with neurological disease and patients with postural symptoms should be evaluated for postural hypotension.
6. Target level for blood pressure is included in the following table.

Target Values For HTN Control (ADOPTED FROM JNC7)

Condition	Target (SBP/DBP mm Hg)	Level of Evidence (QE, R)	Resource*
Hypertension	<140/90	<150/90 (I,A) <140/90 (II,B)	SBP: SHEP, Syst-Eur DPB: HDFP, HOT
Diabetes	<140/80	(I, A)	UKPDS, HOT
DM + Nephropathy	<140/80	(I, A)	IDNT, RENAAL, MDRD
Chronic Kidney Disease	<140/90	<140/90 (I, A) <130/80 (III, C)	AASK
Proteinuria >1g/day	<125/75	(III, C)	Post analyses MDRD

SHEP = Systolic Hypertension in the Elderly; Syst-Eur = Systolic Hypertension in Europe; HDFP = Hypertension Detection and Follow-up Program; HOT = Hypertension Optimal Treatment; UKPDS = United Kingdom Prospective Diabetes Study; IDNT = Irbesartan in Diabetic Nephropathy Trial; RENAAL = Reduction of Endpoints in NIDDM with the Angiotensin II Receptor Antagonist Losartan; MDRD = Modification of Diet in Renal Disease; AASK = African American Study Of Kidney Disease And Hypertension

The VA/DOD Hypertension Guideline recommends a **minimal** target threshold that is based on level I evidence derived from randomized clinical trials. For persons with diabetes this is 140/80 mm Hg, and for persons without diabetes 140/90 mm Hg. The VA/DOD Hypertension Guideline also acknowledges that there are data from multiple observational studies, including pooled data from randomized clinical trials (level II evidence) demonstrating that lower blood pressure levels are associated with risk reduction for adverse outcomes; the relationship is linear without a threshold. Consequently, clinicians are encouraged to set target values for each patient based upon their individual circumstances, including tolerance of medications.

	Recommendations	Sources	QE	Overall Quality	R
1	Treat for HTN if SBP \geq 150 mm Hg	Lewington et al., 2002 SHEP Cooperative Research Group, 1991 Staessen et al., 1997	II-2 I I	Good Good Good	A
2	Treat for HTN if SBP \geq 140 mm Hg	Lewington, et al., 2002 Chobanian et al., 2003	II-2 III	Good Poor	B
3	Treat for HTN if DBP \geq 90 mm Hg	Lewington et al., 2002	II-2	Good	A
4	Confirm SBP \geq 140 mm Hg or DBP \geq 90 mm Hg on 2 or more visits, unless there are other clinical reasons for beginning therapy immediately (e.g., if target organ damage)	Sheridan, Pignone, & Donahue, 2003	III	Fair	C
5	Confirm and/or begin treatment within 1 month if SBP \geq 160 mm Hg or DBP \geq 100 mm Hg	SHEP Cooperative Research Group, 1991	III	Fair	C
6	Classify SBP 120 to 139 mm Hg or DBP 80 to 89 mm Hg as "prehypertension"	Chobanian et al., 2003 Lewington, et al., 2002	II-2	Good	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

O. Continue Current Treatment; Reinforce Lifestyle Modification; Follow up at Next Regular Visit

Objective

Follow patients who attain the desired target BP.

Recommendations

1. Once the patient's BP is stabilized, follow-up at 3- to 6-month intervals (depending on patient status) is generally appropriate.
2. Decrease or cessation of antihypertensive drug therapy is possible in patients who are willing to do so and whose BP is very well controlled. Cessation may be considered in patients well controlled on monotherapy. These patients should be closely followed-up.

	Recommendations	Sources	QE	Overall Quality	R
1	Follow-up visits may occur every three to six months	Birtwhistle et al., 2004	Ia	Good	B
2	Decrease or cessation of antihypertensive drug therapy	Nelson et al., 2003	I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

P. Self Monitoring

Objective

Assess and promote blood pressure control.

Recommendations

1. Home blood pressures may be used as a supplement to, but should not wholly substitute for, obtaining clinic blood pressures to assess or promote blood pressure control.
2. If home blood pressure monitoring is used, a minimum of two measurements per day for at least two days should be obtained and then averaged in order to provide a reliable estimate of home blood pressure.*
3. In order to improve accuracy and interpretation of home blood pressure measurements, the use of a device with a memory function is recommended rather than relying on the patient's recall or diary.
4. Home blood pressure monitoring may assist in detecting a white coat effect or poorer control at home than in the office.

* Note: Patients enrolled in a formal Care Coordination\Telehealth (CC-TH) should follow the instructions of the CC-TH program.

	Recommendations	Sources	QE	Overall Quality	R
1	Home blood pressure may be used as an alternative to clinic blood pressure in improving blood pressure control	Ebrahim, 1998 Boulware et al., 2001	I	Good	B
2	If home blood pressure monitoring is used, a minimum of two measurements per day for at least two days should be obtained and then averaged in order to provide a reliable estimate of home blood pressure	Stergiou et al., "Self-monitoring," 1998	I	Good	B
3	In order to improve accuracy and interpretation of home blood pressure measurements, the use of a device with a memory function is recommended rather than relying on the patient's recall or diary	Bachmann et al., 2002	I	Good	B
4	The use of home blood pressures may be used as a reliable alternative to 24-hour ambulatory blood pressure monitoring in the detection of the white coat effect	Stergiou et al., "White coat," 1998	I	Good	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in original guideline document)

Q. Adjust Therapy

Objective

Modify drug therapy to help achieve BP control.

Recommendations

If the blood pressure continues to be elevated, clinicians may consider choosing one of the strategies that have proven effective in the treatment of HTN.

1. Increase the dose of the original medication.

- Titrating the dose usually means doubling the dose. Be aware of the dose response that is not always linear although adverse effects may increase with higher doses.
2. Add another agent
 - If a thiazide-type diuretic is not chosen as the initial drug, it should be used as the second agent, unless contraindicated or not tolerated, especially because it frequently enhances the effects of the initial agent and has the best cardiovascular outcome data. **(IA)**
 - When using combination therapy select those agents that have been shown to reduce morbidity and mortality. **(A)**
 - When using combination therapy select agents from different classes and provide benefit for comorbid condition or compelling indications if they exist. **(C)**
 - Combination therapy includes a potential for drug-drug interactions, but these are uncommon.
 3. Consider care management by pharmacist in the follow-up and adjustment of medication to improve blood pressure goal. **(B)**
 4. Involving other allied health professionals in follow-up may as well improve blood pressure control. **(C)**

	Recommendations	Sources	QE	Overall Quality	R
1	Add second agent	Materson, Reda, & Williams, 1996 "Major outcomes," 2002	I	Good	A
2	Thiazide-type diuretic should be used as one of the agents in combination therapy	"Major outcomes," 2002 Chobanian et al., 2003	I	Good	A
3	When using combination therapy, select agents from different classes	Group Consensus	III	Poor	C
4	Involving other allied health professionals in follow-up	Group Consensus	III	Poor	C
5	Consider care management by pharmacist in the follow-up		I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

R. **Reassess Adherence**

Objective

Identify causes of inadequate response to therapy following dose or stepwise titration.

Recommendation

Adherence to an antihypertensive medication regimen can be improved by a multi pronged approach including:

- Address barriers for obtaining the medications (administrative, economic, etc.).
- Simplify medication regimens incorporating patient's preference.
- Coordinate with other health care team members to improve monitoring of adherence with prescriptions of pharmacological and lifestyle modification.
- Educate patients and patients' families about their disease/treatment regimens.
- Encourage greater patient responsibility/autonomy in monitoring their blood pressure and adjusting their prescriptions.

Causes of Inadequate Response to Therapy are shown in Table 11 of the original guideline document.

The primary care provider should employ measures that assist in improving patient adherence to treatment. Many of these measures are designed to engage the patient in his or her wellness. The table below titled "Strategies to Improve Patient Adherence to Antihypertensive Therapy" lists several suggestions to improve the patient's adherence to therapy.

Strategies to Improve Patient Adherence to Antihypertensive Therapy

1. Be aware of signs of patient non-adherence to therapy (e.g., missed appointments, missed refills).
2. Establish the goal of therapy early: to reduce BP to non-hypertensive levels with minimal or no adverse effects.
3. Educate patients about the disease and involve them and their families in its treatment. Have them measure blood pressure at home.
4. Maintain contact with patients.
5. Integrate pill taking into routine activities of daily living.
6. Prescribe medications that require no more than twice daily dosing if possible.
7. Ask about adverse effects and adjust therapy to prevent, minimize, or ameliorate side effects.

8. Enlist the support of pharmacist in adjusting medication with regular follow-up.

9. Consider group visits for education

S. Consider Consultation

Objective

Determine appropriate point in time to consider consultation to improve hypertension management.

Recommendation

From a clinical perspective, referral to, or consultation with hypertension specialists or those with particular expertise in the relevant clinical area should be considered if there is:

1. Failure to achieve target blood pressure goals when on appropriate doses of three medications, one of which should typically be a thiazide-type diuretic and assuming that other remedial causes of inadequate response have been identified and addressed
2. Suspected secondary cause for hypertension

Hypertension and Comorbid Conditions (From Appendix C in the original guideline document)

C1 Patients with Diabetes with SBP >140 or DBP >80 mm Hg

Recommendations

1. Patients with diabetes with hypertension (systolic BP \geq 140 or diastolic BP \geq 90 mm Hg) should:
 - Begin anti-hypertensive therapy with a diuretic or an angiotensin converting enzyme inhibitor (ACEI)
 - If ACEI induced side-effects occur, consider switching to an angiotensin receptor blocker (ARB)
 - Use other preferred agents (beta blockers, long acting calcium channel blockers) as necessary, depending on other comorbid conditions or compelling indications to achieve a blood pressure <140/80 mm Hg.
2. Patients with diabetes with initial SBP <140 mm Hg and DBP between 80 and 89 mm Hg (within the "pre-hypertensive" category identified by JNC 7) may benefit from lowering diastolic blood pressure to < 80 mm Hg. **(A)**
3. Individuals with diabetes whose blood pressures is <140/80 mm Hg who have clinical cardiovascular disease may benefit from ACEI therapy even without a reduction in blood pressure. **(A)**
4. In patients with diabetes with renal insufficiency (i.e., serum creatinine >1.5 mg/dL) and proteinuria (i.e., >1 g/24h) there are some data suggesting that further BP lowering (<125/75 mm Hg) may slow progression of renal disease.

Lower BP should be achieved, if feasible and practical, depending on the tolerance of medications and side effects of BP lowering. **(B)**

	Recommendations	Sources	QE	Overall Quality	R
GENERAL RECOMMENDATIONS					
1	Treatment of HTN in patients with diabetes to retard progression of macrovascular complications and DM	Hansson et al., 1998 "Major outcomes," 2002	I	Good	A
2	Target BP of <140/80 mm Hg for patients with diabetes with HTN, due to high-risk for cardiovascular disease	Group Consensus	III	Poor	C
3	Consideration of lower BP targets (<125/75 mm Hg) to slow the progression of renal disease for patients with diabetes with elevated serum creatinine and/or urinary protein excretion above 1 g/day		II-2	Fair	B
GENERAL THERAPEUTIC RECOMMENDATIONS					
4	Antihypertensive therapy with thiazide diuretic or ACEI for patients with diabetes with BP >140/80 mm Hg. Switch to ARB if ACEI-induced side-effects occur, then use other agents to achieve BP target <140/80 mm Hg	Hansson et al, 1998 Yusuf et al., 2000	I	Good	A
SPECIFIC THERAPEUTIC RECOMMENDATIONS					
5	ACEI for normotensive patients with type 1 DM and proteinuria and for patients with type 2 DM and microalbuminuria or a high-risk for cardiovascular disease	Yusuf et al, 2000	I	Good	A
6	Consideration of ACEI for normotensive patients with		I	Fair	B

	Recommendations	Sources	QE	Overall Quality	R
	type 1 DM				
7	Treatment with ARBs for patients with type 2 DM and nephropathy, microalbuminuria, or HTN and left ventricular hypertrophy		I	Good	A
8	Combination ACEI and NCCB to provide renal protection in patients with inadequate response to an ACE-I alone		II-2	Fair	B
9	Diuretics to enhance the BP lowering effects of other antihypertensive agents.		I	Good	A
THERAPEUTIC CAUTIONS					
10	Use caution in prescribing long-acting DHCCBs without an ACEI or ARB because of the risk of less renal protection and/or adverse cardiovascular outcomes.		I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

C2 Kidney Disease

Objective

To provide recommendations on pharmacologic therapy for renal preservation in patients with kidney disease, regardless of blood pressure level

Recommendations

1. ACEI may be preferred agent for patients with HTN and kidney disease (reduced kidney function with proteinuria). ARB may be substituted for patients with ACEI-induced cough.
2. In African Americans with hypertensive kidney disease, ACEI may be a first line therapy for treating HTN.
3. A diuretic should be used when a second blood pressure medication is needed or if hyperkalemia occurs. Thiazide diuretic may be used if estimated GFR >30 cc/min/1.73m², but loop diuretics are usually needed for lower kidney

- function. Potassium-sparing diuretics should be avoided in patients with chronic kidney disease (CKD).
4. A stable increase of serum creatinine as much as 35% above baseline after ACEI or ARB initiation may be tolerated, as long as hyperkalemia does not occur. ACEI or ARB should be discontinued, or other potentially reversible causes of kidney failure investigated if progressive and rapid rise of serum creatinine continues. Since CKD is associated with progressive rise in creatinine over years, ACEI or ARB should not be discontinued for this situation, since these medications are renoprotective.
 5. When treating HTN in patients with non-diabetic kidney disease, use of combined therapy with ACEI and ARB may offer more renoprotection than with either class of medication alone.
 6. Avoid potential nephrotoxic medications such as non-steroidal anti-inflammatory drugs (NSAIDs), COX-2 inhibitor, aminoglycosides, intravenous (IV) contrast, and excessive diuretic use.
 7. Monitor kidney function over time by estimating GFR or Clcr. Consider consulting with a nephrologist if a non-diabetic patient has nephrotic range proteinuria, or kidney function is $< 30 \text{ cc/min/1.73m}^2$.

	Recommendations	Sources	QE	Overall Quality	R
1	ACEI for treating HTN in African Americans patients	Wright et al., 2002	I	Good	A
2	ACEI more effective in patients with HTN and kidney disease	The GISEN Group, 1997 Jafar et al., 2001	I	Good	A
3	ACEI and ARB may offer more renoprotection than with either class of medication alone in patient with nondiabetic kidney disease	Nakao et al., 2003	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

Chronic Heart Failure (HF)

Objective

To provide recommendations on pharmacologic therapy for patients with HTN and concomitant chronic heart failure (HF) due to systolic dysfunction

The recommendations in this annotation refer to patients with Stage C heart failure (HF) (e.g., patients with past or current HF symptoms and evidence of structural heart damage).

Many of the classes of medications used to treat patients with hypertension have also been shown to provide benefit in patients with chronic HF. If the patient continues to have an elevated blood pressure despite optimal treatment for HF based on the following recommendations, additional antihypertensive medications should be initiated (except for NCCBs or nifedipine) to achieve blood pressure goal.

Recommendations

1. A diuretic should be used in the treatment of patients with signs of fluid overload.
2. All patients should be treated with an ACEI unless contraindicated or not tolerated. These agents improve HF symptoms, functional status, and quality of life, while decreasing frequency of hospitalization and mortality.
3. A beta-adrenergic blocker should be used in conjunction with an ACEI in all patients who are considered stable (i.e., minimal or no signs of fluid overload or volume depletion and not in an intensive care unit), unless contraindicated or not tolerated. These agents have been shown to reduce mortality and decrease the symptoms of HF.
4. An ARB should be considered as an alternative to an ACEI in patients who are on a diuretic, beta-adrenergic blocker, and usually digoxin and are unable to tolerate an ACEI due to cough or possibly, angioedema.
5. The combination of hydralazine and isosorbide dinitrate (HYD/ISDN) may be considered as an alternative to an ACEI in patients who are on a diuretic, beta-adrenergic blocker, and usually digoxin and are unable to tolerate an ACEI due to hypotension, renal insufficiency, or possibly, angioedema.
6. Digoxin (although not effective for the treatment of HTN) should be used in patients whose symptoms persist despite treatment with an ACEI, a beta-adrenergic blocker, and a diuretic. Digoxin reduces symptoms associated with HF and decreases the risk for hospitalizations due to HF but does not improve mortality.
7. Low dose spironolactone (an aldosterone antagonist) should be considered in patients with recent New York Heart Association (NYHA) Class IV HF and current Class III or IV symptoms and left ventricular ejection fraction (LVEF) <35%, provided the patient has preserved renal function and normal potassium levels. This therapy improves symptoms (as assessed by change in New York Heart Association (NYHA) functional class), decreases hospitalizations for worsening HF, and decreases mortality.

	Recommendations	Sources	QE	Overall Quality	R
1	Diuretic in patients with signs of fluid overload	Hunt et al., 2001	III	Fair	B
2	ACEI for all patients unless contraindicated/not tolerated	"Comparative effects of therapy," 1988 SOLVD Investigators, 1991 Cohn et al., 1991	I I I	Good	A

	Recommendations	Sources	QE	Overall Quality	R
		CONSENSUS Trial Study Group, 1987 Garg & Yusef, 1995 Hunt et al., 2001	II-2 III		
3	Beta-adrenergic blocker in conjunction with an ACEI in all stable patients unless contraindicated/not tolerated	"Effect of metoprolol," 1999 The Cardiac Insufficiency Bisoprolol Study II (CIBIS-II), 1999 Leizorovicz et al., 2002 Shibata, Flather, & Wang, 2001 Hunt et al., 2001	I I II-2 II-2 III	Good	A
4	ARB should be alternative to an ACEI in patients on a diuretic, beta-adrenergic blocker, and usually digoxin and are unable to tolerate an ACEI	Cohn & Tagnoni, 2001 Granger et al., 2003 McMurray et al., 2003 Pfeffer et al., 2003 Hunt et al., 2001	I I I I III	Good	A
5	HYD/ISDN as alternative to an ACEI in patients on a diuretic, beta-adrenergic blocker, and usually digoxin and are unable to tolerate an ACEI	Cohn et al., 1986 Cohn et al., 1991	I I	Fair	B
6	Digoxin in patients with symptoms despite an ACEI, beta-adrenergic blocker, and diuretic	Digitalis Investigation Group, 1997 "Comparative effects of therapy," 1988 Jaeschke, Oxman, & Guyatt, 1990	I I II-2	Good	A
7	Aldosterone antagonist in patients with severe HF unless contraindicated/not tolerated	Pitt et al., 1999	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

C4 Stroke Prevention

Recommendations

1. When an ACEI is used as principal therapy after stroke, a thiazide (or similar) diuretic should be used to assure maximal effect. **(A)**
2. Diuretics remain a principal agent for risk reduction after stroke or transient ischemic attack (TIA) based on data on primary prevention studies and extrapolation from the PROGRESS trial on secondary prevention. **(Primary prevention of stroke A; Secondary prevention B)**
3. Alternatives (in alphabetical order) include ACEI/ARB, beta-blockers, dihydropyridine (long-acting) or diltiazem calcium channel blockers. **(Primary prevention I, A Secondary prevention B)**
4. In post-stroke patients with pre-hypertension, the addition of an ACEI may be considered but should be with a diuretic, as noted above **(level of evidence for secondary prevention A)**. An ACEI may provide additional benefit to existing antihypertensive therapies or for patients who are not hypertensive for primary stroke protection **(Primary prevention A)**.

	Recommendations	Sources	QE	Overall Quality	R
1	In post-stroke patient using ACEI as principal therapy, a thiazide (or similar) diuretic should be used to assure maximal effect	"Randomised trial," 2001	I	Good	A
2	Diuretics as a principal agent for risk reduction after stroke or TIA <ul style="list-style-type: none"> • Primary prevention • Secondary prevention 	"Major outcomes," 2002 Turnbull, 2003 Psaty, Lumley, & Furberg, 2003 Collins & MacMahon, 1994 "Randomised trial," 2001 PATS Collaborating Group, 1995	I III	Good Poor	A C
3	Alternatives to diuretics (in alphabetical order) ACEI/ARB, beta-blockers, dihydropyridine (long-acting) or diltiazem calcium channel blockers <ul style="list-style-type: none"> • Secondary prevention 	Yusuf et al., 2000 Staessen et al., 1997 Dahlof et al., 2002 Psaty, Lumley, & Furberg, 2003 "Major outcomes," 2002 Hansson et al., "Randomised," 1999 Hansson et al., "Effect," 1999 "Randomised trial," 2001	III	Poor	C

	Recommendations	Sources	QE	Overall Quality	R
4	ACEI may provide additional benefit to existing antihypertensive therapies or for primary stroke prevention In post-stroke patients with pre-hypertension, the addition of an ACEI for secondary prevention may be considered but should be with a diuretic	Yusuf et al., 2000 "Randomised trial," 2001	I I	Good Good	A A

QE = Quality of Evidence; R = Recommendation (see Appendix E in the original guideline document)

C5 High Ambient Temperature and/or Extreme Conditions

These recommendations are based on consensus opinion that considers the available literature, experience in the field, and physiology.

1. Patients who are likely to be deployed should preferably be started on ACEI/ARB or CCB. Diuretics, if needed, should be used in low doses. This stipulation also applies to those who do extreme physical activity and are prone to dehydration. Patients should be stable on their medications prior to deployment. Clinicians should discuss how deployment might effect blood pressure control and describe potential complications of treatment with their patients as part of pre-deployment processing. If possible, the patient should be monitored for signs and symptoms of dehydration and adequate blood pressure control for the first 7 to 10 days of deployment while they are becoming acclimatized.
2. For patients who are diagnosed with and/or started on treatment for hypertension during a deployment, dihydropyridine CCBs are the preferred agents in the desert environment since they are available in once a day formulations, do not limit heart rate, and do not require electrolytes to be checked after initiation.

Definitions:

Strength of Evidence

I: Evidence obtained from at least one properly done randomized controlled trial

II-1: Evidence obtained from well designed controlled trails without randomization

II-2: Evidence obtained from well designed cohort or case-control analytic study

II-3: Evidence obtained from multiple time series; dramatic results of uncontrolled experiments

III: Opinion of respected authorities, case reports, and expert committees

Overall Quality

Good: High grade evidence (I or II-1) directly linked to health outcome

Fair: High grade evidence (I or II-1) linked to intermediate outcome; *or* grade evidence (II-2 or II-3) directly linked to health outcome

Poor: Level III evidence or no linkage of evidence to health outcome

Net Effect of Intervention

Substantial:

- More than a small relative impact on a frequent condition with a substantial burden of suffering, *or*
- A large impact on an infrequent condition with a significant impact on the individual patient level

Moderate:

- A small relative impact on a frequent condition with a substantial burden of suffering, *or*
- A moderate impact on an infrequent condition with a significant impact on the individual patient level

Small:

- A negligible relative impact on a frequent condition with a substantial burden of suffering, *or*
- A small impact on an infrequent condition with a significant impact on the individual patient level

Zero or Negative:

- Negative impact on patients, *or*
- No relative impact on either a frequent condition with a substantial burden of suffering, *or*
- An infrequent condition with a significant impact on the individual patient level

Recommendation Grade

	Net Benefit of the Intervention			
Overall Quality of Evidence	Substantial	Moderate	Small	Zero or Negative
Good	A	B	C	D

Overall Quality of Evidence	Net Benefit of the Intervention			
	Substantial	Moderate	Small	Zero or Negative
Fair	B	B	C	D
Poor	I	I	I	I

CLINICAL ALGORITHM(S)

The following clinical algorithms are provided in the original guideline document:

- [Screening for Elevated Blood Pressure](#)
- [Management of Elevated Blood Pressure](#)

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The annotations that accompany the algorithms in the guideline document include a reference, when required, and evidence grading for each of the recommendations (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Consistent high level quality of care for patients with hypertension
- The guideline can assist primary care providers or specialists in the early detection of symptoms, assessment of the clinical situation, determination of appropriate treatment, and delivery of individualized interventions.
- It is known that lowering blood pressure decreases deaths from stroke and coronary events, prevents progression to more severe hypertension, and reduces mortality

POTENTIAL HARMS

Adverse effects of pharmacologic therapy (see Appendix B of original guideline document)

CONTRAINDICATIONS

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- Beta- blockers are contraindicated in patients with asthma.
- Thiazides are contraindicated in patients with gout.
- Intravenous pyelogram is relatively contraindicated in diabetes.

- Eprosartan is contraindicated in 2nd and 3rd trimesters of pregnancy.
- Angiotensin-converting enzyme inhibitors (ACEIs) contraindicated in patients with angioedema and should be avoided in second and third trimesters of pregnancy.
- Verapamil is contraindicated in patients with atrioventricular node dysfunction (2nd or 3rd degree heart block) and/or left ventricular (systolic) dysfunction when ejection fraction is <45%.

QUALIFYING STATEMENTS

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- Clinical practice guidelines, which are increasingly being used in health care, are seen by many as a potential solution to inefficiency and inappropriate variations in care. Guidelines should be evidenced-based as well as based upon explicit criteria to ensure consensus regarding their internal validity. However, it must be remembered that the use of guidelines must always be in the context of a health care provider's clinical judgment in the care of a particular patient. For that reason, the guidelines may be viewed as an educational tool analogous to textbooks and journals, but in a more user-friendly tone.
- Although this guideline represents the best evidence-based practice on the date of its publication, it is certain that medical practice is evolving and that this evolution will require continuous updating of published information. In addition, the reader is reminded that this document is intended as a guideline and should not supersede the clinical judgment of the health care provider.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Explicit indicators to measure implementation system wide are a part of the Veterans Health Administration's performance measurement system and are described in the Technical Manual available from the [Department of Veterans Affairs \(VA\) Web site](#).

IMPLEMENTATION TOOLS

Clinical Algorithm
 Pocket Guide/Reference Cards
 Quality Measures
 Resources

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Veterans Administration, Department of Defense. VA/DoD clinical practice guideline for diagnosis and management of hypertension in the primary care setting. Washington (DC): Veterans Administration, Department of Defense; 2004 Aug. 99 p.

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999 May (revised 2004)

GUIDELINE DEVELOPER(S)

Department of Defense - Federal Government Agency [U.S.]
Department of Veterans Affairs - Federal Government Agency [U.S.]
Veterans Health Administration - Federal Government Agency [U.S.]

SOURCE(S) OF FUNDING

United States Government

GUIDELINE COMMITTEE

The Hypertension Working Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

The list of contributors to this guideline includes internists, specialists, primary care providers, program specialists, administrators, external peer review physicians, and expert consultants in the field of guideline and algorithm development.

Guideline Update Working Group

Veterans Affairs Working Group Members: Peter Glassman, MBBS, MSc. (*Co-chairman*); Paul R Conlin, MD; William Cushman, MD; Elaine Furmaga, PharmD; Leonard Pogach, MD; Thakor G. Patel, MD

Department of Defense Working Group Members: Douglas, Kevin, MAJ, MD (*Co-chairman*); Robert Manaker, LtCol, MC, USAF; Angela Allerman, PharmD, BCPS; Vincent P. Fonseca, LtColMD, MPH; Doreen Lounsbery, COL, MD, MHA; Paul G. Welch, LTC, MC, USA; Bell Michael R MAJ USACHPPM; Angela Klar, RN, MSN, ANP, CS

Facilitator: Oded Susskind, MPH

Coordinator: Joanne Marko, MS, CCC-SLP

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Diagnosis and management of hypertension in the primary care setting. Washington (DC): Department of Veterans Affairs (U.S.); 1999 May. Various p.

GUIDELINE AVAILABILITY

Electronic copies: Available from the [Department of Veterans Affairs Web site](#).

Print copies: Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Performance (10Q) 810 Vermont Ave. NW, Washington, DC 20420.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Diagnosis and management of hypertension pocket guide - update 2004. Washington (DC): Department of Veterans Affairs (U.S.); 2004
- Diagnosis and management of hypertension guideline summary - update 2004. Washington (DC): Department of Veterans Affairs (U.S.); 2004
- Diagnosis and management of hypertension key points card - update 2004. Washington (DC): Department of Veterans Affairs (U.S.); 2004. 2 p.
- Diagnosis and management of hypertension clinical reminders - update 2004. Washington (DC): Department of Veterans Affairs (U.S.); 2004

Electronic copies: Available from the [Department of Veterans Affairs \(VA\) Web site](#).

Print copies: Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Performance (10Q) 810 Vermont Ave. NW, Washington, DC 20420.

The following is also available:

- Putting clinical practice guidelines to work [online tutorial]. Available from the [Department of Veterans Affairs Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 1, 2001. The information was verified by the guideline developer as of November 1, 2001. This NGC summary was updated by ECRI on May 27, 2005.

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