



Introduction to Clinical Pharmacology Chapter 34 Antihypertensive Drugs

Blood Pressure and Hypertension



- **Blood pressure:** force of blood against artery walls
- **Hypertension:** high blood pressure that stays elevated over time
- **Box 34.1 Risks for Hypertension**
- Women over 55 years old and men over 45 years old; African American has a greater risk over Asian, Caucasian, or Hispanics; obesity; excessive dietary intake of sodium and too little potassium; chronic alcohol consumption; lack of physical activity; cigarette smoking; and family history of hypertension and/or cardiovascular disease, diabetes, or persistent stress.

Hypertension



- **Primary hypertension:** hypertension that has no known cause, also known as essential or idiopathic hypertension
- **Secondary hypertension:** hypertension with a known cause, such as kidney disease

Ranges




- A systolic blood pressure less than 120 mm Hg and a diastolic blood pressure less than 80 mm Hg (120/80) are considered normal.
- Hypertension is defined by a blood pressure of 140/90 or greater. Unchecked, it can lead to heart and kidney disease, heart failure, or stroke.
- Prehypertension exists when the blood pressure is 120 to 139/80 to 89, and patients should engage in lifestyle modifications to reduce risk factors for the diseases mentioned.
- Stage 1 hypertension would be characterized by a systolic pressure between 140 and 159 mm Hg or a diastolic pressure between 90 and 99 mm Hg. Stage 2 hypertension would be characterized by a systolic pressure of 160 mm Hg or greater or a diastolic pressure of 100 mm Hg or greater.

Nonmedication Treatment Hypertension



- Weight loss (if the patient is overweight)
- Stress reduction (e.g., relaxation techniques, meditation, and yoga)
- Regular aerobic exercise
- Smoking cessation (if applicable)
- Moderation of alcohol consumption
- Dietary changes, such as a decrease in sodium (salt) intake



Types of Drugs Used for the Treatment of Hypertension #1

- Diuretics—for example, furosemide and hydrochlorothiazide
- β -Adrenergic blocking drugs—for example, atenolol and propranolol
- Antiadrenergic drugs (centrally acting)—for example, clonidine and methyldopa
- Antiadrenergic drugs (peripherally acting)—for example, doxazosin and prazosin



Types of Drugs Used for the Treatment of Hypertension #2

- Calcium channel blocking drugs—for example, amlodipine and diltiazem-work by relaxing blood vessels, increasing oxygen supply reducing workload, reducing B/P
- Angiotensin-converting enzyme inhibitors (ACEIs)—for example, captopril and enalapril
- Angiotensin II receptor antagonists—for example, irbesartan and losartan-block angiotensin II receptors, stopping the renin-angiotensin system reducing blood pressure
- Vasodilating drugs—for example, hydralazine and minoxidil
- Direct renin inhibitors (aliskiren) and selective aldosterone receptor antagonists (SARAs; eplerenone)

Antihypertensive Drugs: Actions and Uses #1



- Lower the blood pressure by dilating or increasing the size of the arterial blood vessel; diuretic increases the excretion of sodium from the body
- Action of angiotensin-converting enzyme inhibitors (ACEIs): act primarily through suppression of the renin-angiotensin-aldosterone system; prevent (or inhibit) the activity of angiotensin-converting enzyme, which converts angiotensin I to angiotensin II, a powerful vasoconstrictor; by preventing the conversion of angiotensin I to angiotensin II, sodium and water are not retained, and the blood pressure decreases



Antihypertensive Drugs: Actions and Uses #2

- Action of the angiotensin II receptor antagonists: block the binding of angiotensin II at the receptor sites found in smooth muscle and adrenal gland, which stops renin-angiotensin system and lowers blood pressure
- Uses: used for the treatment of hypertension; some drugs are used only in severe cases of hypertension; two antihypertensive drugs may be given together to achieve a better response; diazoxide and nitroprusside used to treat medical emergencies

Antihypertensive Drugs: Adverse Reactions



- When any antihypertensive drug is given, orthostatic (postural) hypotension may result, especially early in therapy
- Angiotensin-converting enzyme inhibitors: GI adverse effects: gastric irritation, peptic ulcers, anorexia, and constipation; other body system reactions: rash, pruritus, cough, dry mouth, tachycardia, hypotension, proteinuria, and neutropenia
- Angiotensin II receptor blocker drugs: CNS effects: fatigue, depression, dizziness, headache, and syncope; GI reactions: abdominal pain, nausea, diarrhea, and constipation; other body system effects: hypotension, symptoms like those of upper respiratory infections, and cough

Antihypertensive Drugs: Contraindications



- Antihypertensive drugs are contraindicated in patients with known hypersensitivity to the individual drug
- ACEIs: contraindicated in patients with impaired renal function, congestive heart failure, salt or volume depletion, bilateral stenosis, or angioedema, also during pregnancy or lactation
- Use of the ACEIs and the angiotensin II receptor blockers during the second and third trimester of pregnancy is contraindicated because use may cause fetal and neonatal injury or death

Antihypertensive Drugs: Precautions



- Antihypertensive drugs: in patients with renal or hepatic impairment or electrolyte imbalances, during lactation and pregnancy, and in older patients
- ACEIs: in patients with sodium depletion, hypovolemia, or coronary or cerebrovascular insufficiency and those receiving diuretics
- Angiotensin II receptor agonists: in patients with renal or hepatic dysfunction, with hypovolemia, with salt depletion, and receiving high doses of diuretics

Antihypertensive Drugs: Interactions #1



- Hypotensive effects of most antihypertensive drugs are increased when administered with diuretics and other antihypertensives; many drugs can interact with the antihypertensive drugs and decrease their effectiveness
- ACEI administered with NSAIDs—reduced hypotensive effects of the ACEIs; rifampin—decreased pharmacologic effect (particularly of enalapril); allopurinol—higher risk of hypersensitivity reaction; digoxin—increased or decreased plasma digoxin levels; loop diuretics—decreased diuretic effects; lithium—increased serum lithium levels and toxicity may occur

Antihypertensive Drugs: Interactions #2



- ACEI administered with hypoglycemic agents and insulin—increased risk of hypoglycemia; potassium-sparing diuretics and /or potassium preparations—elevated serum potassium level
- Angiotensin II receptor antagonists administered with fluconazole—increased antihypertensive and adverse effects (particularly with losartan); indomethacin—decreased hypotensive effect (particularly with losartan)

Nursing Process: Assessment #1



- Preadministration assessment: before therapy with the drug starts assess the blood pressure and pulse rate in both arms in the standing, sitting, and lying positions; identify all these pressures and record in the patient's chart; obtain patient's weight if diuretic is part of therapy or the primary health care provider prescribes weight loss
- A hypertensive emergency, if not recognized and treated quickly, can result in damage to target organs including the heart, kidneys, and eyes. (ex. 200/120 continuous monitoring)
- Ongoing assessment: monitoring and recording the blood pressure is an important part of the ongoing assessment, especially early in therapy; resources for B/P monitoring, schedule regularly, recording of weight and blood pressure

Nursing Process: Assessment #2



- Ongoing assessment (cont.): each time the blood pressure is measured, use the same arm with the patient in the same position; the primary health care provider may order blood pressure to be taken in more than one position; monitor the blood pressure and pulse every 15 to 30 minutes if the patient has severe hypertension, does not have the expected response to drug therapy, or is critically ill; assess the patient's weight and examine the extremities for edema; weight gain of 2 lbs or more needs to be reported

Nursing Process: Planning



- The expected outcomes for the patient may include:
 - Optimal response to therapy (blood pressure maintained in an acceptable range)
 - Patient needs met in relation to management of adverse drug reactions
 - Understanding of and compliance with the prescribed therapeutic regimen

Nursing Process: Diagnosis



- **Risk for Deficient Fluid Volume** related to excessive diuresis secondary to administration of a diuretic; also can be caused by excessive diaphoresis and diarrhea
- **Risk for Injury** related to dizziness or lightheadedness secondary to postural or orthostatic hypotensive episodes
- **Risk for Ineffective Sexuality Patterns** related to impotence secondary to effects of antihypertensive drugs
- **Risk for Activity Intolerance** related to fatigue and weakness

Nursing Process: Implementation #1



- Promoting an optimal response to therapy
 - Administering antiadrenergic drugs: apply the transdermal patch to a hairless area of intact skin on the upper arm or torso; the patch is kept in place for 7 days; a different body part is selected for each application; if patch loosens before 7 days, reinforce with nonallergenic tape
 - Administering vasodilating drugs: monitor the patient receiving minoxidil because the drug increases the heart rate

Nursing Process: Implementation #2

- Promoting an optimal response to therapy (cont.)
 - Administering vasodilating drugs (cont.): The primary care provider is notified of heart rate 20 bpm or more above the normal rate; rapid weight gain of 5 lb or more; unusual swelling of the extremities, face, or abdomen; dyspnea, angina, severe indigestion, or fainting
 - Administering calcium channel blockers: may be given without regard to meal; if GI upset occurs, may be administered with meal
 - Angioedema presents with swelling of the face, lips, throat, or extremities. The client should immediately call the health care provider to report the symptoms and get instructions regarding treatment

Nursing Process: Implementation #3



- Promoting an optimal response to therapy (cont.)
 - Administering calcium channel blockers (cont.): verapamil is best given with meals because of the tendency to cause gastric upset; verapamil capsules (not sustained release) may be opened and the contents sprinkled in liquid or on soft foods; diltiazem may be crushed and mixed with food or fluids for patients who have difficulty swallowing

Nursing Process: Implementation #4



- Promoting an optimal response to therapy (cont.)
 - Administering ACEIs: administer captopril and moexipril 1 hour before or 2 hours after meals to enhance absorption; some patients taking an ACEI experience a dry cough that does not subside until the drug therapy is discontinued, this needs to be tolerated; ensure that the patient is not pregnant before beginning therapy; ACEIs may cause a significant drop in blood pressure after the first dose, this can be minimized if minoxidil discontinues diuretic therapy or begins treatment in small dose; after the first dose of an ACEI, monitor the blood pressure every 15 to 30 minutes for at least 2 hours and afterward until the blood pressure is stable for 1 hour

Nursing Process: Implementation #5



- Promoting an optimal response to therapy (cont.)
 - Administering angiotensin II receptor antagonists: administered without regard to meals; ensure the patient is not pregnant before beginning therapy; recommend the patient use a reliable birth control method
 - Administering drugs for hypertensive emergencies: nitroprusside and diazoxide are drugs used to treat patients with a hypertensive emergency; when used hemodynamic monitoring of the patient's blood pressure and cardiovascular status is required throughout the course of therapy; monitoring of older patients is important due to possible significant hypotension

Nursing Process: Implementation #6



- Monitoring and managing patient needs
 - Risk for deficient fluid volume: patient receiving a diuretic is observed for dehydration and electrolyte imbalances; to prevent fluid volume deficit encourage patient to drink adequate oral fluids; electrolyte imbalances that may occur during therapy with a diuretic include hyponatremia (low blood sodium level) and hypokalemia (low blood potassium level)
 - When renin inhibitors are given such as Aliskiren or Eplerenone potential for hyperkalemia exists monitor potassium levels

Nursing Process: Implementation #7



- Monitoring and managing patient needs (cont.)
 - Risk for injury: dizziness or weakness along with orthostatic hypotension can occur with the administration of antihypertensive drugs; advise to sit on side of bed for 1 or 2 minutes when rising from lying position; advise the patient to rise slowly from a sitting or lying position, which helps minimize symptoms; when symptoms occur, assist the patient getting out of bed or chair and with ambulatory activities

Nursing Process: Implementation #8



- Monitoring and managing patient needs (cont.)
 - Risk for ineffective sexual pattern: must provide an open atmosphere when discussing sexuality; explain potential problems with sexual patterns that can occur with these drugs; allow the patient time to express feelings and concerns and encourage the patient and partner to discuss ways to satisfy intimacy needs
 - Risk for activity tolerance: patient is encouraged to walk and ambulate as he or she can tolerate; assistive device used if needed; gradually increase tolerance by increasing daily activity; plan rest periods according to tolerance

Nursing Process: Implementation #9



- Monitoring and managing patient needs (cont.)
 - Pain: if headache is acute the patient may need to remain in bed with a cool cloth on the forehead, or give the patient a back and neck rub; if nursing measures not successful the primary health care provider is notified because an analgesic may be required
- Educating the patient and family: educate others on the importance of having patient's blood pressure checked at periodic intervals; once hypertension is detected, patient teaching becomes an important factor in successfully returning the blood pressure to normal or near-normal levels; avoid nonprescription drugs, alcohol; notify if diastolic increases to 130mmg/Hg or higher

Nursing Process: Evaluation #1



- The therapeutic effect is achieved and blood pressure controlled
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through nursing interventions
- Understands not to stop taking medications such as losartan because of rebound hypertension
- Fluid volume deficit is corrected
- No evidence of injury is apparent
- The patient resumes previous sexual activity or engages in alternative satisfying sexual activity

Nursing Process: Evaluation #2



- The patient reports no decrease in activity tolerance
- The patient reports no headache or headache is controlled
- The patient complies with the prescribed drug regimen
- The patient and family demonstrate an understanding of the drug regimen
- The patient verbalizes the importance of complying with the prescribed therapeutic regimen