

Preconference Form

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Medical Diagnosis/Disease: Heart Failure

NCLEX IV (8): Physiological Integrity/Physiological Adaptation

Anatomy and Physiology

Normal Structures

- Heart:** four chambered muscular organ that lies within the thorax in the mediastinal space that separates the right and left pleural cavities. It is composed of **three layers** the endocardium, myocardium, and epicardium.
- Endocardium** is the thin inner lining.
- Myocardium** is the layer of muscle.
- Epicardium** is the outer layer.
- A sac called the **pericardium** covers the heart and consists of two layers the inner (visceral) that is also a part of the epicardium and the outer (parietal).
- There are about 10 to 15 milliliters of **pericardial fluid** in the space between the pericardial layers that lubricates/prevents friction when the heart contracts.
- The **interatrial septum** splits into a right and left atrium.
- The **interventricular septum** splits into a right and left ventricle.
- The **wall thickness** of each heart chamber is different. The atrial myocardium is thinner than the ventricles. The left ventricular wall is 2 to 3 times thicker than the right ventricular wall. This thickness is needed for strength to pump blood into the systemic circulation.
- There are **4 valves in the heart** that keep blood flowing in a forward direction. These valves are the **mitral, tricuspid, pulmonic, and aortic**.
- The myocardium has its own blood supply called the **coronary circulation**.
- The **left coronary artery** arises from the aorta and divides into two main branches, the left anterior descending artery and the left circumflex artery. These arteries supply the left atrium, left ventricle, interventricular septum, and part of the right ventricle.
- The **right coronary artery** also arises from the aorta. Its branches supply the right atrium, right ventricle, and part of the posterior wall of the left ventricle.
- Coronary veins** parallel the coronary arteries and most of the blood from the coronary system drains into the coronary sinus.
- Coronary sinus:** a large channel that empties into the right atrium near the entrance of the inferior vena cava.
- An **action potential** starts depolarization of the heart cells which leads to heart muscle

Pathophysiology of Disease

Heart failure:

- reduced cardiac output due to insufficient relaxation of contraction of the heart.
 - inability of heart to provide adequate blood to meet oxygen needs of tissues and organs.
 - HTN and CAD are primary risk factors for HF.
 - CO depends on preload, afterload, myocardial contractility and HR.
 - Can be left sided or right sided heart failure.
 - HF w/ reduced EF=systolic failure, results from the inability of the heart to pump blood effectively, increased afterload, cardiomyopathy, and mechanical problems.
 - HF w/ preserved EF= diastolic failure, results from the inability of the ventricles to relax and fill during diastole.
 - HF develops in response to myocardial injury and results in decreased heart function.
 - Left sided HF is most common.
- Decompensated Heart Failure:**
- sudden onset of signs and symptoms
 - requires urgent medical care
 - pulmonary and systemic congestion due to increased left and right sided filling pressures

NCLEX IV (7): Reduction of Risk

Anticipated Diagnostics

Labs

- CBC
- Troponin levels
- Natriuretic peptide levels
- BMP
- BUN
- Creatinine
- Glucose
- LFT's
- Urinalysis

Additional Diagnostics

- Echocardiogram
- Transesophageal echocardiogram
- Chest X ray
- 12 lead ECG
- Heart catheterization
- Stress test

contraction. It starts in the SA node travels to the AV node through the bundle of his and the left and right bundle branches. It then moves through the walls of both ventricles via purkinje fibers, and the ventricular conduction system delivers the impulse within 0.12 seconds. This triggers a synchronized right and left ventricular contraction to eject blood into the pulmonary and systemic circulations.

-**Cardiac output** is the amount of blood pumped by each ventricle in one minute.

-**Cardiac reserve** is the ability to respond to demands of health and illness by maintaining or increasing cardiac output.

-The major blood vessels are **arteries, veins, and capillaries**.

-**Arteries** (except for the pulmonary artery) carry oxygenated blood away from the heart. -**Veins** (except for the pulmonary veins) carry deoxygenated blood toward the heart.

-**Blood circulates** from the left side of the heart into arteries, arterioles, capillaries, venules, and veins and then back to the right side of the heart.

-The **large arteries** have thick walls of elastic tissue that properly cushions the impact of pressure from ventricular contraction and provides recoil that propels blood forward.

Large arteries also contain some smooth muscle.

-**Arterioles** have more smooth muscle and little elastic tissue, they control arterial blood pressure and distribution of blood flow. They respond readily to things such as low CO₂ or increased CO₂ by dilating or constricting.

-The **endothelium** is the innermost lining of the arteries that maintains hemostasis, promotes blood flow, and under normal conditions inhibits blood coagulation.

-**Capillaries** are made-up of endothelial cells and have no elastic or muscle tissue. These thin-walled vessels are where the exchange of cellular nutrients and metabolic end products take place.

-**Capillaries** also connect the arterioles and venules.

-**Venules** are small vessels with a minor amount of muscle/connective tissue. They collect blood from the capillary beds and channel it to the larger veins.

-**Veins** have a larger diameter but are thin-walled vessels that return blood to the right atrium.

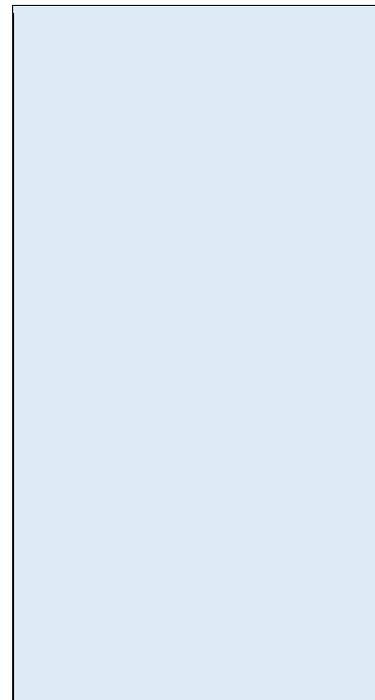
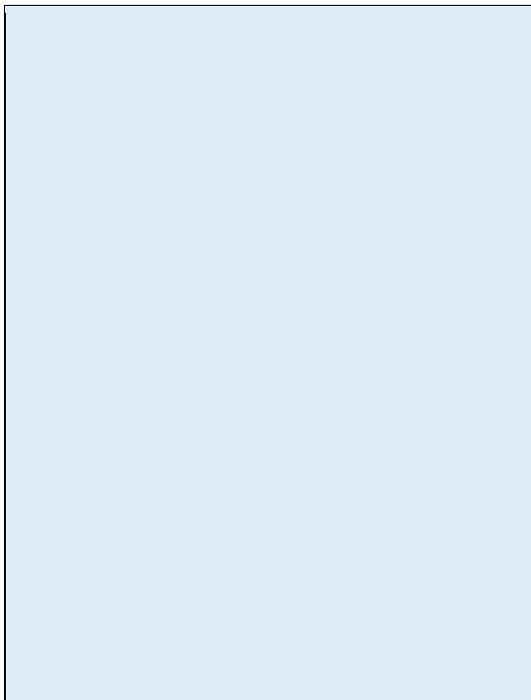
-The **venous system** is a low-pressure high-volume system.

-**Semi lunar valves** are in the larger veins to prevent backflow and maintain blood flow toward the heart.

-The **largest veins** are the **superior vena cava** which returns blood to the heart from the head, neck, and arms and the **inferior vena cava**. The

inferior vena cava returns blood to the heart from the lower part of the body.

- Pressure** in the right side of the heart affects these large vessels. For example, elevated right atrial pressure can cause distended neck veins/enlarged liver because of the blood flow resistance.
- The cardiovascular system is regulated by the **autonomic nervous system** which consists of the **sympathetic nervous system** and the **parasympathetic nervous system**.
- Stimulation of the **sympathetic nervous system** increases heart rate, speed of impulse conduction, and force of atrial/ventricular contractions.
- Whereas stimulation of the **parasympathetic nervous system** slows the heart rate and decreases impulses/conduction.
- Hemodynamic monitoring** is the measurement of pressure, flow, and oxygenation within the cardiovascular system. To assess heart function, fluid balance, and the effects of fluid and drugs on cardiac output.



NCLEX II (3): Health Promotion and Maintenance

Contributing Risk Factors

- CAD
- Hyperglycemia/diabetes
- HTN
- Hyperthyroidism
- Acute/chronic kidney failure
- Sedentary lifestyle
- Polypharmacy
- Obesity
- Alcoholism
- Tobacco use

Signs and Symptoms

Right sided:

- Ascites
- Jaundice
- Enlarged liver
- Weight gain
- N/V
- Nocturia
- Peripheral edema
- Right ventricular heave

Left sided:

- Crackles/productive cough
- Dyspnea, exertion dyspnea
- Fatigue
- Chest pain
- Heart murmur, S3/S4 heart sound
- Tachycardia
- Weakness/fatigue/confusion/restlessness
- Cool/pale lower extremities
- Diminished peripheral pulses

NCLEX IV (7): Reduction of Risk

Possible Therapeutic Procedures

Non-surgical

- Medication
- Cardiac resynchronization therapy
- Angioplasty
- Cardiac rehabilitation
- Diet counseling
- Smoking cessation counseling

Surgical

- Coronary artery bypass grafting
- Heart valve repair
- Implantable cardioverter defibrillator
- Ventricular assist device
- Heart transplant

Prevention of Complications

(What are some potential complications associated with this disease process)

- Cardiac dysrhythmia/sudden death
- Hypokalemia
- Heart valve problems
- Myocardial ischemia
- Low serum sodium
- Renal failure
- Liver failure
- Obstructive sleep apnea
- Pulmonary edema
- HTN
- Anemia

NCLEX IV (6): Pharmacological and Parenteral Therapies

Anticipated Medication Management

- ACE inhibitors
- Beta blockers
- Diuretics
- Analgesics
- ARBS
- Digoxin
- Nitrates
- Vasodilators
- Positive inotrope

NCLEX IV (5): Basic Care and Comfort

Non-Pharmacologic Care Measures

- Patient education
- Lifestyle modifications
- Weight management
- Stress management
- Diet, sodium restrictions and fluid restrictions.
- Physical activity

NCLEX III (4): Psychosocial/Holistic

Care Needs

What stressors might a patient with this diagnosis be experiencing?

- Fear of death
- Anxiety about complications
- Frustration over limited quality of life
- Anger over condition

Client/Family Education

List 3 potential teaching topics/areas

- Importance of maintaining a healthy blood pressure, glucose, and healthy diet.
- Importance of regular physical exercise to strengthen the heart.
- Cessation of smoking and tobacco use.

NCLEX I (1): Safe and Effective Care Environment

Multidisciplinary Team Involvement

(Which other disciplines do you expect to share in the care of this patient)

- Nurses
- Dietician
- Cardiologist/cardiac surgeon
- Pulmonologist
- Pharmacists
- PT
- Psychologists
- Endocrinologists
- Transplant team