This Clinical Practice Guideline (CPG) and accompanying patient education were developed by a multidisciplinary team, under the leadership of Nebraska Health Network’s Primary Care Clinical Integration Workgroup.

Based on national guidelines and emerging evidence and shaped by expert local opinion, this CPG provides practical strategies for early recognition, diagnosis and effective treatment of hypertension.

**Overview**
- High blood pressure puts individuals at risk for heart disease and stroke, which are leading causes of death in the United States.
- Approximately 29% of American adults have high blood pressure—that’s 1 in every 3 adults.
- About 1 in 3 American adults has prehypertension—blood pressure numbers that are higher than normal—but not yet in the high blood pressure range.
- Only about half (52%) of people with high blood pressure have their condition under control.
- High blood pressure costs the nation almost $46 billion annually in direct medical expenses and $3.6 billion in lost productivity.

**GOALS**
This Clinical Practice Guideline helps Primary Care teams achieve clinical quality measures for hypertension. Inadequate treatment for chronic hypertension places patients at undue risk for health complications.

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TREATMENT

Key Points

1. Hypertension is a major risk factor for cardiovascular disease and microvascular complications in patients with diabetes.

2. Encourage heart healthy lifestyle modifications for all adults—including healthy weight, regular physical activity, tobacco cessation, limited alcohol consumption, and dietary modification (DASH-style diet).

3. Most patients will require >2 pharmacologic therapies to achieve target blood pressure
   - Angiotensin-converting enzyme inhibitor (ACE-I) plus thiazide-type diuretic single-pill combination preferred.

Ambulatory BP Monitoring (ABPM) and Home BP Monitoring

<table>
<thead>
<tr>
<th>COMPARISON OF BLOOD PRESSURE MEASUREMENT METHODS</th>
<th>Office BP</th>
<th>ABPM</th>
<th>Home BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicts events</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Diagnostic utility</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Detects white-coat and masked HTN</td>
<td>No</td>
<td>Yes</td>
<td>Yes (limited)</td>
</tr>
<tr>
<td>Evaluates the circadian rhythm of BP</td>
<td>No</td>
<td>Yes (limited repeat uses)</td>
<td>No</td>
</tr>
<tr>
<td>Evaluates therapy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Normal limit for average-risk patients, mmHg</td>
<td>140/90</td>
<td>130/80 (24 hour)</td>
<td>135/85</td>
</tr>
<tr>
<td>Cost</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Reimbursement</td>
<td>Yes</td>
<td>Partial</td>
<td>No</td>
</tr>
</tbody>
</table>

Lifestyle Modifications

- **Weight Reduction**
  Target BMI <25kg/m²

- **Diet**
  Moderate sodium (<2300mg/day), low fat dairy, rich in fruits/vegetables (DASH). Reinforce importance of healthy diet and refer to dietician as necessary.

- **Moderate Alcohol Consumption**
  Limit of one alcoholic beverage (women) or two alcoholic beverages (men) per day.

- **Smoking Cessation**

- **Aerobic Activity**
  150 minutes/week

Medication Adherence

- **Regular assessment** of medication compliance
- **Utilize one-daily and combination products**, whenever possible
- **Address depression and anxiety** when appropriate

Initial Lab and Diagnostic Workup
Lab and Diagnostic recommendations for goal of managing hypertension and risk factors associated with cardiovascular disease.

<table>
<thead>
<tr>
<th>Initial Lab and Diagnostic Workup</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP</td>
<td>Potassium levels may indicate renal disease and aldosterone excess. Serum Creatinine and BUN levels may indicate kidney disease.</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>Identifies glucose intolerance or diabetes, consider further testing as necessary.</td>
</tr>
<tr>
<td>Lipids</td>
<td>Abnormal LDL/HDL levels are associated with an increased risk of cardiovascular disease.</td>
</tr>
<tr>
<td>Hemoglobin/Hematocrit</td>
<td>Can identify issues beyond CVD; including sickle cell anemia and CKD.</td>
</tr>
<tr>
<td>Liver function tests</td>
<td>Consider for medication side effects; identifies fatty liver disorder in obese patients.</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>Albuminuria may be indicative of kidney disease. Red/white cells may identify potential urinary tract conditions.</td>
</tr>
<tr>
<td>EKG</td>
<td>Assists in identifying previous myocardial infarctions, ventricular hypertrophy, arrhythmias.</td>
</tr>
<tr>
<td>TSH</td>
<td>Add in specific situations, e.g. elevated BMI or concern for thyroid disease.</td>
</tr>
</tbody>
</table>
TREATMENT OF HYPERTENSION in Adults with or without Diabetes 9-12

SUSPECTED DIAGNOSIS: Consider confirming with Ambulatory BP Monitoring OR Home BP Monitoring

CONFIRMED DIAGNOSIS: Lab and Diagnostic Workup, Recommend Home BP Monitoring

INITIATE LIFESTYLE MODIFICATIONS

BP ≥ 160/100?

STAGE 1

140-159/90-99 mmHg

DIABETES WITH ALBUMINURIA OR CKD?

NO

ACEI or ARB OR Thiazide* OR CCB*

/add preferred in Black Patients

NHN Preferred Drug List

FOLLOW UP 2-4 WEEKS

AT GOAL?

YES

NO

Add ACEI or ARB OR Thiazide* OR CCB*

Single Pill Combination Preferred

FOLLOW UP 2-4 WEEKS

AT GOAL?

YES

NO

FOLLOW UP EVERY 6 MONTHS

STAGE 2

≥ 160/100 mmHg

INITIATE DUAL MEDICATION THERAPY:

ACEI or ARB

+ CCB or Thiazide

*Single Pill Combination Preferred

NHN Preferred Drug List

FOLLOW UP 2-4 WEEKS

AT GOAL?

YES

NO

FOLLOW UP EVERY 6 MONTHS

Triple Drug Therapy: CCB + Thiazide + ACEI (or ARB)

FOLLOW UP 2-4 WEEKS

AT GOAL?

YES

NO

FOLLOW UP EVERY 6 MONTHS

Hypertension Management Principles in ALL CASES:
- Reassess readings and titrate medication q2-4 weeks until control achieved
- Assess medication adherence during each patient encounter
- Encourage lifestyle modifications during each patient encounter
- Monitor labs as needed based on medication regimen
- When target BP achieved, follow-up every 6 months

If not at target on 3 drug optimal regimen:
- Assess Medication Adherence
- Consider Ambulatory Blood Pressure Monitoring to check for resistant HTN
- Consider adding spironolactone, centrally acting agents, -blockers

If control not achieved or if complications, evaluate for secondary causes OR refer to HTN specialist
First-Line Drug Treatment

General nonblack population, including those with diabetes

- Thiazide-type diuretic, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI), angiotensin receptor antagonist (ARB)

General black population, including those with diabetes

- Thiazide-type diuretic or CCB

Age ≥18 years with chronic kidney disease (CKD)

- ACEI or ARB

PHARMACOLOGICAL TREATMENT

NHN Antihypertensive Preferred Drug List (current as of 6.1.2015)

<table>
<thead>
<tr>
<th>Antihypertensive Medication*</th>
<th>Usual Dosage Range (Hypertension)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thiazide-type Diuretics</strong></td>
<td></td>
</tr>
<tr>
<td>Chlorthalidone</td>
<td>12.5-25mg daily</td>
</tr>
<tr>
<td>Hydrochlorothiazide (HCTZ)</td>
<td>12.5-25mg daily</td>
</tr>
<tr>
<td>Indapamide</td>
<td>1.25-5mg daily</td>
</tr>
<tr>
<td><strong>Aldosterone Antagonist</strong></td>
<td></td>
</tr>
<tr>
<td>Spironolactone</td>
<td>50-100mg daily</td>
</tr>
<tr>
<td>Eplerenone</td>
<td>50-100mg daily</td>
</tr>
<tr>
<td><strong>Diuretic Combinations</strong></td>
<td></td>
</tr>
<tr>
<td>HCTZ/Triamterene</td>
<td>25/37.5mg, 1-2 tabs daily</td>
</tr>
<tr>
<td>Spironolactone/HCTZ</td>
<td>25/100mg, 1-2 divided doses</td>
</tr>
<tr>
<td><strong>Angiotensin Converting</strong></td>
<td></td>
</tr>
<tr>
<td>Enzyme Inhibitors (ACEI)</td>
<td></td>
</tr>
<tr>
<td>Lisinopril</td>
<td>10-40mg daily</td>
</tr>
<tr>
<td>Enalapril</td>
<td>10-40mg daily, in 1-2 divided doses</td>
</tr>
<tr>
<td>Benazepril</td>
<td>10-80mg daily</td>
</tr>
<tr>
<td><strong>ACEI/Thiazide-type Diuretic Combinations</strong></td>
<td></td>
</tr>
<tr>
<td>Lisinopril/HCTZ</td>
<td>20/25mg, 1/2-2 tabs daily</td>
</tr>
<tr>
<td>Enalapril/HCTZ</td>
<td>10/25mg, 1/2-2 tabs daily</td>
</tr>
<tr>
<td>Benazepril/HCTZ</td>
<td>10/12.5mg, 1/2-2 tabs daily</td>
</tr>
<tr>
<td><strong>Angiotensin II Receptor</strong></td>
<td></td>
</tr>
<tr>
<td>Blockers (ARB)</td>
<td></td>
</tr>
<tr>
<td>Losartan</td>
<td>25-100mg daily</td>
</tr>
<tr>
<td>Irbesartan</td>
<td>150-300mg daily</td>
</tr>
<tr>
<td>Valsartan</td>
<td>80-320mg daily</td>
</tr>
<tr>
<td><strong>ARB/Thiazide-type Diuretic Combinations</strong></td>
<td></td>
</tr>
<tr>
<td>Losartan/HCTZ</td>
<td>50/12.5mg, 1-2 tabs daily</td>
</tr>
<tr>
<td>Irbesartan/HCTZ</td>
<td>150/12.5mg, 1-2 tabs daily</td>
</tr>
<tr>
<td>Valsartan/HCTZ</td>
<td>160/12.5mg, 1-2 tabs daily</td>
</tr>
<tr>
<td><strong>Calcium Channel Blocker</strong></td>
<td></td>
</tr>
<tr>
<td>(Long Acting Dihydropyridine)</td>
<td></td>
</tr>
<tr>
<td>Amlodipine</td>
<td>2.5-10mg daily</td>
</tr>
<tr>
<td>Nifedipine (long acting)</td>
<td>30-90mg daily</td>
</tr>
<tr>
<td><strong>CCB/ACEI Combinations</strong></td>
<td></td>
</tr>
<tr>
<td>Amlodipine/Benazepril</td>
<td>5/10mg, 1/2-2 tabs daily</td>
</tr>
<tr>
<td><strong>Beta-Blockers (BB)</strong></td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td>25-100mg daily</td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>5-20mg daily</td>
</tr>
<tr>
<td>Carvedilol IR</td>
<td>6.25-25mg twice daily</td>
</tr>
<tr>
<td>Labetalol</td>
<td>200-400mg twice daily</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>100-450mg daily, in 1-2 divided doses</td>
</tr>
<tr>
<td>Metoprolol XR</td>
<td>25-400mg daily</td>
</tr>
<tr>
<td>Nadolol</td>
<td>40-80mg daily</td>
</tr>
<tr>
<td>Propranolol IR</td>
<td>160-480mg daily, in 1-2 divided doses</td>
</tr>
</tbody>
</table>

Medication Monitoring (Laboratory)

<table>
<thead>
<tr>
<th>Antihypertensive Medication*</th>
<th>Lab Monitoring</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI or ARB</td>
<td>Potassium and Creatinine</td>
<td>Before initiating therapy and within 1-2 weeks of initiation or dose increase and annually</td>
</tr>
<tr>
<td>Diuretic and/or Aldosterone Antagonist</td>
<td>Potassium and Creatinine</td>
<td>Before initiating therapy and within 1-2 weeks of initiation or dose increase and annually</td>
</tr>
<tr>
<td>Beta-Blockers and/or CCBs</td>
<td>No routine lab monitoring required</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
The ‘Triple Aim’ of the Nebraska Health Network is to improve the quality and safety of our patient care and improve the patient experience while enhancing affordability. The goal of the NHN is to standardize treatment across our health systems and providers. Clinical Practice Guidelines (CPGs) and resources are developed by NHN physician workgroups to implement evidence-based care and best practice standards within our network.

Team Roles: There is an ongoing commitment from NHN to develop and implement current evidence-based CPGs. Educating yourself and your patients on these best practice guidelines helps your office achieve the “Triple Aim.”

Team Resources: Patient-centered teams work more efficiently and effectively to provide high-quality care that’s known to improve health outcomes and patient satisfaction.

PATIENT EDUCATION

Patient Education is essential for improving health behaviors and overall health outcomes.

GOALS

1. Simplify communication and confirm understanding (teach-back).
2. Support patients’ efforts to improve their health (shared decision making).

SUGGESTED TEACHING RESOURCES:

- StayWell Healthsheets:
  - High Blood Pressure, New, Begin Treatment & Controlling High Blood Pressure
  - Discharge Instructions: Taking Blood Pressure Medications
- ExitCare Education Leaflets:
  - Hypertension
  - Hypertension (Easy to Read)
  - Managing your High Blood Pressure
- Additional Resources:
  - Centers for Disease Control and Prevention
    http://www.cdc.gov/bloodpressure/docs/ConsumerEd_HBP.pdf

Health Literacy Universal Precautions:15

Assume all patients have difficulty comprehending health information and accessing health services. This section provides key talking points to support health literacy.16

Definitions:

Blood pressure is the force of blood against the artery walls as it circulates through the body. It is measured using two numbers:

- **Systolic** blood pressure (the first number) measures the pressure in blood vessels when the heart beats.
- **Diastolic** blood pressure (the second number) measures the pressure in your blood vessels when the heart rests between beats.

Risk Factors:

- **Age**: The risk for high blood pressure increases with age.
- **Race or ethnicity**: African Americans are at an increased risk for high blood pressure and develop the condition earlier in life.
- **Lifestyle**: Excessive alcohol use, tobacco use, unhealthy diet, and physical inactivity increases risk.
- **Genetics and family history**: High blood pressure can run in families.

Signs and Symptoms:

- High blood pressure usually has no warning signs or symptoms.
- Patients often mistakenly believe they would feel when their blood pressure is high (i.e. headaches).

Diagnosis and Testing:

- Diagnosis is based on the measurement in the office and may require more than one reading to confirm.
- Readings >140/90 mmHg = high blood pressure
  - Prehypertension: 120-139/80-89 mmHg
  - Stage 1 hypertension: 140-159/90-99 mmHg
  - Stage 2 hypertension: ≥160/100 mmHg
- Patients may be encouraged to try lifestyle changes first, or be asked to monitor their blood pressure more often.
- If medication is recommended, patients should take as prescribed and not skip doses. If side effects are concerning, instruct patient to call the office.
- Schedule a doctor’s visit about every 2-4 weeks until controlled.

Prevention and Lifestyle Modifications:

- Limit alcohol to 1 drink/day for women, 2 drinks/day for men.
- Diet (DASH) - Healthy eating to include fruits, vegetables and whole grains.
- Exercise approximately 150 minutes/week with the doctor’s approval.
- Avoid adding salt to food.
- Limit processed, canned, dried and fast foods.
- Maintain a healthy weight.
- Do not smoke or use tobacco products.
REFERENCES & RESOURCES


