Wolters Kluwer

When you have to be right

Introduction to Clinical Pharmacology

Chapter 34
Antihypertensive Drugs

Learning Objectives #1

1. Compare and contrast the various types of hypertension and risk factors involved.
2. Identify normal and abnormal blood pressure levels for adults.
3. List the various types of drugs used to treat hypertension.
4. Explain the general drug actions, uses, adverse reactions, contraindications, precautions, and interactions of the antihypertensive drugs.
5. Distinguish important preadministration and ongoing assessment activities the nurse should perform for the client taking an antihypertensive drug.

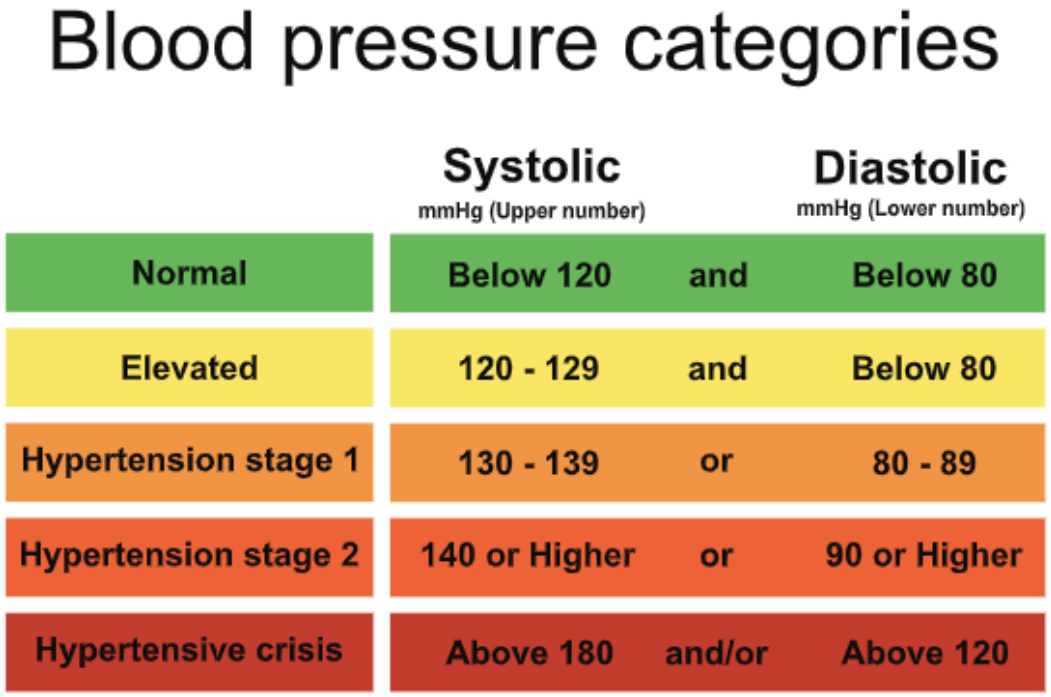
Learning Objectives #2

6. Explain why blood pressure determinations are important during therapy with an antihypertensive drug.
7. List nursing diagnoses particular to a client taking an antihypertensive drug.
8. Examine ways to promote an optimal response to therapy, how to manage adverse reactions, and important points to keep in mind when educating clients about the use of an antihypertensive drug

Blood Pressure and Hypertension

- Blood pressure: force of blood against artery walls; normal is considered 120/80 mm Hg or lower
- Hypertension: high blood pressure that stays elevated over time; blood pressure of 130/90 mm Hg or higher
- Prehypertension: elevated blood pressure; at risk of developing hypertension; occurs when the systolic blood pressure falls between 120 and 129 mm Hg and the diastolic blood pressure remains between 80 and 89 mm Hg.

Normal and Abnormal Blood Pressure Levels in Adults



Risk Factors for Hypertension

BOX 34.1 Risk Factors for Hypertension

Nonmodifiable

- Age and sex (women older than 55 years and men older than 45 years of age)
- Family history of high blood pressure and/or cardiovascular disease, diabetes, persistent stress
- Race (African Americans have higher rates than Asian, Caucasian, or Hispanic individuals)

Modifiable

- Obesity[a]
- Excessive dietary intake of salt and too little intake of potassium
- Chronic alcohol consumption
- Lack of physical activity
- Cigarette smoking

[a]Overweight in youth younger than 18 years has become a risk factor for prehypertension in teens.

Nonpharmacologic Treatment of Hypertension

- Weight loss (if the client 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

Pharmacology in Practice Exercise #1

- A nurse is presenting an educational session to clients on the consequences of untreated hypertension. Which of the following may develop if hypertension is not treated? Select all that apply.

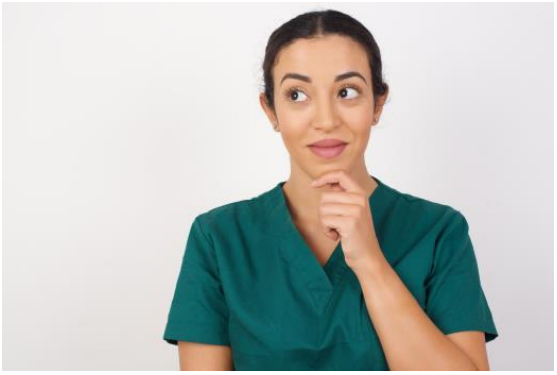
a) Adrenal tumor

b) Blindness

c) Stroke

d) Heart disease

e) Obesity



Drugs Used to Treat Hypertension #1

- Diuretics—for example, furosemide and hydrochlorothiazide
- ß-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
- Calcium channel blocking drugs—for example, amlodipine and diltiazem

Drugs Used to Treat Hypertension #2

- Angiotensin-converting enzyme inhibitors (ACEIs)—for example, captopril and enalapril
- Angiotensin II receptor antagonists—for example, irbesartan and losartan
- Vasodilating drugs—for example, hydralazine and minoxidil
- Direct renin inhibitors (aliskiren)
- Selective aldosterone receptor antagonists (SARAs; eplerenone)

Antihypertensive Drugs—Actions

- Drugs with vasodilating properties (adrenergic blocking and calcium-channel blocking) creates an in creases in the lumen of the arterial blood vessels, thus increasing the space available for blood to circulate and decreasing blood pressure
- Diuretics: increase the excretion of sodium
- Angiotensin-converting enzyme inhibitors (ACEIs): inhibit the activity of ACE, which converts angiotensin I to angiotensin II and causes vasoconstriction and secretion of aldosterone (retention of sodium and water); prevention of this process means that sodium and water are not retained and blood pressure decreases

Antihypertensive Drugs—Actions

- Calcium channel blockers: inhibit the movement of calcium ions across the cell membranes of cardiac and arterial muscle cells; results in less calcium available for the transmission of nerve impulses and blood vessels relax; increases the supply of oxygen to the heart and reduces the heart's workload
- Angiotensin II receptor antagonists: block the binding of angiotensin II at various receptor sites in the vascular smooth muscle and adrenal gland; blocks the vasoconstrictive effect of the renin-angiotensin system and release of aldosterone; results in lowering blood pressure

Antihypertensive Drugs—Uses

- Used in the treatment of hypertension and heart failure
- Different types of hypertensives are often prescribed to be taken together if the client's hypertension does not respond to just one drug therapy
- Nitroprusside is used via IV to treat hypertensive emergencies

Antihypertensive Drugs—Adverse Reactions #1

- Central Nervous System Reactions:
  - Fatigue
  - Depression
  - Dizziness
  - Headache
  - Syncope

Antihypertensive Drugs—Adverse Reactions #2

- Respiratory System Reactions:
  - Upper respiratory infections
  - Cough

dry cough

Antihypertensive Drugs—Adverse Reactions #3

- Gastrointestinal System Reactions:
  - Abdominal pain
  - Nausea
  - Diarrhea
  - Constipation
  - Gastric irritation
  - Anorexia

Antihypertensive Drugs—Adverse Reactions #4

- Other Reactions:
  - Rash
  - Pruritis
  - Dry mouth
  - Tachycardia
  - Hypotension
  - Proteinuria
  - Neutropenia
  - Orthostatic hypotension

Antihypertensive Drugs—Contraindications

- Contraindications:
  - known hypersensitivity to the drugs
  - ACEIs and angiotensin II receptor blockers: impaired renal function, salt or volume depletion, bilateral stenosis, angioedema, pregnancy (pregnancy category C), and lactation
  - Calcium channel blockers: sick sinus syndrome, second- or third-degree heart block, hypotension, ventricular dysfunction, and cardiogenic shock

Antihypertensive Drugs—Precautions #1

- Use cautiously in clients with:
  - Renal or hepatic impairment
  - Electrolyte imbalances
  - Lactation and pregnancy

Antihypertensive Drugs—Precautions #2

- Calcium-channel blockers: heart failure, renal or hepatic impairment, pregnancy (pregnancy category C) and lactation
- ACEIs: sodium depletion, hypovolemia, coronary or cerebrovascular insufficiency, clients receiving diuretic therapy or dialysis
- Angiotensin II receptor antagonists: renal or hepatic dysfunction, hypovolemia, volume or salt depletion, and in clients receiving high doses of diuretics

ACEI Drug—Interactions #1

Interacting Drug	Common Use	Effect of Interaction
NSAIDs	Relief of pain and inflammation	Reduced hypotensive effects o the ACEIs
Rifampin	Antitubercular agent	Decreased pharmacological effect of ACEIs
Allopurinol	Antigout agent	Higher risk of hypersensitivity reaction
Digoxin	Management of heart failure	Increased or decreased plasma digoxin levels

ACEI Drug—Interactions #2

Interacting Drug	Common Use	Effect of Interaction
Loop diuretics	Reduce/eliminate edema	Decreased diuretic effects
Lithium	Management of bipolar disorder	Increased serum lithium levels, possible lithium toxicity
Hypoglycemic agents and insulin	Management of diabetes	Increased risk of hypoglycemia
Potassium-sparing diuretics or potassium preparations	Diuretics: reduce blood pressure and edema; Potassium preparations: control of low serum potassium levels	Elevated serum potassium level

Calcium Channel Blockers—Interactions

Interacting Drug	Common Use	Effect of Interaction
Cimetidine or ranitidine	GI disorders	Increased effects of calcium channel blockers
Theophylline	Control of asthma or COPD	Increased pharmacologic and toxic effects of theophylline
Digoxin	Heart failure	Increased risk for digitalis toxicity
Rifampin	Antitubercular agent	Decreased effect of calcium channel blocker

Angiotensin II Receptor Antagonists—Interactions

Interacting Drug	Common Use	Effect of Interaction
Fluconazole	Antifungal agent	Increased antihypertensive and adverse effects
Indomethacin	Pain relief	Decreased hypotensive effect

Pharmacology in Practice Exercise #2

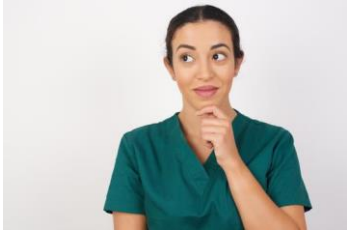
- A client with diabetes mellitus and hypertension is on insulin and enalapril for hypertension. Which of the following interactions would occur with the combined administration of both drugs?

a) Increased risk of hypersensitivity reaction

b) Increased risk of electrolyte imbalance

c) Increased risk of hypoglycemia

d) Increased risk of hypotensive effect



Nursing Process—Client Receiving an Antihypertensive Drug #1

- **Preadministration Assessment**
- **Objective** Data
  - Vital signs
  - Blood pressure readings in lying, sitting, and standing positions
  - Weight
  - Laboratory tests: lipid profile and pregnancy test

Nursing Process—Client Receiving an Antihypertensive Drug #2

- **Preadministration Assessment (continued)**
- **Subjective** Data
  - Medical history of hypertension and modifiable factors
  - Current list of all drugs and supplements

Nursing Process—Client Receiving an Antihypertensive Drug #3

- **Ongoing Assessment**
  - Frequently monitor blood pressure and take blood pressure readings in same arm with client in the same position
  - Blood pressure measurement before each administration of the drug
  - Hold the drug if the blood pressure is significantly lower than baseline
  - Menopausal women: use of birth control while on ACEIs and angiotensin II receptor antagonists
  - Assess for edema and weight gain of more than 2 lbs or more per day

Nursing Process—Client Receiving an Antihypertensive Drug #4

- **Nursing Diagnosis**
  - Dehydration related to excessive diuresis secondary to administration of a diuretic
  - Injury Risk related to dizziness or lightheadedness secondary to postural or orthostatic hypotensive episodes
  - Impaired Sexual Functioning related to impotence secondary to effects of antihypertensive drugs
  - Activity Intolerance related to fatigue and weakness
  - Acute Pain (acute headache) related to antihypertensive drugs

Nursing Process—Client Receiving an Antihypertensive Drug #5

- **Planning**
  - Expected client outcomes depend on the reason for administration of the drug but include:
    - Optimal response to therapy
    - Blood pressure maintained in an acceptable range
    - Management of adverse drug reactions
    - Confidence in an understanding of the prescribed medication regimen

Nursing Process—Client Receiving an Antihypertensive Drug #6

- **Implementation**
  - Promoting Optimal Response to Therapy—ACEIs
    - ACEIs should be taken 1 hour before or 2 hours after meals
    - The sustained-release capsules should not be crushed, opened or chewed
    - Teach the client to refrain from using potassium-based salt substitutes (hyperkalemia)
    - Support client if they develop a dry cough; report to primary health care provider
    - If a significant drop in blood pressure occurs after the first dose, notify the provide

Nursing Process—Client Receiving an Antihypertensive Drug #7

- **Implementation**
  - Promoting Optimal Response to Therapy—Clonidine
    - Clonidine transdermal patch:
      - apply to hairless area of intact skin and keep in place for 7 days; select a different area of the body for each application
      - reinforce loose patch with tape
      - date and time the patch application and the date/time of the removal

Nursing Process—Client Receiving an Antihypertensive Drug #8

- **Implementation**
  - Promoting Optimal Response to Therapy—Other Antihypertensives
    - Aliskiren: advise client to hold the drug if angioedema occurs and notify the primary health care provider
    - Nitroprusside: for hypertensive emergency; continuous monitoring of blood pressure and cardiovascular status
    - Most antihypertensive drugs can be given with or without food. If GI upset occurs, give with food.

Nursing Process—Client Receiving an Antihypertensive Drug #9

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Dehydration**
      - Observe for dehydration and electrolyte imbalances
      - Encourage client to drink oral fluids up to 2000 mL/day unless contraindicated
      - Monitor for hyponatremia, hypokalemia, and other electrolyte imbalances

Nursing Process—Client Receiving an Antihypertensive Drug #10

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Injury Risk**
      - If orthostatic hypotension occurs, teach client to rise slowly from laying to sitting to standing (1 to 2 minutes in each position) or to seek assistance getting out of a chair or bed

Nursing Process—Client Receiving an Antihypertensive Drug #11

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Impaired Sexual Functioning**
      - Provide and open and understanding atmosphere to establish rapport and trust
      - Allow client to express feelings
      - Provide client educational literature in native language
      - If sexual patterns are negatively affected, encourage other means of intimacy
      - Encourage client to discuss the use of erectile dysfunction medications with provider

Nursing Process—Client Receiving an Antihypertensive Drug #12

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Activity Intolerance**
      - Encourage client to walk and ambulate as they can tolerate and to gradually increase activity
      - Teach client to plan rest periods
      - Reassure client that fatigue diminishes after 4 to 6 weeks of therapy

Nursing Process—Client Receiving an Antihypertensive Drug #13

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Acute Pain**
      - Client may develop a headache as an adverse effect
      - Encourage client to remain in bed with a cool cloth on forehead and offer client back or neck rub
      - Teach client to use guided imagery or progressive body relaxation
      - Notify primary health care provider if nursing measures are not successful

Pharmacology in Practice

- A client has developed a headache following the use of prazosin for hypertension. Which of the following instructions should the nurse provide the client receiving prazosin? Select all that apply.

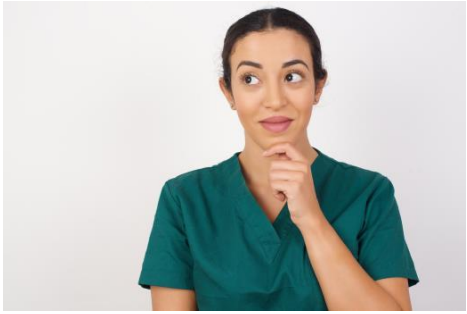
a) Lie down and elevate legs above head level

b) Withhold administration of prazosin

c) Apply a cool cloth over the forehead

d) Engage in progressive body relaxation

e) Take an analgesic drug for the pain



Nursing Process—Client Receiving an Antihypertensive Drug #14

- **Implementation—Educating th**e Client and Family
  - Educate all clients that blood pressures should be checked periodically
  - Emphasize the importance of drug therapy and following the therapeutic drug regimen
  - Educate the client about the adverse reactions and to contact the primary health care provider if adverse reactions occur

Nursing Process—Client Receiving an Antihypertensive Drug #15

- **Implementation—Educating th**e Client and Family (continued)
  - Teach client to use blood pressure machine or community resources to measure blood pressure and to keep a blood pressure record
  - Avoid the use of nonprescription drugs unless the primary health care provider is consulted
  - Avoid alcohol and if the drug causes drowsiness, avoid driving or performing hazardous tasks

Nursing Process—Client Receiving an Antihypertensive Drug #16

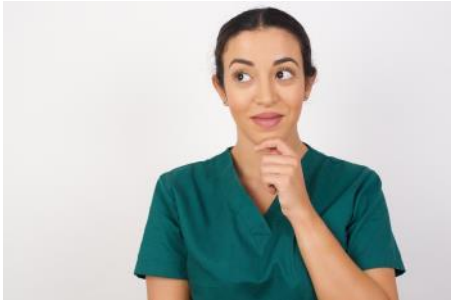
- **Implementation—Educating th**e Client and Family (continued)
  - Teach client about diet restrictions and to avoid salt substitutes unless a particular brand is approved by the primary health care provider
  - If client is at risk for orthostatic hypotension, teach client and family safety methods to prevent injury and falls at home

Nursing Process—Client Receiving an Antihypertensive Drug #17

- **Evaluation**
  - Was the therapeutic effect achieved and was blood pressure controlled?
  - Were adverse reactions: identified, reported, and managed?
    - No evidence of dehydration
    - No injury is evident
    - Client is satisfied with sexual activity
    - Client engages in activity as able
    - Client is free of headache pain
  - Did client and family express confidence and demonstrate understanding of drug regimen?

Turn and Talk—Case Study #1

- A client presents to the physician's office for a yearly wellness check-up. The physician has been watching the client's blood pressure for a couple of years, and today the client vital signs are as follows: blood pressure 165/90 mm Hg, heart rate 80 beats/minute, temperature 98.5°F, weight 125 kg (275 lb), and height 5 ft 11 in. Currently, the client has no other diagnosed medical conditions. The physician initiates a prescription forlisinopril/hydrochlorothiazide (Prinzide) 10/12.5 mg with directions to take one tablet by mouth daily in the morning.



Turn and Talk—Case Study #2

1. In which stage of hypertension would you place this client?
2. What lifestyle modifications should the client be encouraged to follow?
3. What class of antihypertensive is lisinopril/hydrochlorothiazide?
4. What would you tell the client about the new medication?