
STANDARD

NURSE PROTOCOL

FOR

PRIMARY HYPERTENSION

IN ADULTS

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STANDARD NURSE PROTOCOL FOR PRIMARY HYPERTENSION IN ADULTS

DEFINITION

Primary (Essential) Hypertension is defined as: systolic blood pressure equal to or greater than 140 mmHg or diastolic blood pressure equal to or greater than 90 mmHg, on at least two subsequent occasions, or taking antihypertensive medication with goal of maintaining a normal blood pressure. For persons with diabetes and renal disease, systolic blood pressure equal to or greater than 130 mmHg or diastolic blood pressure equal to or greater than 80 mmHg is considered hypertensive.

The three objectives for evaluation of clients with documented hypertension are to:

1. Identify known causes of hypertension.
2. Assess for the presence or absence of target organ damage and cardiovascular disease, the extent of disease, and the response to therapy.
3. Assess lifestyle and identify other cardiovascular risk factors or concomitant disorders that may affect prognosis and guide treatment.

ETIOLOGY

1. Primary hypertension/high blood pressure (HBP) appears to be a multi-factorial disease/disorder in which several genes interact with each other and with the environment.
2. Contributing and Risk Factors for Hypertension and Cardiovascular Disease:
 - a. Hypertension.
 - b. Family history of premature cardiovascular disease (men aged less than 55 and women aged less than 65).
 - c. Male or postmenopausal female.
 - d. Race (African American).
 - e. Body Mass Index equal to or greater than 30 kg/m² and/or waist circumference in men equal to or greater than 40 inches and female equal to or greater than 35 inches.
 - f. Habitual high salt intake.
 - g. Lifestyle elements: sedentary, smoking, stress.
 - h. Elevated blood lipids (Total cholesterol 200 mg/dL or greater, HDL less than 40 mg/dL; LDL greater than 100mg/dL, triglyceride greater than 150 mg/dL).
 - i. Diabetes mellitus.
 - j. Microalbuminuria.
 - k. Estimated glomerular filtration rate (GFR) less than 60 mL/min.

- SUBJECTIVE**
- I. Age, older than 55 for men and 65 for women.
 - 1. Normally no symptoms. (Headaches, dizziness, or nosebleeds do not occur any more often in persons with hypertension.)
 - 2. May or may not have personal or family history of hypertension.
 - 3. The following medical history may or may not reveal contributing factors or symptoms of high blood pressure:
 - a. Known duration/levels of elevated blood pressure.
 - b. Past or current symptoms of coronary heart disease, heart failure, cerebrovascular disease, peripheral vascular disease, renal disease, diabetes mellitus, dyslipidemia, gout, sleep apnea or sexual dysfunction.
 - c. Recent changes in weight, leisure-time activity, smoking or other tobacco use, recreational drug use or homeopathies.
 - d. Results and adverse effects of:
 - 1) Previous antihypertensive therapy.
 - 2) Other prescription and/or OTC medications.
 - 3) Alternative therapies (e.g., herbal).
 - e. Family history of hypertension, cardiovascular disease, diabetes and/or dyslipidemia.
 - f. Results of previous medical assessments of possible causes of hypertension (e.g., labile hypertension or paroxysms of hypertension accompanied by headache, palpitations, pallor and perspiration; abdominal bruits or abdominal or flank masses; delayed or absent femoral artery pulses or decreased blood pressure in the lower extremities; hypokalemia; hypercalcemia; elevated creatinine).
 - g. Diet history, including intake of sodium, alcohol, saturated fat and caffeine.
 - h. Psychosocial and environmental factors (e.g., family situation, employment status, working conditions, educational level).
 - 4. May have one or more of the following symptoms of complications and target organ damage and/or clinical cardiovascular disease (e.g., left ventricular hypertrophy [LVH], angina, prior myocardial infarction [MI] or coronary revascularization, heart failure, stroke or transient ischemic attack [TIA], neuropathy, peripheral arterial disease, chronic kidney disease, retinopathy):
 - a. Visual disturbances.
 - b. Chest pain.
 - c. Shortness of breath.
 - d. Edema.
 - e. Dizziness.

- f. Headache.
- g. Confusion or other neurological symptoms (e.g., difficulty with speech or movement, facial or one-sided numbness).
- h. Nocturia, urinary frequency, urinary incontinence.

OBJECTIVE

1. Systolic BP (SBP) equal to or greater than 140 mmHg **AND/OR** diastolic BP (DBP) equal to or greater than 90 mmHg (based on the average of at least two measurements (separated by 2 minutes). Have client sit quietly for at least 5 minutes before checking the blood pressure. With the client seated, feet flat on the floor and the arm supported at heart level, measure the blood pressure (BP) in each arm, unless contraindicated in one arm. Indicate in the client's record the arm with the higher reading. The arm with the higher reading is to be used for ongoing evaluation on subsequent visits.
2. Systolic BP (SBP) 120-139 mmHg or diastolic BP (DBP) 80-89 mmHg is classified as Prehypertension. SBP of 140-159 mmHg or DBP 90-99 mmHg is classified as Hypertension, Stage 1. SBP equal to or greater than 160 mmHg or DBP equal to or greater than 100 mmHg is classified as Hypertension, Stage 2. For persons with diabetes mellitus and renal disease SBP equal to or greater than 130 mmHg or DBP equal to or greater than 80 mmHg is considered hypertensive.
3. When HBP is identified early before target organ damage occurs, the physical examination usually is normal for the client's age and sex.
4. If the BP has been elevated long enough, or if the elevation has been high enough to cause damage or complications, physical examination findings may include:
 - a. Optic Fundi - Narrowing, copper-wiring, or A.V. nicking; no hemorrhages, exudates or papilledema.
 - b. Chest & Lungs - Rales or congestion.
 - c. Heart - Left ventricular hypertrophy (LVH), premature ventricular contractions (PVCs), a gallop, and/or a displaced point of maximal impulse.
 - d. Arterial Pulses – Bruits auscultated over the carotid arteries or abdominal aorta; distended neck veins, femoral arteries and/or renal arteries.
 - e. Extremities – Edema and/or venous pooling, abnormal peripheral arterial pulsations, intermittent claudication.
 - f. Neurologic - One-sided weakness, cranial nerve weakness, or hyperactive reflexes on the side of an old stroke.

ASSESSMENT

Primary (Essential) Hypertension
(Subjective and objective findings do not indicate a cause of the hypertension.)

NOTE: If secondary hypertension is suspected because subjective and/or objective findings indicate target organ damage (heart, brain, renal disease, peripheral artery disease or retinopathy), coarctation, Cushing's syndrome, or pheochromocytoma, refer the client to a physician for further evaluation. Immediately refer clients to the Emergency Room with accelerated/malignant hypertension characterized by systolic blood pressure equal to or greater than **180** mmHg, diastolic blood pressure equal to or greater than **110** mmHg, papilledema, retinal hemorrhages and exudates, severe headache.

PLAN

DIAGNOSTIC STUDIES

NOTE: If the hypertension is identified early, diagnostic studies should be within normal limits. They may be abnormal if the BP has been elevated long enough, or the elevation has been high enough, to cause target organ damage.

For baseline evaluation:

1. Complete Blood Count (CBC)
2. Serum Potassium
3. Serum Creatinine
4. Blood Glucose
5. Serum Uric Acid
6. Serum Sodium
7. Total Cholesterol and Lipid Profile, fasting
8. Calcium
9. Urinalysis-initial screen may be by dipstick; full urinalysis by laboratory for any positive results
10. ECG
11. Hemoglobin A1c (if diabetes mellitus is suspected).
12. Microalbumin by dipstick

NOTE: Inform the client of any abnormal results and the importance of follow-up and additional studies (e.g., chest x-ray, thyroid stimulating hormone) if indicated. If there are questions as to whether the client has secondary, not primary, hypertension, further studies or referral to a physician is required. Findings that might suggest a need for further study or referral include:

1. Bruits in the carotid, abdominal, or femoral areas
2. Palpable kidneys

3. Spells of sweating, tachycardia, and headache
4. Absence of femoral pulses
5. Cushing-like appearance
6. Hypokalemia/hyperkalemia

THERAPEUTIC

The goal of therapy for hypertension is to minimize end-organ damage by lowering blood pressure. This may be accomplished with only lifestyle modification, or a combination of lifestyle changes and medications.

NON-PHARMACOLOGIC MEASURES

Review the following lifestyle modifications with all clients, as applicable:

1. Counsel regarding the Dietary Approaches to Stop Hypertension (DASH), Reduced Sodium Diet. **For specific recommendations:**
<http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/index.htm>.
2. Achieve/maintain desirable body weight or Body Mass Index of 18.5-24.9 Kg/m².
3. Reduction of dietary sodium (1500 mg to no more than 2300 mg/day). **Persons who are 40 years of age or older, African Americans, and persons with high blood pressure should consume no more than 1,500 mg per day.**
4. Reduction of dietary fats and cholesterol **to meet DASH recommendations.**
5. Moderation of alcohol intake (less than one ounce [30mL] ethanol/day for men and less than 0.5 oz. [15mL] for women). One ounce of ethanol equals 24 oz. beer, 10 oz. wine, or 3 oz. 80-proof whiskey.
6. Adequate dietary potassium intake (if renal function is normal and not taking drugs known to raise potassium, such as ACE Inhibitors) of **4700** mg/day.
7. Regular aerobic physical activity at least 30 minutes per day, most days of the week.

8. **Smokers and tobacco users should receive cessation counseling and be referred to the Georgia Quit Line 1-877-270-STOP (7867).**
9. Adequate intake of calcium, 1000-1500 mg/day **based on age.**

NOTE: Refer to Georgia Dietetic Association Diet Manual and Nutrition Practice Guidelines: A Manual of the Georgia Dietetic Association 4th edition, 2010, for lists of foods rich in potassium and calcium.

PHARMACOLOGIC

The general principles of drug therapy in the treatment of primary hypertension are:

1. Initiate drug therapy for Stage 1 (SBP140-159 or DBP90-99) or Stage 2 (SBP equal to or greater than 160 or DBP equal to or greater than 100). When BP is more than 20 mmHg above systolic goal or 10 mmHg above diastolic goal, consideration should be given to initiate therapy with 2 drugs.
2. Initial drug choices are:
 - a. Stage 1 Hypertension: Thiazide-type diuretics. Consider angiotensin converting enzyme inhibitor (ACEI), calcium channel blocker (CCB) or a combination.
 - b. Stage 2 Hypertension: Two drug combination for most, usually thiazide-type diuretic and ACEI, or BB or CCB.
 - c. Initial treatment for clients with diabetes mellitus is an angiotensin converting enzyme inhibitor (ACEI). However, initial treatment may require a 2 drug regimen to include an ACEI with a diuretic or a calcium channel blocker, whichever is most appropriate.
3. **NOTES** regarding drug treatment:
 - a. Gradually titrate dosage until BP goes down, maximum dose is reached or side effects appear.
 - b. Before increasing dosage(s) or changing drug(s), determine why a client is not responding to

treatment. The main cause of resistant hypertension is nonadherence to therapy.

- c. If pressure reduction is not at goal after 3-4 weeks, increase the dosage up to maximum dose indicated in this nurse protocol or add one appropriate drug after another, from different classes, in gradually increasing doses, until BP is controlled.
- d. See the state SHAPP Program recommendations for drug treatment in the Tables and Figures beginning on page 6.15. Consult the package insert or appropriate drug reference for full information and contraindications. Based on the client's state of health (e.g., pre-existing health problems, risk factors, age, race, sex), select the drug(s) to begin therapy from the following classes.
- e. After control (defined as DBP equal to or less than 90 and SBP equal to or less than 140, except for persons with diabetes when goals are DBP equal to or less than 80 and SBP equal to or less than 130) is gained and maintained for one year, step-down therapy should be considered.

4. Diuretic

Indication: Clients with uncomplicated hypertension.

NOTE: Clients with diabetes mellitus most likely will require a 2 drug regimen, the first agent being an angiotensin converting enzyme inhibitor (ACEI) and the second either a diuretic or a calcium channel blocker, whichever is most appropriate.

Hydrochlorothiazide (HCTZ) tablets
12.5 mg - 25 mg PO daily

If client does not gain control of BP, or BP does not steadily decrease after 3-4 weeks, increase dosage. Continue to increase dosage until control is reached, side effects become intolerable, or 25 mg/day is reached.

If BP is still uncontrolled, add a second drug from another appropriate class. Consider adding second agent if blood pressure is not controlled with HCTZ 25 mg. Monitor glycemic and potassium levels with HCTZ therapy.

NOTE: If a diuretic is the initial drug, the second drug may be from any other drug class that fits with the client assessment. However, if a drug from another class

besides a diuretic was chosen initially, then the second drug should almost always be a diuretic.

AND/OR

5. Angiotensin Converting Enzyme (ACE) inhibitor
Indication: Clients with diabetes mellitus and/or uncontrolled hypertension and documented compliance with medication therapy using diuretic therapy.

Lisinopril tablet 10-40 mg PO daily.

If client is compliant after 4 weeks but BP is not decreasing, increase dosage until control is gained, side effects become intolerable, or maximum dosage is reached (40 mg/day).

See information under Follow-up, 3 c.

If BP is still uncontrolled, add a diuretic (if appropriate) or another appropriate drug from a different class.

AND/OR

6. Beta-Blockers
Indication: Compliant clients not achieving controlled blood pressure reading using diuretic and/or ACE inhibitor, angina, or an abnormal ECG.

Atenolol tablets 25 mg- 100 mg PO daily.

If client is compliant on the beta blocker but still uncontrolled after 4 weeks, gradually increase dosage. Continue to increase dosage until control is gained, side effects are intolerable, or maximum dosage is reached.

If BP is still uncontrolled, substitute another appropriate drug from a different class for one of the two drugs the client is on OR add another appropriate drug from a different class, meaning the client will be taking three different drugs.

If Atenolol needs to be discontinued, reduce the dose gradually over a period of 1-2 weeks.

AND/OR

7. Channel Blocker

Indication: Use only with clients who do not respond to any combination of standard therapy with SHAPP medications, have intolerable side effects, or have specific contraindications to other therapy.

Verapamil 120 mg sustained-release (SR) up to 480 mg/day. Dosage should be adjusted according to the client's blood pressure response. Please see individual manufacture package insert to determine if the sustained-release form can be broken in half.

NOTE: When switching from immediate-release Verapamil tablets to sustained/extended-release, the total daily dose in milligrams may remain the same.

Antihypertensive effects usually are evident within the first week. If client is compliant after 4 weeks but BP is not decreasing, increase dosage until control is gained, side effects become intolerable, or maximum dosage is reached (480 mg/day).

If BP still is uncontrolled, add a diuretic (if appropriate) or another appropriate drug from a different class, **OR** substitute another appropriate drug from a different class, meaning the client may be taking four different drugs.

AND/OR

8. Alpha-Adrenergic Agonist

Indication: Use only as a third or fourth line agent OR use with clients who: 1) do not respond to other combination therapy with SHAPP medications, 2) have intolerable side effects, or 3) have specific contraindications to other therapy.

Clonidine tablets

Initial dose: 0.1 mg PO bid. Elderly patients may benefit from lower initial dose.

If BP is still uncontrolled, increase dosage in increments of 0.1 mg/day at weekly intervals until the desired response is achieved; most common range is 0.2 mg to 1.2 mg/day given in divided doses. The maximum dose is 2.4 mg/day. Minimize sedative effects by slowly increasing the daily dosage and giving the majority of the daily dose at bedtime.

If Clonidine therapy is to be discontinued, dosage should be slowly reduced over a period of 1 week to avoid rebound hypertension. If taking Atenolol and Clonidine concurrently, and Clonidine therapy is going to be discontinued, Atenolol should be discontinued several days before gradual withdrawal of Clonidine to avoid exacerbation of rebound hypertension.

CLIENT EDUCATION/COUNSELING

1. Refer to nutritionist, **if available**, for DASH Eating Plan counseling. Nurses are **to provide counseling on DASH Eating Plan if no nutritionist is available and reinforce counseling on follow up visits.**
 - a. Attain/maintain sodium intake at 1500 mg/day **for persons who are 40 years of age or older, African Americans, and persons with high blood pressure should consume no more than 1,500 mg per day.**
 - b. Attain/maintain fat consumption to no more than 25-30% of calories.
 - c. Achieve/maintain desirable body weight/BMI.
 - d. Use alcohol and caffeine in moderation.
 - e. Use foods rich in potassium content especially if taking a potassium-wasting diuretic (e.g., HCTZ) **up to 4700 mg/day.**
 - f. If impaired renal function or on ACE Inhibitor therapy, avoid salt substitutes because of potassium content.
 - g. Attain and maintain adequate calcium intake **appropriate for age.**

2. Risk Factors
 - a. Sedentary lifestyle - assist the client to establish a physical activity plan and discuss the importance of regular aerobic physical activity at least 30 minutes per day most days of the week.
 - b. Smoker or tobacco user- **provide cessation counseling and refer to the Georgia Quit Line 1-877-270-STOP (7867) using the Quit Line Fax Back Form.**
 - c. Hypercholesterolemia - provide nutrition counseling and promote adherence to a low cholesterol/low fat diet to decrease cholesterol level.

3. Treatment Regimen - Emphasize importance of **adherence** with all aspects of the treatment plan: diet, lifestyle changes, and drugs. This phase of education should include drug side effects, clinic appointments, and when and how to contact the clinician with questions or problems.
4. Counsel the client about the signs and symptoms of stroke and heart attack. Stress that both conditions are medical emergencies and to call 911 (or for an ambulance where 911 is not locally available).
 - a. Signs and symptoms of stroke may include: sudden numbness or weakness in the face, arm or leg, especially on one side of the body; sudden confusion or trouble speaking or understanding; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, loss of balance or coordination; sudden severe headache with no known cause.
 - b. Signs and symptoms of heart attack may include: uncomfortable pressure, fullness, squeezing or pain in the center of the chest lasting more than a few minutes; pain spreading to the shoulders, neck or arms; chest discomfort with lightheadedness, fainting, nausea or shortness of breath.
5. Assess and administer vaccines indicated according to the current Advisory Committee on Immunization Practices (ACIP) childhood or adult immunization schedule (i.e., those recommended for persons with chronic medical conditions). See the Georgia Immunization Program Manual, Recommended Schedule and Guidelines, for current ACIP schedules and administration guidelines for each vaccine. The Georgia Immunization Manual may be accessed on line at <http://health.state.ga.us/programs/immunization/publications.asp>.

FOLLOW-UP

1. Clinic Appointments
 - a. When beginning drug therapy, see clients about every 2-4 weeks.
 - b. After two to three appointments at 2-4 week intervals, may move to 4-6 week intervals if the client is making satisfactory progress and adjusting to the treatment regimen.
 - c. When the client has gained control, 8-16 week (2 to 4 month) appointment intervals may be sufficient.

NOTE: Some clients need and/or want closer supervision. Keeping them on a 4-week appointment interval may be necessary.

2. Triage assessment of the client is performed at each visit and includes the information components listed below:

NOTE: Any part of the assessment performed by staff other than the PHN ordering and dispensing medication must be verified by the PHN ordering and dispensing the medication.

- a. Chief complaint.
 - b. Physical examination includes:
 - 1) Weight, Body Mass Index, and waist circumference.
 - 2) Sitting and standing BP (particularly for clients with diabetes or complaints suggestive of orthostatic hypotension, the elderly and clients taking diuretics). A drop in BP without an increase in pulse rate is suggestive of autonomic neuropathy in clients with diabetes, and of volume depletion in clients taking diuretics.
 - 3) Temperature and pulse rate.
 - 4) Heart and lung sounds.
 - 5) Assessment of extremities.
 - c. Adherence to the treatment regimen, including lifestyle modifications and pharmacologic treatment. Note any side effects to medications.
 - d. ER/Hospital visits since the last visit.
3. Do routine follow-up lab studies to determine the effect of therapy, or when there are symptoms or complaints of problems.
 - a. 3 months after beginning diuretic therapy: potassium and sodium.
 - b. 6 to 12 months: potassium and sodium.
 - c. Obtain baseline serum creatinine and repeat one month after initiation of ACEI therapy. If serum creatinine elevates to 1.4 mg/dL or greater for women or 1.5 mg/dL or greater for men, consult with hypertension specialist for recommendation of continued therapy and refer patient to the hypertension specialist for treatment and evaluation for renal artery stenosis, hyperaldosteronism.
 - d. Yearly: total cholesterol and lipid profile, hemoglobin/hematocrit, glucose, uric acid, creatinine, calcium, HgbA_{1c} (if has diabetes), and urinalysis by

- dipstick, by laboratory if any positive results, annual dipstick microalbumin.
- e. A repeat ECG is indicated if the client develops new signs and/or symptoms of heart disease (e.g., chest pain or abnormal heartbeats) or evidence of congestive heart failure (e.g., peripheral edema, shortness of breath); otherwise, once every 5 years is acceptable.
4. Step-Down Therapy - Once a client gains blood pressure control and maintains it for 1 year, consider decreasing drug therapy in the same step-by-step method used to increase dosage. Gradually decrease dosage or drugs, allowing 1-3 months after each change to make sure control remains. If the client stops all medication, continue to monitor BP at least every 6 months.

REFERRAL/CONSULTATION

1. All clients should have, at minimum, a nutritional evaluation and development of an appropriate meal plan by a nutritionist.
2. Allied health professionals - Where available, refer to a pharmacist and/or health educator, as needed, for education and counseling.
3. Medical Consultation - In addition to periodic review by a medical practitioner, special consultation is indicated if:
 - a. Initial systolic pressure is **180** mmHg or greater (**see NOTE, Assessment, p. 6.4**).
 - b. Initial diastolic pressure is **110** mmHg or greater (**see NOTE, Assessment, p. 6.4**).
 - c. **Fasting** lab results are abnormal, total cholesterol is 200 mg or higher, LDL is 130mg/dL or greater than 100mg/dL in persons with diabetes, HDL equal to or less than 40 mg/dL, triglyceride is 200 mg/dL or greater **unless person has diabetes and triglyceride is greater than 150mg/dl**, serum creatinine of 1.4 mg/dL or greater for women or 1.5 mg/dL for men or greater, serum potassium of 3.5 mEq or less or 5.5 mEq or greater, or positive microalbuminuria. Refer for abnormal lipids and initiation of pharmacological intervention by the client's primary care provider. Refer for elevated serum creatinine and microalbuminuria for evaluation for renal disease. Document the referral and the result of the referral, including any communication with the provider regarding actions taken.
 - d. Extreme complications/side effects of therapy occur.
 - e. Client does not respond to therapy.

- f. Client is less than 18 years old.
- g. Client is pregnant.
- h. Client has premature ventricular contractions equal to or greater than 6 per minute, couplets (bigeminy) or irregular heart rate (other than premature atrial contractions).
- i. Client has bradycardia (heart rate equal to or less than 56 and is not taking a beta-blocker) or tachycardia (heart rate equal to or greater than 100). Follow district protocol guidelines for management/referral or exceptions or specific instructions documented in writing in the client's record by the referring physician.
- j. ECG is abnormal.

FIGURE 1

Algorithm for the Treatment of Hypertension

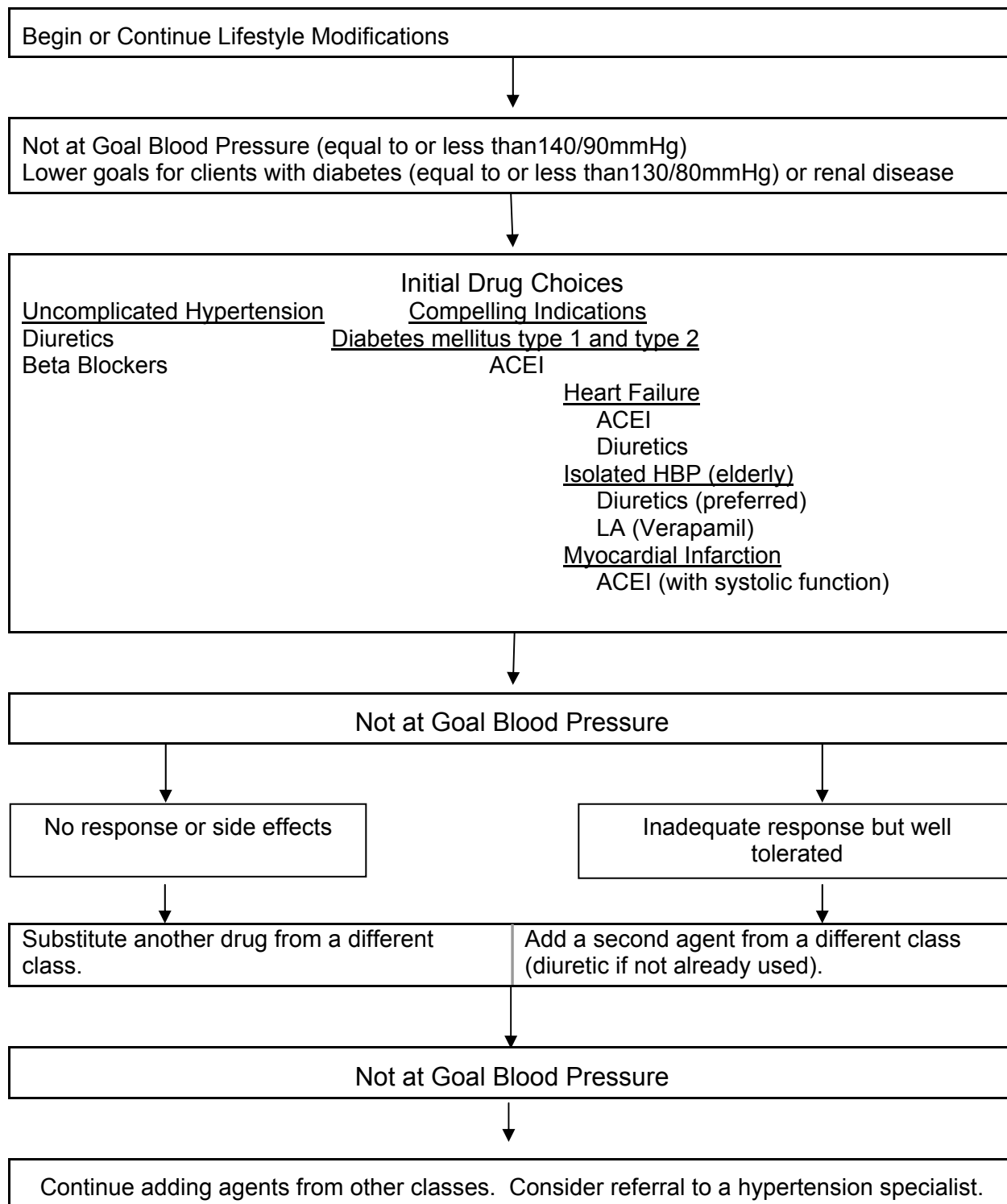


TABLE A

**SHAPP Antihypertensive Medications
Drug Interactions/Pregnancy Category**

NOTE: Not all drugs in this table are on the SHAPP Formulary but are included for information.

| Pregnancy Risk Category | |
|-------------------------|--|
| A | Adequate studies in pregnant women have failed to show a risk to the fetus. |
| B | Animal studies have not shown a risk to the fetus, but controlled studies have not been conducted in pregnant women; or animal studies have shown an adverse effect on the fetus, but adequate studies in pregnant women have not shown a risk to the fetus. |
| C | Animal studies have shown an adverse effect on the fetus, but adequate studies have not been conducted in humans. The benefits from use in pregnant women may be acceptable despite potential risks. |
| D | The drug may cause risk to the human fetus, but the potential benefits of use in pregnant women may be acceptable despite the risks. |
| X | Studies in animals or humans show fetal abnormalities, or adverse reaction reports indicate evidence of fetal risk. The risks involved clearly outweigh potential benefits. |

TABLE B***

| Antihypertensive Agent (Pregnancy Category) | Interacting Medication(s) | Interacting Effect(s) |
|--|---|--|
| Hydrochlorothiazide (B) | Alcohol/Barbiturates/Narcotics | Orthostatic Hypotension |
| | Antidiabetic Medications | Dosage of antidiabetic medications adjusted |
| | Corticosteroids | Electrolyte depletion, particularly hypokalemia |
| | Cholestyramine/colestipol resins | Absorption of Hydrochlorothiazide is reduced up to 85% |
| | Pressor agents (e.g., Norepinephrine) | Possible decreased response to pressor agents |
| | Skeletal muscle relaxants (nondepolarizing) | Possible increased response to muscle relaxant |
| | Lithium | Reduction of renal clearance of lithium; high risk of potential lithium toxicity |
| Reserpine (C) | NSAIDs | Reduction of the diuretic, natriuretic and antihypertensive effects |
| | MAO inhibitors | Avoided with extreme caution |
| | Digoxin | Cardiac arrhythmias |
| | Quinidine | Cardiac arrhythmias |
| | Tricyclic antidepressants | Decreased antihypertensive effects |
| Hydralazine (C) | Sympathomimetics: Direct-acting (e.g., epinephrine) Indirect-acting (e.g., ephedrine) | Prolonged effects of direct acting sympathomimetics and with inhibition of indirect sympathomimetics |
| | Beta-blockers | Increased serum levels of beta-blockers |
| | Indomethacin | Indomethacin inhibits the antihypertensive effects of hydralazine |
| | Diazoxide | Severe hypotension |

| Antihypertensive Agent (Pregnancy Category) | Interacting Medication(s) | Interacting Effect(s) |
|--|---|--|
| Propranolol (C) Atenolol (D) | Reserpine | Due to the added catecholamine blocking action of Reserpine, may produce marked bradycardia, hypotension, vertigo, syncopal attacks, or orthostatic hypotension |
| | Calcium Channel Blockers | Bradycardia and heart block can occur and the left ventricular end diastolic pressure can rise. Clients with pre-existing conduction abnormalities or left ventricular dysfunction are particularly susceptible. |
| | NSAIDs | Reduction of antihypertensive actions of beta-blockers |
| | Haloperidol | Hypotension, cardiac arrest |
| | Aluminum hydroxide gel | Absorption of beta-blockers greatly reduced |
| | Phenytoin/Phenobarbital/ Rifampin | Increase clearance of beta-blockers |
| | Chlorpromazine | Increase clearance of both medications |
| | Lidocaine | Decrease clearance of Lidocaine |
| | Thyroxine | Reduction of T3 serum concentration |
| | Cimetidine | Decrease clearance and increase serum of beta-blockers |
| Theophylline | Decrease clearance of Theophylline with beta-blockers | |
| Clonidine | Beta-blockers may potentiate bradycardia and may exacerbate the rebound | |

| Antihypertensive Agent (Pregnancy Category) | Interacting Medication(s) | Interacting Effect(s) |
|--|---|---|
| | | hypertension which follows the withdrawal of Clonidine |
| Fosinopril, Lisinopril (C) | Diuretics Potassium Supplements Lithium | Severe hypotension may occur after initiating ACEI therapy Decreases the potassium loss caused by thiazide diuretics; Potassium sparing or potassium supplements may increase risk of hyperkalemia Increases lithium serum levels and symptoms of toxicity |
| Verapamil (C) | Beta-blockers Digoxin Antiarrhythmic Agents: Disopyramide Flecainide Quinidine Other: Lithium Carbamazepine | Additive effects on heart rate, AV conduction, and/or cardiac contractility Chronic Verapamil therapy can increase Digoxin serum levels by 50-75% during the first week of therapy and may result in Digoxin toxicity Should not be administered within 48 hrs before or 24 hrs after Verapamil administration Additive negative inotropic effects and prolongation of AV conduction Significant hypotension; combined therapy of Quinidine and Verapamil should be avoided in clients with hypertrophic cardiomyopathy; increased Quinidine levels have been reported during Verapamil therapy Decreases lithium serum levels and increased sensitivity to the effects of lithium Increases Carbamazepine serum levels; this may increase Carbamazepine side effects |

| Antihypertensive Agent (Pregnancy Category) | Interacting Medication(s) | Interacting Effect(s) |
|--|---------------------------|---|
| | Rifampin | Reduces oral Verapamil bioavailability |
| | Cyclosporine | Increases serum levels of Cyclosporine |
| | Phenobarbital | Increases Verapamil clearance/decreases effects of Verapamil |
| | Theophylline | Inhibits the clearance of Theophylline and increases serum levels of Theophylline |

***Not all inclusive. Refer to approved drug reference or package insert for additional information.

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