Wolters Kluwer
When you have to be right

Introduction to Clinical Pharmacology

Chapter 35
Antianginal and Vasodilating Drugs

Learning Objectives

1. Describe the two types of antianginal drugs.
2. Explain the general actions, uses, adverse reactions, contraindications, precautions, and interactions of antianginal and vasodilating drugs.
3. Distinguish important preadministration and ongoing assessment activities the nurse should perform on the client taking an antianginal or vasodilating drug.
4. List nursing diagnoses particular to a client taking an antianginal or vasodilating drug.
5. Examine ways to promote an optimal response to therapy, how to manage common adverse reactions, and important points to keep in mind when educating clients about the use of antianginal or vasodilating drugs.

Key Definitions

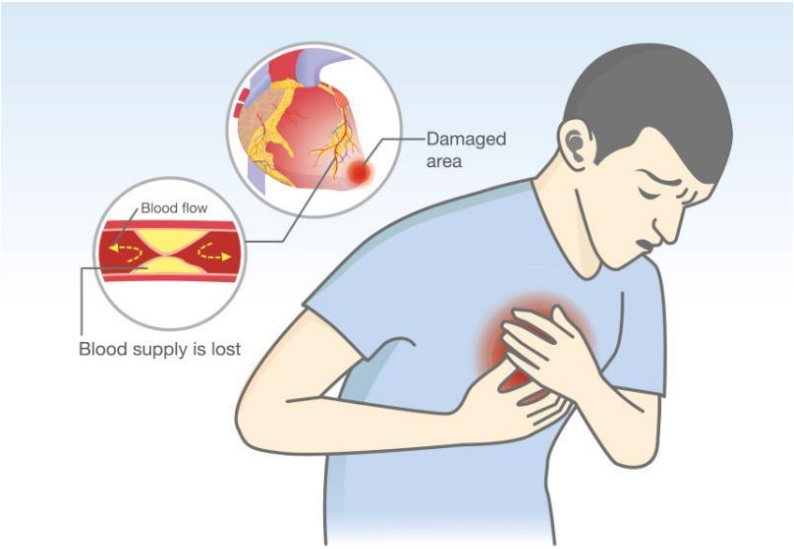
- Atherosclerosis: disease characterized by deposits of fatty plaques on the inner walls of arteries
- Angina: acute pain in the chest resulting from decreased blood supply to the heart muscle
- Pulmonary arterial hypertension (PAH): high blood pressure in the pulmonary artery (heart to lungs), which can also cause chest pain and results in heart failure if not treated

Antianginal Drugs—Actions

- Beta (β)-blockers: reduce heart rate and contractility which reduces the amount of oxygen needed by the heart muscle
- Calcium channel blockers: act by inhibiting the movement of calcium ions across cell membranes of cardiac muscle cells; effects on the heart: blood vessels relax, increase the supply of oxygen to the heart, reduced cardiac workload
- Nitrates: relax smooth muscle layer of blood vessels, increasing the lumen of the artery or arteriole, increases the amount of blood flowing through the vessels

Antianginal Drugs—Uses

- Used to:
  - Relieve cardiac pain and acute anginal attacks
  - Prevent angina
  - Treat chronic stable angina pectoris



Pharmacology in Practice Exercise #1

- Which of the following statements is true in regard to nitrates? Select all that apply.

a) Relax the smooth muscle layer of blood vessels

b) Increase the lumen of the artery or arteriole

c) Slow the conduction velocity of the cardiac impulse

d) Depress myocardial contractility

e) Increase the amount of blood flowing though the vessel

Antianginal Drugs—Adverse Reactions #1

- Central Nervous System Reactions:
  - Headache (severe and persistent)
  - Dizziness
  - Weakness
  - Restlessness

Antianginal Drugs—Adverse Reactions #2

- Other Reactions:
  - Hypotension
  - Flushing
  - Rash
  - Reactions associated with the route of administration

Antianginal Drugs—Contraindications

- Beta- and Calcium Channel Blocker Contraindications:
  - known hypersensitivity to the drugs
  - severe anemia
  - closed-angle glaucoma
  - postural hypertension
  - early myocardial infarction (sublingual form)
  - head trauma
  - cerebral hemorrhage
  - allergy to adhesive (transdermal)
  - constrictive pericarditis
  - clients taking phosphodiesterase inhibitors
    - should not use nitrates

Antianginal Drugs—Precautions

- Nitrates are used cautiously in clients with:
  - Severe hepatic or renal disease
  - Severe head trauma
  - Hypothyroidism
  - Lactation and pregnancy (pregnancy category C)

Nitrates—Interactions #1

Interacting Drug	Common Use	Effect of Interaction
Aspirin	Pain reliever	Increased nitrate serum concentrations and actions may occur
Calcium channel blockers	Treatment of angina	Increased symptomatic orthostatic hypotension
Dihydroergotamine	Migraine headache treatment	Increased risk of hypertension and decreased antianginal effect

Nitrates—Interactions #2

Interacting Drug	Common Use	Effect of Interaction
Heparin	Anticoagulant	Decreased effect of heparin
Phosphodiesterase inhibitors	Erectile dysfunction	Severe hypotension and cardiovascular collapse may occur
Alcohol	Relaxation and enjoyment of social situations	Severe hypotension and cardiovascular collapse may occur

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

Drugs Used to Treat Pulmonary Artery Hypertension

- Action:
  - Orphan drugs: depends on route of administration but most PAH drugs work by blocking receptors in pulmonary smooth muscles allowing vasodilation and better oxygenation
  - Phosphodiesterase type 5 inhibitors: cause relaxation in the smooth muscles of the pulmonary tissue and vasodilation of pulmonary capillaries
- Adverse reactions: headache, flushing, and nausea; oral drugs can cause fetal defects and hepatotoxicity
- Contraindicated in pregnancy

Nursing Process—Client Receiving an Antianginal Drug #1

- **Preadministration Assessment**
- **Objective** Data
  - Vital signs
  - Inspect physical appearance, noting skin color and lesions
  - Auscultate the lungs for adventitious sounds
  - Weight
  - Laboratory tests: ECG, stress test, chest x-ray, laboratory panels, and possible pregnancy testing

Nursing Process—Client Receiving an Antianginal Drug #2

- **Preadministration Assessment (continued)**
- **Subjective** Data
  - Pain assessment
  - Client's ideas regarding the cause of pain and remedies used
  - Medical/family history of hypertension and modifiable factors
  - Current list of all drugs and supplements

Nursing Process—Client Receiving an Antianginal Drug #3

- **Ongoing Assessment**
  - Monitor frequency and severity of any episodes of anginal pain
  - Ongoing assessment is usually conducted on an outpatient basis
  - Teach the client or family to monitor vital signs frequently during administration
  - If client's heart rate falls below 50 bpm or if the systolic BP is below 90 mm Hg, hold the drug and notify the provider

Nursing Process—Client Receiving an Antianginal Drug #4

- **Ongoing Assessment (continued)**
  - Clients taking beta- or calcium channel blockers should be assessed for signs of heart failure
    - Dyspnea
    - Weight gain
    - Peripheral edema
    - Abnormal lung sounds
    - Jugular vein distention
  - Assess client's cardiac status via telemetry when drug is being titrated to a therapeutic dose

Nursing Process—Client Receiving an Antianginal Drug #5

- **Nursing Diagnosis**
  - Injury Risk related to hypotension, dizziness, or lightheadedness
  - Pain related to narrowing of peripheral arteries, decreased blood supply to the extremities

Nursing Process—Client Receiving an Antianginal Drug #6

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

Nursing Process—Client Receiving an Antianginal Drug #7

- **Implementation**
  - *Promoting Optimal Response to Therapy—Beta- and Calcium Channel Blockers—Preventing an Attack*
    - Most blockers can be taken without regard to meals, but if GI upset occurs, take with food
    - Verapamil should be taken with food and can be opened and sprinkled on food or mixed with fluids
    - Diltiazem caplets can be crushed and mixed with food or fluids

Nursing Process—Client Receiving an Antianginal Drug #8

- **Implementation**
  - *Promoting Optimal Response to Therapy—Nitrates—Stopping a Pain Attack*
    - Teach clients proper administration of nitrates that are prescribed via sublingual or buccal route
    - Teach clients that have a nitroglycerin spray to spray the drug onto or under the tongue; do not shake the canister or inhale the spray
    - Dose of sublingual nitroglycerin or spray can be repeated every 5 minutes until pain is relieved or until client has received 3 doses in a 15-minute period; contact provider if angina is not relieved

Nursing Process—Client Receiving an Antianginal Drug #9

- **Implementation**
  - *Promoting Optimal Response to Therapy—Administering Oral Nitrates*
    - Sustained release oral tablet should not be crushed or chewed

Nursing Process—Client Receiving an Antianginal Drug #10

- **Implementation**
  - *Promoting Optimal Response to Therapy—Administering Nitroglycerin Ointment*
    - Topical nitroglycerin is measured in inches or millimeters
    - Check vital signs frequently and contact provider if blood pressure is out of normal range
    - Remove old paper from previous application and cleanse area, then don gloves, measure proper dose with paper and/or applicator, and apply the ointment in a thin uniform layer over a small area of the paper; do not rub direction on skin; secure the paper with tape

Nursing Process—Client Receiving an Antianginal Drug #11

- **Implementation**
  - *Promoting Optimal Response to Therapy—Administering Transdermal Nitroglycerin*
    - Be mindful that tolerance can occur
    - Apply the patch in the morning and leave in place for 10 to 12 hours; remove patch and leave off for 10 to 12 hours
    - Best time to apply transdermal patch is after morning bath or shower or cleansing routine; thoroughly dry skin

Nursing Process—Client Receiving an Antianginal Drug #12

- **Implementation**
  - *Promoting Optimal Response to Therapy—Administering Transdermal Nitroglycerin (continued)*
    - Inspect the skin at the site of application; shave if necessary; optimal sites are chest, abdomen, and thighs; do not apply to extremities
    - When removing old patch, fold the adhesive side onto itself to avoid inadvertent adhesion to another person or pet
    - New patch should be labeled with a fiber-tipped pen: initials, date, and time of application
    - Document location of application

Nursing Process—Client Receiving an Antianginal Drug #13

- **Implementation**
  - *Promoting Optimal Response to Therapy—Administering IV Nitroglycerin*
    - Must be diluted in normal saline (NS) or 5% dextrose in water (D_5W)
    - Deliver via infusion pump and titrate per cardiologist's orders
    - Given in a glass bottle and using special infusion sets
    - Do not mix with other drugs or blood products

Pharmacology in Practice Exercise #2

- A nurse is caring for a client in the ICU with an IV nitroglycerin drip. The student nurse asks why there is special tubing with this IV. What is the rationale?

a) The drug is light sensitive

b) The hospital is switching IV products

c) Nitroglycerin reacts with plastic tubing

d) The IV does not need special tubing

Nursing Process—Client Receiving an Antianginal Drug #14

- **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
      - Client should take the medication in one position and remain in that position until symptoms disappear
      - Monitor blood pressure frequently

Nursing Process—Client Receiving an Antianginal Drug #15

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Injury Risk—Lifespan Considerations**
      - Men: If client is taking medications for erectile dysfunction, severe hypotension can occur if client takes nitrates; assess for use of ED drugs in all male clients who have been prescribed nitrates
      - Adolescents and Young Adults: “Poppers” are nitrates or products that contain nitrates (e.g., air fresheners) that are huffed to enhance sexual pleasure or to experience the “high” feeling; always ask about the use of poppers when injury and low blood pressure are presenting symptoms

Nursing Process—Client Receiving an Antianginal Drug #16

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Pain**
      - Assess and document client's pain (full relief/partial relief, intensity, location, duration, etc.)
      - Provider will make adjustments in drug therapy if needed

Pharmacology in Practice Exercise #3

- A client is being seen at an urgent care facility for the treatment of severe acute angina. A nurse is administering sublingual nitroglycerin to the client every 5 minutes. What is the maximum number of doses of nitroglycerin the nurse should administer before reporting no improvement to the primary health care provider?

a) 3 doses in a 15-minute period

b) 5 doses in a 30-minute period

c) 7 doses in a 30-minute period

d) 9 doses in a 60-minute period

Nursing Process—Client Receiving an Antianginal Drug #17

- **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 healthcare provider if adverse reactions occur

Nursing Process—Client Receiving an Antianginal Drug #18

- **Implementation—Educating the** 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 Antianginal Drug #19

- **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 healthcare provider
  - If client is at risk for orthostatic hypotension, teach client and family safety methods to prevent injury and falls at home

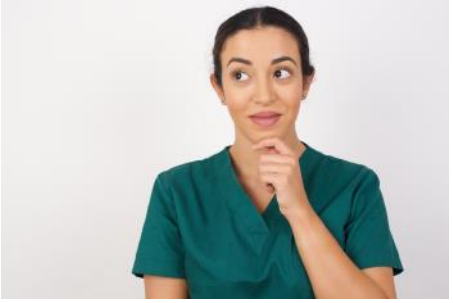
Nursing Process—Client Receiving an Antianginal Drug #20

- **Evaluation**
  - Was the therapeutic effect achieved?
  - Were adverse reactions: identified, reported, and managed?
    - No injury is evident
    - Pain is relieved
  - Did client and family express confidence and demonstrate understanding of drug regimen?

Turn and Talk—Case Study #1

- A client with a history significant for hypertension, hyperlipidemia, and diabetes is being discharged from the hospital today. The discharge included a prescription for nitroglycerin (Nitrostat) tablets.

1. The client asks the nurse, “What is this new tablet for?”
2. How should the client be instructed to use the nitroglycerin sublingual tablets?



Turn and Talk—Case Study #2

- A client with a history significant for hypertension, hyperlipidemia, and diabetes is being discharged from the hospital today. The discharge included a prescription for nitroglycerin (Nitrostat) tablets.

3. What side effects might occur with the use of nitroglycerin?
4. The client asks the nurse, “Will this new medication interfere with my Viagra?”