Adult Hypertension

National Guideline Summary

This guideline summary is based on the 2009 National Hypertension Guideline and was developed to assist Primary Care physicians and other health care professionals in the outpatient treatment of **uncomplicated hypertension** in nonpregnant adults aged 18 and older. The guideline was developed by the KP National Hypertension Guideline Development Team.

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Definition of Hypertension (HTN)

- **Hypertension** is defined as systolic/diastolic blood pressure (SBP/DBP) level **at or above 140/90 mm Hg,** systolic and/or diastolic. Table 1 provides a classification scheme for hypertension in adults.
- **"Uncomplicated hypertension"** refers to hypertension in the absence of diabetes (DM), heart failure (HF), chronic kidney disease (CKD) or known coronary heart disease (CHD).

Table 1: Hypertension Classifications (*Source: JNC7)*

Hypertension Classification	SBP (mm Hg)	DBP (mm Hg)
Normal	<120	<80
Prehypertension	120-139	80-89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	≥ 160	≥ 100

Lifestyle Modifications

- **Lifestyle modifications are recommended for patients with:**
  - **Prehypertension** (120-139/80-89 mmHg) (in order to prevent progression to hypertension)
  - **Stage 1 or 2 HTN** (as an adjunct to medical therapy)

Lifestyle modifications include:

- **Consuming a diet that is low in fat, high in fruits, high in vegetables, and high in low-fat dairy products** (e.g. the "DASH" diet)
- **Reducing dietary sodium** (<2.4 gm sodium daily)
- **Losing weight** (if BMI ≥25 kg/m^2)
- **Limiting alcohol consumption –** no more than one drink for women or two drinks for men per day
- **Increasing physical activity -** at least 30 minutes of walking or equivalent, at least 3 times per week
- **Tobacco cessation**

Target Blood Pressure

- When treating an individual with uncomplicated HTN (nonpregnant adults without DM, CKD, HF or known CHD), the target blood pressure is ≤139/≤89 mm Hg.
- When treating an individual with a prior diagnosis of stroke (excluding subarachnoid hemorrhage, subdural hematoma and post-traumatic stroke), the target office blood pressure is ≤129/≤79 for hypertension and ≤119/≤79 for prehypertension.

Initiation of Drug Therapy

- **In addition to lifestyle interventions, if an individual has blood pressure of 140-159 mm Hg SBP OR 90-99 mm Hg DBP (Stage 1), and does not have target organ damage or DM, then initiate of drug therapy as follows:**
  - If there is documentation of elevated blood pressure (SBP ≥140 OR DBP ≥90) for at least 2 or 3 months prior to the current measurement, then initiate pharmacotherapy.

Importance of Hypertension Control in Kaiser Permanente

Controlling hypertension is a very effective way of decreasing the incidence of myocardial infarctions (MIs) and strokes (CVAs). This is reflected in the numbers need to treat (NNT) of **63 for CVAs** and **86 for MIs**. To prevent either one stroke or MI, only **36** people need to be treated and controlled for hypertension over a five year period.

A 2% improvement in identification and a 5% improvement in initiation of treatment and maintenance of long term hypertension control of KP adult members in California can prevent **1324 CVAs** and **970 MIs** over the next 5 years. Improving control by 5% in the regions outside of California can prevent another **437 CVAs** and **320 MIs**.

Initiation of Drug Therapy (continued)

  - If this is the first elevated measurement, wait at least 2 or 3 months. If, after at least 2 or 3 months, blood pressure is ≥140 mm Hg SBP OR ≥90 mm Hg DBP, then initiate pharmacotherapy.

- **If an individual has blood pressure 160-179 mm Hg SBP OR 100-109 mm Hg DBP (Stage 2), and patient does not have target organ damage or DM:**
  - If there is documentation of elevated BP (SBP≥140 OR DBP ≥90) for one or more months prior to the current measurement, then initiate pharmacotherapy.
  - If this is the first elevated measurement, wait approximately one month. If, after one month, blood pressure is ≥140 mm Hg SBP OR ≥90 mm Hg DBP, then initiate pharmacotherapy.
- **If blood pressure ≥180 mm Hg SBP OR ≥110 mm Hg DBP, then initiate pharmacotherapy.**

First-Line Drug Therapy

- Combination therapy consisting of a thiazide diuretic plus an ACEI or a thiazide diuretic alone are recommended options as initial therapy for patients with Stage 1 hypertension (SBP 140 to 159 mm Hg OR DBP 90 to 99 mm Hg).
- Combination therapy with a thiazide diuretic plus an ACEI is recommended as initial therapy for patients with:
  - Stage 2 hypertension (SBP >160 OR DBP >100 mm Hg)

    and/or
  - Prior stroke/ TIA* with hypertension (stage 1 or 2) or prehypertension.

**Note: Transient ischemic attack (TIA) is defined as evidence of an acute disturbance of focal neurological or monocular function with symptoms lasting less than 24 hours and thought to be due to arterioembolic or thrombotic vascular disease.*

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Step-Care Therapy

Because most people with hypertension will need more than one drug to control their hypertension effectively:

For two drugs:

- **If blood pressure is not controlled on a thiazide-type diuretic alone, then a thiazide-type diuretic + ACEI is recommended.**

For three drugs:

- **If blood pressure is not controlled on a thiazide-type diuretic + ACEI, then adding a dihydropyridine calcium channel-blocker is recommended.**

For four drugs:

- **If blood pressure is not controlled on a thiazide-type diuretic + ACE inhibitor + dihydropyridine calcium channel-blocker, then adding a beta blocker or spironolactone is recommended.**

Adjunctive Therapy

Low-Dose Aspirin

For Primary CVD Prophylaxis (In the absence of known CAD, stroke or DM):

- When the CHD risk is high*, low dose aspirin (81 mg daily) is recommended. A shared decision-making approach, with a review of the benefits and harms, is recommended.
- For individuals with an intermediate risk* of CHD, low dose aspirin (81 mg daily) is an option. Use of aspirin should be based on a shard decision-making approach and on each individual's benefit/risk** status.
- When the CHD risk is low*, aspirin is not recommended. For low risk patients who are already taking aspirin, or who express a desire to begin taking it, a shared decision-making approach, with a review of the benefits and harms, is recommended.
- Aspirin is not recommended for patients with uncontrolled hypertension.

**The benefit for men is primarily reduction in nonfatal MI and the benefit for women is stroke reduction. Low-dose aspirin increases the risk of GI bleeding and hemorrhagic stroke, and the risk of hemorrhagic stroke may increase with uncontrolled hypertension, particularly stage 2 hypertension. NNTs to prevent one adverse CV outcome vs NNHs (usually a transfusion requiring GI bleed) for men and women on low-dose aspirin for primary CV prophylaxis for 6.4 years are: women NNT 333 and NNH 400; men: NNT 270 and NNH 303.

Lipid-lowering Therapy

- **Patients with hypertension should be treated for hyperlipidemia according to their total cardiovascular risk profile*.**

Clinicians are strongly encouraged to prescribe lipid-lowering therapy for primary CVD prevention when indicated.

Note: There is no recommendation for or against the use of lipid-lowering therapy in hypertensive patients in the absence of other significant risk factors.

* A validated risk calculator such as Framingham should be applied. Using the ATP III Framingham 10-year Hard CHD risk calculator (1, 2): low risk is < 10%, intermediate risk is 10 to 20%, and high risk is > 20%. Using the SCAL/NW Dyslipidemia Guideline CAD Risk Tables (based on Framingham 1991) 10-year Total CHD risk calculator: low risk is < 12.5%, intermediate risk is 12.5 to 25%, and high risk is > 25%.

1. National Heart Lung and Blood Institute's ATP III Framingham CHD risk calculator- http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=prof
2. 1991 Framingham Risk Calculator based on Anderson KM, et al. An Updated Coronary Risk Profile: A Statement for Health Professionals. Circulation 1991; 83(1): 356-362. KP Northwest link: http://internal.or.kp.org/cpg/support/cholest.html.

Adherence to Medications and Lifestyle Modifications

1. Assist patients with achieving medication and life-style adherence by means of a vigorous stepped care approach to therapy and an organized system of regular medical follow-up and review.
2. Recommend once-daily medication and combination therapy whenever possible.
3. Address depression and anxiety issues to maximize patient adherence.
4. Use patient education in conjunction with other strategies, particularly in the context of team care utilizing nurses and pharmacists.
5. Educate patients about their goal blood pressure because patients who are knowledgeable of their goal are more likely to achieve it.

Hypertension Treatment for Women of Childbearing Potential

- **ACE inhibitors are not recommended for women of child-bearing potential.**
- **To treat chronic hypertension in women of child-bearing potential:**
  - Thiazide diuretics are the first choice.
  - CCBs are the second choice.
  - BBs are the third choice.
- **When pregnancy occurs, women receiving antihpertensive therapy should be referred to OB/GYN for hypertension management.**

Home Blood Pressure Monitoring for Diagnosis and Management

- **Diagnosis of hypertension should be established in the medical office.**
- **Home self-measurement of blood pressure can be performed to:**
  - Identify a low-risk subpopulation of individuals with "white coat hypertension," without target organ damage** or diabetes, for whom medication may not be necessary. These individuals have home blood pressure levels ≤134/84 mm Hg, but office blood pressures ≥140/≥90 mm Hg.
  - Attain control in patients with uncontrolled HTN (>135/85 mm Hg by home monitoring) according to drug treatment algorithms, using telephone/ e-mail/ fax or other electronic patient communications, in conjunction with standard provider-based clinic visits.
  - Monitor controlled hypertension over time.

(Continued on the next page.)

** Target organ damage refers to the following: Left-ventricular hypertrophy, angina/prior MI, prior coronary revascularization, heart failure, stroke or transient ischemic attack, dementia, chronic kidney disease, peripheral artery disease and retinopathy.

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BLOOD PRESSURE (BP) GOALS

NNT CVA[3]	= 63
NNT MI[3]	= 86
NNT CVA or MI[3]	**= 36**

≤ 139 / 89 mm Hg – Uncomplicated Hypertension

≤ 129 / 79 mm Hg – Diabetes or CKD Stages 1–3, CVA, TIA

ACE-Inhibitor[2] / Thiazide Diuretic

Lisinopril / HCTZ
(Advance as needed)
20 / 25 mg X ½ daily
20 / 25 mg X 1 daily
20 / 25 mg X 2 daily

Pregnancy Potential: Avoid ACE-Inhibitors[2]

If ACEI intolerant or pregnancy potential →

Thiazide Diuretic

Chlorthalidone 12.5 mg → 25 mg
OR
HCTZ 25 mg → 50 mg

If not in control ↓ (from ACE-Inhibitor / Thiazide Diuretic)

If not in control ↓ (from Thiazide Diuretic)

Calcium Channel Blocker

Add amlodipine 5 mg X ½ daily → 5 mg X 1 daily → 10 mg daily

If not in control ↓

Beta-Blocker OR Spironolactone

Add atenolol 25 mg daily → 50 mg daily (Keep heart rate > 55)
OR
IF on thiazide AND eGFR ≥ 60 mL/min/1.73m^2 AND K < 4.5
Add spironolactone 12.5 mg daily → 25 mg daily

If not in control ↓

- Consider medication non-adherence.
- Consider interfering agents (e.g., NSAIDs, excess alcohol).
- Consider white coat effect. Consider BP checks by medical assistant (e.g., two checks with 2 readings each, 1 week apart).
- Consider discontinuing lisinopril / HCTZ and changing to chlorthalidone 25 mg plus lisinopril 40 mg daily.
- Consider additional agents (hydralazine, terazosin, reserpine, minoxidil).
- Consider stopping atenolol and adding diltiazem to amlodipine, keeping heart rate > 55.
- **Avoid using clonidine, verapamil, or diltiazem together with a beta blocker. These heart-rate slowing drug combinations may cause symptomatic bradycardia over time.**
- Consider secondary etiologies.
- Consider consultation with a hypertension specialist.

1. Includes essential hypert1nsion, DM and Stage 1-3 CKD, CVA, TIA; excludes CAD, Heart Failure, Stage 4 CKD, and pregnancy.
2. ACE-Inhibitors are contraindicated in pregnancy and not recommended in most child-bearing age women. http://cl.kp.org/pkc/national/cmi/programs/hypertension/practice_resource/htn_pregnancy_practice_resource.pdf OR Clinical Library → National tab → Interregional Guidelines and Practices Resources → Hypertension: Treatment of Hypertension in Women
3. NNT = number needed to treat to prevent one event, maintaining hypertension control for at least 5 years. (See Appendix A of Hypertension Guidelines for age-based NNT analysis: http://cl.kp.org/pkc/national/cmi/programs/hypertension/guideline/index.html OR Clinical Library → National tab → National Evidence-Based Guidelines → Hypertension Guidelines → Background → Appendix A).

Home Blood Pressure Monitoring for Diagnosis and Management (continued)

The following quality standards are recommended for home self-measurement of blood pressure:

- Only devices with documented yearly validation within 5 mm Hg systolic and 5 mm Hg diastolic of a blood pressure measure by a nurse, physician, or trained observer are acceptable, preferably those devices approved by the Association for the Advancement of Medical Instruments (AAMI), British Hypertension Society (BHS), or European Hypertension Society (EHS). Devices with visual or printout memory or using telemonitoring are preferred.
- Eligible patients should have observation of blood pressure competency with particular attention to miscuffing and common pitfalls of technique during yearly validation. Only brachial pressures are acceptable.
- A minimum of six home blood pressures should be used, half of which are obtained in the morning.
- Control by home blood pressure monitoring is defined as a mean <134/84 mm Hg

Since no home blood pressure equivalency for an office blood pressure of 129/79 mm Hg has been demonstrated in the literature, home blood pressure should not be used exclusively as a surrogate in the care of patients with diabetes or chronic kidney disease with a targeted office blood pressure ≤129/29 mm Hg.

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SELECTED ANTIHYPERTENSIVE MEDICATIONS

Medication Name	Usual Dosage Range
Thiazide-type Diuretics	
Chlorthalidone (Hygroton)	12.5 – 25 mg daily
Hydrochlorothiazide (HCTZ) (Esidrix)	25 – 50 mg daily
Thiazide Combinations	
Lisinopril/HCTZ (Prinzide)	10/12.5, 20/12.5, 20/25 mg daily
Spironolactone/HCTZ (Aldactazide)	25/25 mg daily
ACE Inhibitors (ACEI)	
Lisinopril (Zestril, Prinivil)	10 – 40 mg daily
Captopril (Capoten)	12.5 – 50 mg BID
Long-Acting Dihydropyridine Calcium Channel Blockers (CCB)	
Amlodopine (Norvasc)	2.5 – 10 mg daily
Felodipine ER (Plendil)	2.5 – 20 mg daily
Nifedipine ER (Nifedipine XL)	30 – 90 mg daily
Beta-Blockers (BB)	
Atenolol (Tenormin)	25 – 100 mg total, taken daily or BID
Carvedilol (Coreg)	3.125 – 25 mg BID
Metoprolol (Lopressor)	25 – 100 mg BID
Metoprolol ER (Toprol XL)	25 – 200 mg daily
Aldosterone Receptor Blocker	
Spironolactone (Aldactone)	12.5 – 25 mg daily
Potassium-sparing Diuretic	
Amiloride (Midamor)	5 – 10 mg total, taken daily or BID
Angiotensin II Receptor Blockers (ARB)	
Losartan (Cozaar – **not available as generic**)	25 – 100 mg daily
Direct Vasodilators	
Hydralazine (Apresoline)	25 – 100 mg BID
Minoxidil (Loniten)	2.5 mg daily – 20 mg BID
Alpha Blockers	
Terazosin (Hytrin)	1 – 20 mg daily
Doxazosin (Cardura)	1 – 16 mg daily
Prazosin (Minipress)	1 – 10 mg BID
Alpha-2 Agonists	
Clonidine (Catapres)	0.1 mg – 0.4 mg BID
Peripheral Adrenergic Inhibitor	
Reserpine	0.05 – 0.2 mg daily

WHEN TO SCREEN

- The U.S. Preventive Services Task Force (USPSTF) strongly recommends that clinicians screen adults aged 18 and older.

HOW OFTEN TO SCREEN

- Every 2 years

RECOMMENDED LIFESTYLE CHANGES:

- DASH diet (low in fat, high in fruit, high in vegetables and high in low-fat dairy products).
- Sodium restriction (≤ 2.4 gm sodium daily).
- Weight reduction if BMI ≥ 25 kg/m^2.
- Exercise (at least 30 minutes ≥ 4 times per week)
- Limit daily alcohol to no more than 1 drink (women) or 2 drinks (men).
- Smoking cessation is strongly recommended; counsel tobacco users on the health risks of smoking and the benefits of quitting

ADJUNCTIVE THERAPIES:

- Use lipid lowering therapy according to patient's total cardiovascular risk profile. Refer to the Dyslipidemia Management in Adults Guideline. (http://cl.kp.org/pkc/scal/cpg/cpg/html/Dyslipid.html or Clinical Library → National tab → National Evidence-Based Guidelines → Dyslipidemia Management in Adults)
- Use aspirin for primary CVD prophylaxis according to the Adjunctive Therapy – Low-Dose Aspirin Therapy Recommendations on page 2.

RECOMMENDATIONS FOR PATIENTS WITH ACE INHIBITOR INTOLERANCE:

1. In the absence of an ARB indication, adding a dihydropyridine calcium channel blocker (CCB) to a thiazide diuretic is recommended.
2. ARB substitution therapy is recommended if any of the following indications are present:
   - Diabetic microalbuminuria (≥ 30 mcg/mg creatinine on 2 or more occasions even if later suppressed with treatment)
   - CKD* in the presence of DM
   - Non-diabetic CKD* with proteinuria
   - Left ventricular ejection fraction ≤ 40%

* CKD means chronic kidney disease and can be identified by proteinuria (urine protein ≥ 300 mg/day, urine protein/creatinine ratio ≥ 0.3, or urine 'micro'albumin ≥ 300 mcg/mg creatinine on 2 or more occasions even if later suppressed with treatment) or eGFR < 60 mL/min/1.73m^2 for more than 3 months.

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