



Complete Summary

GUIDELINE TITLE

Hypertension diagnosis and treatment.

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2004 Feb. 47 p. [106 references]

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Hypertension

GUIDELINE CATEGORY

Diagnosis
Evaluation
Risk Assessment
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Geriatrics
Internal Medicine
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Health Plans
Hospitals
Managed Care Organizations
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To increase the percentage of patients in blood pressure control
- To improve the assessment of patients with hypertension
- To increase the percentage of patients not at blood pressure goal who have a change in subsequent therapy
- To increase the percentage of patients with hypertension who receive patient education, especially in the use of non-pharmacological treatments

TARGET POPULATION

Adults age 18 or older

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Evaluation

1. History and physical examination, including 2 or more blood pressure measurements separated by 2 minutes in accordance with recommended techniques
2. Laboratory screen, including 12-lead electrocardiogram (ECG), urinalysis, blood glucose, hematocrit, serum sodium, potassium, creatinine (or blood urea nitrogen), calcium, and lipid profile (total cholesterol, high-density lipoprotein [HDL] and triglycerides)

Risk Assessment/Treatment/Follow-Up

1. Risk assessment and treatment based on blood pressure level, presence or absence of target organ damage, and other risk factors, such as smoking, dyslipidemia, diabetes, and others
2. Evaluation for secondary hypertension
3. Lifestyle modifications, including weight reduction and maintenance, the DASH diet, reduction of dietary sodium, moderation of alcohol intake, physical activity, tobacco avoidance, relaxation and stress management
4. Drug therapy, including thiazide diuretics, beta-blockers, angiotensin-converting enzyme inhibitors, calcium channel blockers, angiotensin receptor blockers, and combinations of these drugs
5. Patient education
6. Referral for consultation for resistant hypertension

7. Follow-up and continuing care

MAJOR OUTCOMES CONSIDERED

- Risk of non-fatal and fatal cardiovascular disease in individuals with hypertension
- Morbidity and mortality from cardiovascular disease in individuals with hypertension
- Adequate control of blood pressure (<140 mm Hg systolic and <90 mm Hg diastolic)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

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

Key conclusions (as determined by the work group) are supported by a conclusion grading worksheet that summarizes the important studies pertaining to the conclusion. Individual studies are classed according to the system presented below, and are designated as positive, negative, or neutral to reflect the study quality.

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or

because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results of different studies or because of serious doubts about generalizability, bias, design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

Study Quality Designations:

The quality of the primary research reports and systematic reviews are designated in the following ways on the conclusion grading worksheets:

Positive: indicates that the report or review has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis.

Negative: indicates that these issues (inclusion/exclusion, bias, generalizability, and data collection and analysis) have not been adequately addressed.

Neutral: indicates that the report or review is neither exceptionally strong nor exceptionally weak.

Not Applicable: indicates that the report is not a primary reference or a systematic review and therefore the quality has not been assessed.

Classes of Research Reports:

A. Primary Reports of New Data Collection:

Class A:

- Randomized, controlled trial

Class B:

- Cohort study

Class C:

- Non-randomized trial with concurrent or historical controls
- Case-control study
- Study of sensitivity and specificity of a diagnostic test
- Population-based descriptive study

Class D:

- Cross-sectional study
- Case series
- Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

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

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

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

METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Institute Partners: System-Wide Review

The guideline draft, discussion, and measurement specification documents undergo thorough review. Written comments are solicited from clinical, measurement, and management experts from within the member medical groups during an eight-week period of "Critical Review."

Each of the Institute's participating medical groups determines its own process for distributing the guideline and obtaining feedback. Clinicians are asked to suggest modifications based on their understanding of the clinical literature coupled with their clinical expertise. Representatives from all departments involved in implementation and measurement review the guideline to determine its operational impact. Measurement specifications for selected measures are developed by the Institute for Clinical Systems Improvement (ICSI) in collaboration with participating medical groups following general implementation of the guideline. The specifications suggest approaches to operationalizing the measure.

Guideline Work Group: Second Draft

Following the completion of the "Critical Review" period, the guideline work group meets 1-2 times to review the input received. The original guideline is revised as necessary and a written response is prepared to address each of the suggestions received from medical groups. Two members of the Cardiovascular Steering Committee carefully review the Critical Review input, the work group responses, and the revised draft of the guideline. They report to the entire committee their assessment of two questions: (1) Have the concerns of the medical groups been adequately addressed? (2) Are the medical groups willing and able to implement the guideline? The committee then either approves the guideline for pilot testing as submitted or negotiates changes with the work group representative present at the meeting.

Pilot Test

Medical groups introduce the guideline at pilot sites, providing training to the clinical staff and incorporating it into the organization's scheduling, computer, and other practice systems. Evaluation and assessment occur throughout the pilot test phase, which usually lasts for three months. Comments and suggestions are solicited in the same manner as used during the "Critical Review" phase.

The guideline work group meets to review the pilot sites' experiences and makes the necessary revisions to the guideline, and the Cardiovascular Steering Committee reviews the revised guideline and approves it for implementation.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations for the diagnosis and treatment of hypertension are presented in the form of an algorithm with 12 components, accompanied by detailed annotations. An algorithm is provided for [Hypertension Diagnosis and Treatment](#). Clinical highlights and selected annotations (numbered to correspond with the algorithm) follow.

Class of evidence (A-D, M, R, X) ratings and key conclusion grades (I-III, Not Assignable) are defined at the end of the "Major Recommendations" field.

Clinical Highlights and Recommendations

1. Confirmation of hypertension is based on the initial visit, plus two follow-up visits with at least two blood pressure measures at each visit. (Annotation #2)
2. Standardized blood pressure measurement techniques should be employed when confirming an initially elevated blood pressure (BP) and for all subsequent measures during follow-up and treatment for hypertension. (Annotation #2, Annotation Appendix B - see original guideline document)
3. A thiazide-type diuretic should be considered as initial therapy in most patients with uncomplicated hypertension. (Annotation #6)
4. Physician reluctance to intensify treatment is a major obstacle to achieving treatment goals. (Annotation #6)
5. Systolic blood pressure level should be the major factor for the detection, evaluation and treatment of hypertension, especially in adults 50 years and older. (Annotation #7)

Hypertension Diagnosis and Treatment Algorithm Annotations

2. Confirm Elevated Blood Pressure

If an elevated blood pressure reading has been obtained (as the result of routine blood pressure screening - (see the National Guideline Clearinghouse [NGC] summary of the Institute for Clinical Systems Improvement [ICSI] guideline [Preventive Services for Adults](#)), the blood pressure level should be confirmed. Confirmation is based on the initial visit plus two follow-up visits with at least 2 blood pressure readings at each visit. Explain the rationale, and emphasize the reason for return and the need for confirmation of elevated blood pressure. Unconfirmed hypertension should be coded as indicated in the original guideline document. Confirmation and follow-up recommendations are noted in the Joint National Committee 7 (JNC 7) Tables 1 and 2 in the original guideline document.

Standardized blood pressure technique should be employed when confirming an elevated reading and for all subsequent readings during follow-up and treatment for hypertension. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Confirmed elevated blood pressure should be classified as to the appropriate hypertension stage. See Joint National Committee 7 Tables 1 and 2 in the original guideline document.

Ambulatory blood pressure monitoring (ABPM) provides information about BP during daily activities and sleep. It is particularly helpful in the assessment of white coat or office effect, i.e. patients with elevated office BP who lack evidence of hypertensive target organ damage, and who have normal out-of-office BP readings. This phenomenon may be present in 20 to 35% of patients diagnosed with hypertension. In general, however, this diagnosis can be reliably established without ABPM in patients with elevated office readings who lack target organ damage, and have accurately measured out-of-office BP readings that are consistently less than 130/80 mm Hg. Other clinical situations in which ABPM may be helpful include the assessment of drug resistance, hypotensive symptoms, episodic hypertension, and suspected autonomic dysfunction. ABPM also appears to predict subsequent cardiovascular events more reliably than office blood pressure measurements.

The JNC 7 report reflects the creation of a new classification, termed as "prehypertension" which is intended to identify individuals in whom early intervention of healthy lifestyle changes could reduce BP, decrease the rate of the progression of BP to hypertensive levels with age, or prevent hypertension entirely.

JNC 7 has also combined stage 2 and stage 3 hypertension into a single stage 2 category. This change was made primarily because the management of the two former groups is similar.

Evidence supporting this recommendation is of classes: A, B, C, D, R

3. Complete Initial Assessment: Evaluate, Accurately Stage, and Complete Risk Assessment

The evaluation should determine if the patient has primary or secondary hypertension, target organ disease, or other cardiovascular risk factors. (Risk assessment)

A. Medical History

The history should focus on modifiable lifestyle factors including weight change, dietary intake of sodium and cholesterol, level of exercise, psychosocial stressors, and patterns of alcohol and tobacco use.

Determine all medications being used--including herbal supplements, over-the-counter, prescription, and illicit drugs--as many agents may temporarily elevate blood pressure and/or adversely affect blood pressure control.

A family history of hypertension, cardiovascular disease, cerebrovascular disease, diabetes mellitus, and dyslipidemia should be documented.

Assess for symptoms and signs of target organ disease and secondary hypertension via a directed history and exam.

B. Physical Examination

The initial physical examination should include the following:

- 2 or more blood pressure measurements separated by 2 minutes with the patient seated and after standing for at least 2 minutes in accordance with the recommended techniques as stated in Annotation Appendix B, "Standards for Blood Pressure Measurement" in the original guideline document
- verification in the contralateral arm (if values are different, the higher value should be used)
- measurement of height, weight, and waist circumference
- funduscopic examination for hypertensive retinopathy (i.e., arteriolar narrowing, focal arteriolar constrictions, arteriovenous crossing changes, hemorrhages and exudates, disc edema)
- examination of the neck for carotid bruits, distended veins, or an enlarged thyroid gland
- examination of the heart for abnormalities in rate and rhythm, increased size, precordial heave, clicks, murmurs, and third and fourth heart sounds
- examination of the lungs for rales and evidence for bronchospasm
- examination of the abdomen for bruits, enlarged kidneys, masses, and abnormal aortic pulsation
- examination of the extremities for diminished or absent peripheral arterial pulsations, bruits, and edema
- neurological assessment

C. Initial Laboratory Studies

Initial lab screen should include 12-lead electrocardiogram (ECG), urinalysis, blood glucose, hematocrit, serum sodium, potassium, creatinine (or blood urea nitrogen [BUN]), calcium, and lipid profile (total cholesterol, high density lipoprotein [HDL]-cholesterol, and triglycerides). Additional laboratory and diagnostic studies may be required in individuals with suspected secondary hypertension and/or evidence of target-organ disease.

Some of these tests are needed for determining presence of target organ disease and possible causes of hypertension. Others relate to cardiovascular risk factors or provide baseline values for judging biochemical effects of therapy.

Additional tests may be ordered at the discretion of the provider based on clinical findings. These may include but are not limited to complete blood count (CBC), chest x-ray, uric acid, and urine microalbumin.

See Annotation Appendix A, "Clinical Evaluation of Confirmed Hypertension" in the original guideline document.

D. Accurately Stage

This treatment guideline is designed to be used in new or previously diagnosed hypertensive patients in conjunction with the NGC summary of the ICSI [Preventive Services for Adults](#) guideline. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Hypertension Stages	Systolic		Diastolic
Prehypertension	120-139	or	80-89
Stage 1 hypertension	140-159	or	90-99
Stage 2 hypertension	≥160	or	≥100

When systolic and diastolic pressures fall into different categories, the higher category should be selected in classifying the individual's blood pressure status.

E. Risk Assessment

The risk for cardiovascular disease in patients with hypertension is determined not only by the level of blood pressure but also by the presence or absence of target organ damage or other risk factors such as smoking, dyslipidemia, and diabetes, as shown excerpted from the Joint National Committee 7 (JNC 7). These factors independently modify the risk for subsequent cardiovascular disease, and their presence or absence is determined during the routine evaluation of patients with hypertension (i.e., history, physical examination, laboratory tests).

JNC 7 Cardiovascular Risk Factors

Major Risk Factors

- Hypertension
- Age (older than 55 for men, 65 for women)*
- Diabetes mellitus**
- Elevated low-density lipoprotein [LDL] (or total) cholesterol or low high-density lipoprotein (HDL) cholesterol**
- Estimated glomerular filtration rate (GFR) less than 60 mL/min
- Family history of premature cardiovascular disease (women aged <65 years or men aged <55 years)
- Microalbuminuria
- Obesity** (body mass index equal to or greater than 30 kg/m²)
- Physical inactivity
- Tobacco usage, particularly cigarettes

Target Organ Damage

- Heart
 - Left ventricular hypertrophy
 - Angina/prior myocardial infarction
 - Prior coronary revascularization
 - Heart failure
- Brain
 - Stroke or transient ischemic attack
 - Dementia

Chronic kidney disease
 Peripheral arterial disease
 Retinopathy

* Increased risk begins at approximately 55 and 65 for men and women, respectively. Adult Treatment Panel III used earlier age cutpoints to suggest the need for earlier action.

** Components of the metabolic syndrome. Reduced HDL and elevated triglycerides are components of the metabolic syndrome. Abdominal obesity is also a component of metabolic syndrome.

A point scale approach for estimating 10 year coronary heart disease risk can also be used. Refer to Annotation Appendix D, "10 year CVD Risk Calculator" in the original guideline document.

Evidence supporting this recommendation is of classes: B, R

4. Is Secondary Cause Suspected?

The term "secondary hypertension" implies that a patient's blood pressure elevation is the result of an underlying discoverable disease process. Secondary causes account for only a small percentage of all documented cases of hypertension, but their detection is important as appropriate intervention may be curative and lead to reversal of hypertension.

Evaluate for features suggestive of secondary hypertension. Suspect a diagnosis of secondary hypertension in patients with an abrupt onset of symptomatic hypertension, with Stage 2 hypertension, hypertensive crisis, sudden loss of blood pressure control after many years of stability on drug therapy, drug resistant hypertension, and in those individuals with no family history of hypertension. Differential diagnosis of secondary hypertension includes:

- Aortic coarctation
- Cushing's syndrome
- Drugs (oral contraceptives, nonsteroidal anti-inflammatory drugs)
- Obesity
- Obstructive sleep apnea
- Pheochromocytoma
- Primary aldosteronism
- Renal parenchymal disease

- Renal artery stenosis

See Annotation Appendix C, "Suspicion of Secondary Hypertension," in the original guideline document.

Note recommendations for additional diagnostic procedures. Be sure advanced testing is correctly chosen and done properly to avert the need for repeat studies. This may require discussion with or referral to a specialist.

5. Order Additional Work-Up/Consider Referral

Consider appropriate referral or additional workup if secondary hypertension is identified, or suspected.

Evidence supporting this recommendation is of class: R

6. Lifestyle Modifications +/- Drug Therapy

Clinical studies show that the blood pressure lowering effects of lifestyle modifications can be equivalent to drug monotherapy. Lifestyle modification is best initiated and sustained through an educational partnership between the patient and a multidisciplinary health care team. While team members may vary by clinical setting, behavior change strategies should include nutrition, exercise, and smoking cessation services. Lifestyle modifications should be reviewed and re-emphasized at least annually.

Some patient education should occur and be documented at every visit. For recommended education messages, see Annotation Appendix E, "Recommended Education Messages," in the original guideline document.

Table 3. Lifestyle Modifications to Prevent and Manage Hypertension*

Modification	Recommendation	Approximate Systolic Blood Pressure (SBP) Reduction (Range)**
Weight reduction	Maintain normal body weight (body mass index 18.5 - 24.9 kg/m ²)	5 - 20 mm Hg/10 kg
Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat.	8 - 14 mm Hg

Modification	Recommendation	Approximate Systolic Blood Pressure (SBP) Reduction (Range)**
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2 - 8 mm Hg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 minutes per day, most days of the week)	4 - 9 mm Hg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (eg, 24 oz. beer, 10 oz. wine, or 3 oz. 80 proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter-weight persons.	2 - 4 mm Hg

*For overall cardiovascular risk reduction, stop smoking

**The effects of implementing these modifications are dose- and time-dependent and could be greater for some individuals.

Other Lifestyle Modifications +/- Drug Therapy to Consider

Supporting evidence is of classes: A, D, M, R

Tobacco Avoidance

Recent data using ambulatory blood pressure monitoring suggests that nicotine may indeed increase blood pressure and could account for some degree of blood pressure lability. In addition, it is a major risk factor for atherosclerotic cardiovascular disease. At each visit, establish tobacco use status and follow the NGC summary of the ICSI [Tobacco Use Prevention and Cessation for Adults and Mature Adolescents](#) guideline.

Evidence supporting this recommendation is of classes: C, M, R

Relaxation and Stress Management

Although studies have not demonstrated a significant long-term effect of relaxation methods on blood pressure reduction, relaxation therapy may enhance an individual's quality of life

and may have independent effects on lowering coronary heart disease risk.

Drug Therapy

A thiazide-type diuretic should be considered as initial therapy in most patients. Diuretics have been shown to be as good as or superior to other classes of drug therapy in preventing cardiovascular disease (CVD) morbidity and mortality and are inexpensive. Thiazide-type diuretics are especially useful for patients age 55 years or older with hypertension and additional risk factors for cardiovascular disease and for patients age 60 years or older with isolated systolic hypertension. In patients for whom diuretics are contraindicated or poorly tolerated, use of a beta-blocker, angiotensin-converting enzyme inhibitor, angiotensin receptor blocker, or calcium antagonist is appropriate. Long-acting dihydropyridine calcium antagonists have been shown to be effective for patients age 60 years or older with isolated systolic hypertension. Co-existing medical conditions may also justify the use of one of these classes of drugs. An example is the use of an angiotensin-converting enzyme inhibitor in a patient with congestive heart failure or diabetic nephropathy. Please see the NGC summary of the ICSI guideline [Management of Type II Diabetes Mellitus](#) for further information. Other classes of drugs should be reserved for special situations or as additive therapy (see Annotation Appendix F, "Therapies" in the original guideline document.)

Many patients will require more than one drug for blood pressure control. Combination therapies that include a diuretic are often effective, lessen the risk for side-effects (by use of low doses of each component drug), and enhance adherence by simplification of the treatment program.

Other considerations when selecting initial drug therapy include age, race, cost, drug interactions, side-effects, and quality of life issues. In general diuretics and calcium channel blocks appear to be more effective as an initial treatment of hypertension in African Americans.

The lowest recommended dose of the chosen drug should be used initially. If tolerated, the dose can be increased or additional medications added to achieve goal blood pressure.

Evidence supporting this recommendation is of classes: A, B, C, D, M, R

7. Blood Pressure (BP) at Goal?

Goal office blood pressures should be <140 mm Hg systolic and <90 mm Hg diastolic for all adults. Goal blood pressures measured out of the office setting should be <135 mm Hg systolic and <85 mm Hg diastolic.

For patients with a history of heart failure, goal office blood pressures are <130 mm Hg systolic and <85 mm Hg diastolic.

For patients with renal dysfunction and 24-hour urine protein excretion of ≥ 1 gram, goal office blood pressures are <130 mm Hg systolic and <80 mm Hg diastolic.

For patients with diabetes mellitus, goal office blood pressures are <130 mm Hg systolic and <80 mm Hg diastolic.

For patients 60 years or older with isolated systolic hypertension who have markedly increased systolic blood pressure levels prior to treatment, it may not be possible to lower systolic blood pressure to <140 mm Hg. An interim goal of 160 mm Hg or what can be achieved by optimal doses of 3 antihypertensive drugs would be reasonable. In addition, as systolic blood pressure is lowered, caution is advised to avoid lowering diastolic blood pressure to <65 mm Hg.

Systolic hypertension in patients age 60 and older is an important modifiable cardiovascular risk factor. [Conclusion Grade I: See Conclusion Grading Worksheet - Appendix A -Annotation #7 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for stage I (systolic blood pressure [SBP] 140-159 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade III: See Discussion Appendix A, Conclusion Grading Worksheet – Annotation #10 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for Stage 1 (SBP 140-159 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade III: See Conclusion Grading Worksheet – Appendix A - Annotation #7 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for Stage 2 (SBP ≥ 160 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade I: See Conclusion Grading Worksheet – Appendix A – Annotation #7 (Isolated Systolic Hypertension)]

Evidence supporting this recommendation is of classes: A, B, M, R

8. Change Treatment

Once a hypertensive drug therapy is initiated, most patients should return for follow-up and medication adjustments at least at monthly intervals until BP goal is reached.

If blood pressure goals are not met, the clinician has three options for subsequent therapy:

- Increase the dose of the initial drug toward maximal levels.
- Substitute an agent from another class.
- Add a second drug from another class.

Individualized drug selection is based on several principles:

- If the initial response to one drug is adequate, continue the same drug.
- If it is partial on one agent, increase the dose or add a second drug of a different class.
- If there is little response, substitute another single drug from a different class.
- Consider low dose diuretic use early or as a first addition.
- Consider loop diuretic agents instead of thiazide or thiazide-like diuretics when creatinine >2.0 mg/dL.
- Do not combine two drugs of the same class.
- The use of combination agents can be effective.

Evidence supporting this recommendation is of classes: A, R

9. BP at Goal?

If at this point acceptable response has not been achieved, several issues should be addressed or revisited. These include adherence to appropriate lifestyle modifications, consistent use of prescribed drugs, and tolerance of treatment modalities. Non-adherence rates to prescribed medications are estimated at 50%, and are slightly higher for elderly and adolescent patients. Since there is not a simple test to accurately measure adherence, there are some practical methods that can be used for all patients: asking the patient about missed doses, watching treatment response, and tracking missed appointments. Although patients will generally overestimate their adherence, simply asking the question will help identify up to 50% of low-adherence patients. Standardized instruction in self-blood pressure measurement will allow assessment of "white coat" syndrome (see the NGC summary of the ICSI [Preventive Services for Adults](#) guideline). Interfering substances which can adversely affect treatment include: non-steroidal anti-inflammatory drugs, oral contraceptives, sympathomimetics, antidepressants, glucocorticoids, nasal decongestants, licorice-containing substances (e.g., chewing tobacco), cocaine, cyclosporine, and erythropoietin. Intermittent use of alcohol, particularly in alcoholics who are binge drinkers, may cause difficulties with widely fluctuating blood pressures.

Non-specific symptoms such as fatigue, lightheadedness, or vaguely impaired cognition may be due to an acute decline in blood pressure level and may resolve within four to six weeks while continuing the drug. Other minor drug-related symptoms unrelated to blood pressure change may also resolve in time without discontinuing the drug. Non-office standardized blood pressure measurement is desirable to monitor blood pressure control.

Evidence supporting this recommendation is of classes M, R

10. Resistant Hypertension?

A patient has resistant hypertension when blood pressure goals are not met despite compliance with a triple drug regimen that includes a diuretic.

The drug regimen should include a diuretic plus near maximal doses of two of the following classes of drugs:

- Beta-adrenergic-blocker or other anti-adrenergic agent
- Direct vasodilator
- Calcium channel-blocker
- Angiotensin-converting enzyme inhibitor
- Angiotensin receptor blocker

Several causes of resistant hypertension may be present:

- Improper BP measurement (over inflation of the cuff or using a cuff that is too small for the arm) can lead to inaccurately high readings
- Brachial arteries may be heavily calcified or arteriosclerotic and cannot be fully compressed (pseudohypertension)
- Clinic or white coat hypertension
- Failure to receive adequate doses of medication (may be reluctance by patient or practitioner)
- Inadequate diuretic therapy
- Drug interactions

Evidence supporting this recommendation is of classes: A, D

11. Hypertension Consult

Consider hypertension consultation if a patient's blood pressure is not controlled on two medications or if secondary hypertension is suspected. All patients with blood pressure that is not controlled on three medications should be referred for consultation.

12. Hypertension Continuing Care

Once blood pressure is at goal and stable, the patient should be seen usually at 3 to 6 months intervals by the provider to assess patient adherence, patient satisfaction, and any changes in target organ status. Patients with comorbidities such as heart failure, associated diseases such as diabetes, as well as the need for laboratory tests influence the frequency of visits. Lifestyle modifications should be reviewed, re-emphasized, and documented annually. Patients should monitor blood pressure more frequently by home monitoring or by other allied health professionals.

On follow-up visits, physical examination should be directed toward detection of hypertensive target organ damage including angina and transient ischemic attack, and physical signs of common comorbidities.

One may consider decreasing the dosage or number of anti-hypertensive drugs while maintaining lifestyle modification if:

- Patient has uncomplicated hypertension that is well controlled.
- Blood pressure has been maintained and documented for at least 1 year.

Evidence supporting this recommendation is of class: M, R

Definitions:

Classes of Research Reports:

A. Primary Reports of New Data Collection:

Class A:

- Randomized, controlled trial

Class B:

- Cohort study

Class C:

- Non-randomized trial with concurrent or historical controls
- Case-control study
- Study of sensitivity and specificity of a diagnostic test
- Population-based descriptive study

Class D:

- Cross-sectional study
- Case series
- Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results of different studies or because of serious doubts about generalizability, bias, design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

CLINICAL ALGORITHM(S)

A detailed and annotated clinical algorithm is provided for the [Diagnosis and Treatment of Hypertension](#).

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The guideline contains an annotated bibliography and discussion of the evidence supporting each recommendation. The type of supporting evidence is identified and classified for selected recommendations (see "Major Recommendations").

In addition, key conclusions contained in the Work Group's algorithm are supported by a grading worksheet that summarizes the important studies pertaining to the conclusion. The type and quality of the evidence supporting these key recommendations (i.e., choice among alternative therapeutic approaches) is graded for each study.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Adequate control of hypertension
- Prevention of end-organ damage due to hypertension
- Improved patient education about modifiable risk factors and the use of non-pharmacological treatments

POTENTIAL HARMS

Potential side effects and drug interactions associated with pharmacological management of hypertension are provided in Annotation Attachment F – "Therapies" of the original guideline document.

CONTRAINDICATIONS

CONTRAINDICATIONS

Contraindications to specific types of pharmacological management of hypertension are provided in Annotation Appendix F – "Therapies," in the original guideline document.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These clinical guidelines are designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and are not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. A guideline will rarely establish the only approach to a problem.
- This clinical guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. Patients are urged to consult a health care professional regarding their own situation and any specific medical questions they may have.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Once a guideline is approved for general implementation, a medical group can choose to concentrate on the implementation of that guideline. When four or more groups choose the same guideline to implement and they wish to collaborate with others, they form a guideline action group.

In the action groups, each medical group sets specific goals they plan to achieve in improving patient care based on the particular guideline(s). Each medical group shares its experiences and supporting measurement results within the action group. This sharing facilitates a collaborative learning environment. Action group learnings are also documented and shared with interested medical groups within the collaborative.

Currently action groups may focus on one guideline or a set of guidelines such as hypertension, lipid treatment, and tobacco cessation.

Detailed measurement strategies are presented in the original guideline document to help close the gap between clinical practice and the guideline recommendations. Summaries of the measures are provided in the National Quality Measures Clearinghouse (NQMC).

RELATED NQMC MEASURES

- [Hypertension diagnosis and treatment: percentage of patients who have blood pressure less than 140/90 mm Hg at the clinic visit.](#)
- [Hypertension diagnosis and treatment: percentage of patients presenting in clinic within the last month for whom patient education about modifiable risk factors has been documented in the medical record.](#)

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness

Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2004 Feb. 47 p. [106 references]

ADAPTATION

Parts of this guideline were adapted from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 2003 May. 34 p.

DATE RELEASED

1995 Jun (revised 2004 Feb)

GUIDELINE DEVELOPER(S)

Institute for Clinical Systems Improvement - Private Nonprofit Organization

GUIDELINE DEVELOPER COMMENT

Organizations participating in the Institute for Clinical Systems Improvement (ICSI): Affiliated Community Medical Centers, Allina Medical Clinic, Altru Health System, Aspen Medical Group, Avera Health, CentraCare, Columbia Park Medical Group, Community-University Health Care Center, Dakota Clinic, ENT SpecialtyCare, Fairview Health Services, Family HealthServices Minnesota, Family Practice Medical Center, Gateway Family Health Clinic, Gillette Children's Specialty Healthcare, Grand Itasca Clinic and Hospital, Hamm Clinic, HealthEast Care System, HealthPartners Central Minnesota Clinics, HealthPartners Medical Group and Clinics, Hennepin Faculty Associates, Hutchinson Area Health Care, Hutchinson Medical Center, Lakeview Clinic, Mayo Clinic, Mercy Hospital and Health Care Center, MeritCare, Minnesota Gastroenterology, Montevideo Clinic, North Clinic, North Memorial Health Care, North Suburban Family Physicians, NorthPoint Health & Wellness Center, Northwest Family Physicians, Olmsted Medical Center, Park Nicollet Health Services, Quello Clinic, Ridgeview Medical Center, River Falls Medical Clinic, St. Mary's/Duluth Clinic Health System, St. Paul Heart Clinic, Sioux Valley Hospitals and Health System, Southside Community Health Services, Stillwater Medical Group, SuperiorHealth Medical Group, University of Minnesota Physicians, Winona Clinic, Winona Health

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GUIDELINE COMMITTEE

Cardiovascular Steering Committee

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

In the interest of full disclosure, ICSI has adopted a policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. The reader should not assume that these financial interests will have an adverse impact on the content of the guideline. Readers of the guideline may assume that only work group members listed below have potential conflict of interest to disclose.

No work group members have potential conflicts of interest to disclose.

ICSI's conflict of interest policy and procedures are available for review on ICSI's website at www.icsi.org.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2003 Apr. 47 p.

GUIDELINE AVAILABILITY

Electronic copies: Available from the [Institute for Clinical Systems Improvement \(ICSI\) Web site](http://www.icsi.org).

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Hypertension diagnosis and treatment. In: ICSI pocket guidelines. April 2004 edition. Bloomington (MN): Institute for Clinical Systems Improvement, 2004 Mar.
- Preventive services for adults. Bloomington (MN): Institute For Clinical Systems Improvement (ICSI); 2003 Sep. 50 p. See the [National Guideline Clearinghouse \(NGC\) summary](#).
- Tobacco use prevention and cessation for adults and mature adolescents. Bloomington (MN): Institute For Clinical Systems Improvement (ICSI); 2004 Jun. 42 p. See the [NGC summary](#).

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

The following is also available:

- The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. Hypertension 2003 Dec 42(6):1206-52. See the [NGC summary](#).

Electronic copies: Available from the [National Heart, Lung and Blood Institute \(NHLBI\) Web site](#).

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

PATIENT RESOURCES

None available

NGC STATUS

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