

Chapter 37

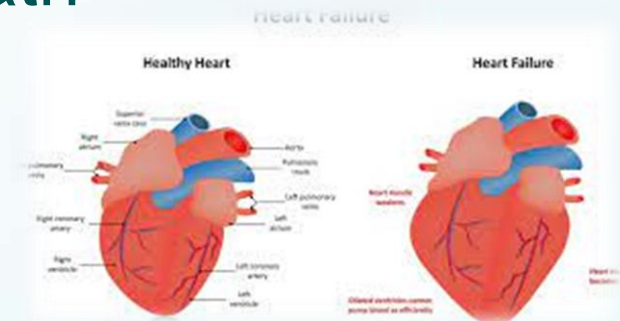
Cardiotonic and Inotropic Drugs

Heart Failure

- Heart cannot pump enough blood to meet the tissue needs of the body, commonly called congestive heart failure
- Complex clinical syndrome that can result from any number of cardiac or metabolic disorders, such as ischemic heart disease, hypertension, or hyperthyroidism. Any condition that impairs the ability of the ventricle to pump blood can lead to heart failure

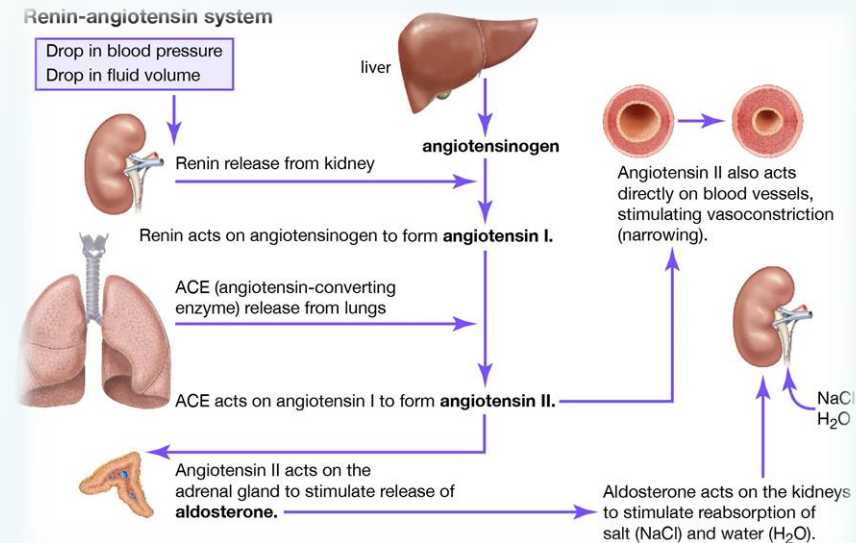
Ventricular Failure

- **Left ventricular dysfunction:** condition in which fluids back up previous to the left ventricle of the heart and is characterized by shortness of breath and moist cough in HF
- **Right ventricular dysfunction:** condition in which fluid backs up previous to the right ventricle of the heart and is characterized by peripheral edema and venous congestion in heart failure



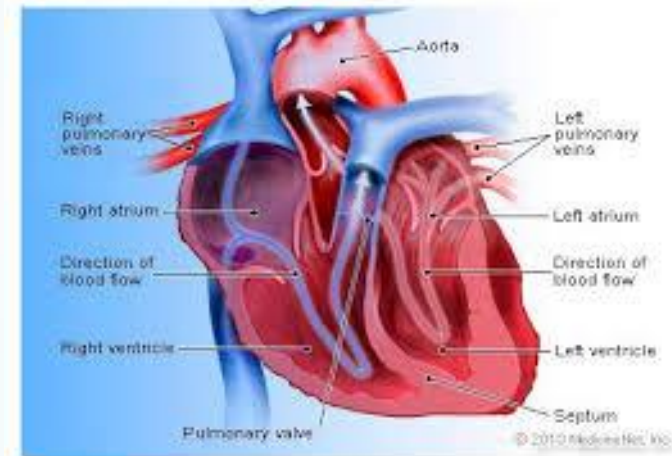
RAA System

- Activation of the renin-angiotensin-aldosterone (RAA) system occurs because of decreased perfusion to the kidneys. As the RAA system is activated, angiotensin II and aldosterone levels increase, which increases the blood pressure, adding to the workload of the heart



Neurohormonal Activity

- **Neurohormonal activity:** in heart failure, increased secretions of epinephrine and norepinephrine, resulting in arteriolar vasoconstriction, tachycardia, and myocardial contractility, resulting in a worsening of heart failure and reduced ability of the heart to contract effectively

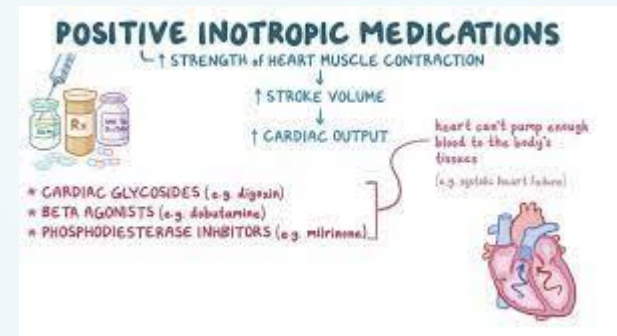


Cardiotonics: Uses

- Digoxin (Lanoxin) was the most commonly used cardiotonic drug. Other terms used to identify the cardiotonics are cardiac glycosides or digitalis glycosides.
- Ivabradine (Corlanor) is a newer cardiotonic replacing digoxin to treat heart failure. When used with a beta blocker drug (Chapter 25), ivabradine is shown to significantly reduce the repeated hospitalization associated with chronic heart failure.
- Digoxin use continues for older clients maintained on the drug for many years, patients experiencing symptoms after used first choice drugs, some cases of atrial fibrillation

Cardiotonics: Actions and Adverse Reactions

- Actions: cardiotonics increase cardiac output through positive inotropic activity. They slow the conduction velocity through the AV node in the heart and decrease the heart rate through a negative chronotropic effect
- CNS reactions: headache; weakness; drowsiness; visual disturbance
- CV and GI reactions: arrhythmias; gastrointestinal upset; anorexia



Cardiotonics: Contraindications and Precautions

- Contraindicated in the presence of digitalis toxicity and in patients with known hypersensitivity, ventricular failure, ventricular tachycardia, or AV block
- Precautions: patients with electrolyte imbalance, severe carditis, thyroid disorders, heart block, myocardial infarction, severe pulmonary disease, acute glomerulonephritis, impaired renal or hepatic function
 - Digoxin and digoxin immune Fab are used cautiously during pregnancy and lactation, when the potential benefit outweighs the potential harm to the fetus

Cardiotonics: Interactions #1

Interactant drug	Effect of interaction
Amiodarone	Increased plasma digitalis levels, leading to toxicity
Benzodiazepines	
Indomethacin	
Itraconazole	
Macrolides	
Propafenone	
Quinidine	
Spirolactone	
Tetracyclines	
Verapamil	

Cardiotonics: Interactions #2

Interactant drug	Effect of interaction
Oral aminoglycoside	Decreased plasma digitalis levels
Antineoplastics	
Activated charcoal	
Cholestyramine	
Colestipol	
Neomycin	
Rifampin	
Antacids	

Cardiotonics: Interactions #3

- The following interactions may occur with the cardiac glycosides:

Interactant drug	Effects of interaction
Thyroid hormones	Decreased effectiveness of digitalis glycosides, requiring a larger dosage of digoxin
Thiazide and loop diuretics	Increased diuretic-induced electrolyte disturbances, predisposing the patient to digitalis-induced arrhythmias

Miscellaneous Inotropic Drugs

- Milrinone: have inotropic actions and are used in the short-term management of severe HF that is not controlled by the digitalis preparations
- Nurse must continuously monitor the patient's heart rate and blood pressure with administration of either drug
- If hypotension occurs, the drug is discontinued or the rate of administration is reduced
- Continuous cardiac monitoring is necessary because life-threatening arrhythmias may occur

Nursing Process: Assessment #1

- Preadministration assessment:
 - The physical assessment should include:
 - Taking blood pressure, apical-radial pulse rate, respiratory rate
 - Auscultating the lungs, noting any unusual sounds during inspiration and expiration
 - Examining the extremities for edema
 - Checking the jugular veins for distention
 - Measuring weight



Nursing Process: Assessment #2

- Preadministration assessment: (cont)
 - Inspecting sputum raised (if any) and noting the appearance (e.g., frothy, pink-tinged, clear, yellow)
 - Looking for evidence of other problems, such as cyanosis, shortness of breath on exertion (if the patient is allowed out of bed) or when lying flat, and mental changes
 - The primary health care provider also may order laboratory and diagnostic tests

Nursing Process: Assessment #3

- Preadministration assessment (cont.)
 - Because digoxin reacts with many medications, the nurse must take a careful drug history
 - Before administering the first dose of the drug, the nurse takes the patient's vital signs and documents the apical pulse rate and rhythm



Nursing Process: Assessment #4

- Ongoing assessment:
 - Before administering each dose of a cardiotonic, the nurse takes the apical pulse rate for 60 seconds and records it in the designated area on the chart or the medication administration record
 - Pulse rate below 60 bpm and above 100 bpm in adults: withhold the drug and inform the primary health care provider

Nursing Process: Assessment #5

- Ongoing assessment (cont.)
 - Weigh patients receiving a cardiotonic drug daily or as ordered
 - Assess the patient for peripheral edema and auscultate the lungs for rales or crackles throughout therapy



Nursing Process: Diagnoses

- **Imbalanced Nutrition: Less Than Body Requirements** related to anorexia, nausea, vomiting
- **Activity Intolerance** related to weakness and drowsiness

Nursing Process: Planning

- The expected outcomes of the patient depend on the specific reason for administering the drug but may include:
 - Optimal response to therapy
 - Support of patient needs related to the management of adverse reactions
 - Understanding of and compliance with the prescribed drug regimen

Nursing Process: Implementation #1

- Promoting an optimal response to therapy
 - The nurse should carefully check the primary health care provider's order and the drug container
 - Digitalization
 - May be accomplished by two general methods: rapid digitalization and gradual digitalization
 - Involves giving a series of doses until the drug begins to exert a full therapeutic effect

Nursing Process: Implementation #2

- Promoting an optimal response to therapy (cont.)
 - Digitalization (cont.)
 - During digitalization, the nurse takes the blood pressure, pulse, and respiratory rate every 2 to 4 hours or as ordered by the primary health care provider
 - Periodic electrocardiograms, serum electrolytes, hepatic and renal function tests, and other laboratory studies also may be ordered

Nursing Process: Implementation #3

- Promoting an optimal response to therapy (cont.)
 - Parenteral administration:
 - The nurse may give a cardiotoxic orally, IV, or intramuscularly (IM)
 - When a cardiotoxic drug is given IV, it is administered slowly and the administration site is assessed for redness or infiltration
 - When giving a cardiotoxic drug IM, the nurse should rotate the injection sites



Nursing Process: Implementation #4

- Promoting an optimal response to therapy (cont.)
 - Oral administration:
 - Nurse can administer oral preparations without regard to meals
- Monitoring and managing patient needs
 - Risk of imbalanced nutrition: Less than body requirements:
 - Observation of the patient for adverse reactions, such as anorexia, vomiting, nausea

Nursing Process: Implementation #5

- Monitoring and managing patient needs (cont.)
 - Risk of imbalanced nutrition: less than body requirements (cont.)
 - Carefully consider patient complaint or comment, record it on the patient's chart, and bring to the attention of primary health care provider; offer frequent small meals instead of three large meals
 - Activity tolerance:
 - Patient may experience weakness and drowsiness as adverse reactions to digoxin; nurse plans a gradual increase in activities as tolerance increases; nurse assists with activities and ambulation as necessary

Nursing Process: Implementation #6

- Monitoring and managing patient needs (cont.)
 - Potential complication: digitalis toxicity
 - Observe for signs of digitalis toxicity: every 2 to 4 hours during digitalization and one to two times a day
 - Digoxin toxicity can be successfully treated by simply withdrawing the drug
 - Nurse should be alert for the possibility of worsening HF, low cardiac output, hypokalemia, or atrial fibrillation

Nursing Process: Implementation #7

- Educating the patient and family:
 - The patient and family must understand that the prescribed drug must be taken exactly as directed by the primary health care provider
 - Show the patient or a family member the correct technique for taking the pulse

Nursing Process: Evaluation #1

- The therapeutic effect is achieved
- The patient maintains an adequate nutritional status
- The patient is able to carry out activities of daily living
- Adverse reactions are identified, reported to the primary health care provider, and managed using appropriate nursing interventions
- The patient verbalizes the importance of continued follow-up care

Nursing Process: Evaluation #2

- The patient verbalizes the importance of complying with the prescribed therapeutic regimen
- The patient and family demonstrate an understanding of the drug regimen
- The patient complies with the prescribed drug regimen