Heart failure

*Pulsus paradoxus:* systolic blood pressure that is more than 10 mm Hg lower during inhalation than during exhalation; difference is normally less than 10 mm Hg

The inability of the heart to pump sufficient blood to meet the needs of the tissues for oxygen and nutrients

A syndrome characterized by fluid overload or inadequate tissue perfusion

The term heart failure indicates myocardial disease, in which there is a problem with the contraction of the heart (systolic failure) or filling of the heart (diastolic failure).

Some cases are reversible.

Most HF is a progressive, lifelong disorder managed with lifestyle changes and medications.

Diminished cardiac output results in inadequate peripheral tissue perfusion.

**Path:**

Significant myocardial dysfunction usually occurs before the patient experiences signs and symptoms of HF such as shortness of breath, edema, or fatigue.

As HF develops, the body activates neurohormonal compensatory mechanisms. These mechanisms represent the body's attempt to cope with the HF and are responsible for the signs and symptoms that eventually develop.

**Classification of heart failure and symptoms**

1. No limitation of physical activity
   Ordinary activity does not cause undue fatigue, palpitation, or dyspnea.
2. Slight limitation of physical activity
   Comfortable at rest, but ordinary physical activity causes fatigue, palpitation, or dyspnea.
3. Marked limitation of physical activity
   Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnea.
4. Unable to carry out any physical activity without discomfort
   Symptoms of cardiac insufficiency at rest
   If any physical activity is undertaken, discomfort is increased.

**Diastolic heart failure:** a stiff non compliant heart, problems with the heart not relaxing to fill with blood.

**Systolic heart failure:** weak heart muscle, leads to problems with contraction and ejection of blood.

**Ejection fraction (EF):** percentage of blood volume in the ventricles at the end of diastole that is ejected during systole; a measurement of contractility

**Right-sided heart failure (right ventricular failure):**

Inability of the right ventricle to fill or eject sufficient blood into the pulmonary circulation, usually occurs from left sided heart failure.

**S/sx:** fluid in the periphery, JVD, abdominal distention, hepatomegaly, splenomegaly, anorexia and nausea, weight gain, nocturnal diuresis, swelling of digits and hands, increased BP.

**Left-sided heart failure (left ventricular failure):**

Inability of the left ventricle to fill or eject sufficient blood into the systemic circulation. Acute pulmonary edema a medical emergency can result, if not treated death will occur from suffocation. Can't pump blood into the aorta, blood pools in the atria and gets backed up into the pulmonary system.

**S/sx:** pulmonary congestion, crackles, dyspnea, tachypnea, dry hacking cough, nocturnal dyspnea, increased BP.
Nursing considerations

Heart failure may go undetected without symptoms. Often has comorbidities such as Renal failure and COPD. Assessment of ventricular fx is essential. Focus Effectiveness of therapy Patient’s self-management. S&S if increased HF, Emotional or psychosocial response, Health history, PE, Mental status; lung sounds: crackles and wheezes; heart sounds: S3; fluid status or signs of fluid overload; daily weight and I&O; assess responses to medications.

Medical management

The overall goals of management of HF are to relieve patient symptoms, to improve functional status and quality of life, and to extend survival.

- Improvement of cardiac function by reducing preload and afterload
- Reduction of symptoms and improvement of functional status
- Stabilization of patient condition and lowering of the risk of hospitalization
- Delay of the progression of HF and extension of life expectancy
- Promotion of a lifestyle conducive to cardiac health

Treatment: options vary according to the severity of the patient’s condition and may include oral and intravenous (IV) medications, major lifestyle changes, supplemental oxygen, implantation of cardiac devices, and surgical approaches including cardiac transplantation.

Pharmacology (always check bp, HR, electrolytes)

Angiotensin-Converting Enzyme Inhibitors: Lisinopril (Prinivil), Enalapril (Vasotec)

Indications: ↓ BP and ↓ afterload, Relieves signs and symptoms of HF, Prevents progression of HF

Nursing actions: Observe for symptomatic hypotension, increased serum K+, cough, and worsening renal function.

Angiotensin Receptor Blockers: Valsartan (Diovan), Losartan (Cozaar)

Indications: ↓ BP and ↓ afterload, Relieves signs and symptoms of HF, Prevents progression of HF

Nursing actions: Observe for symptomatic hypotension, increased serum K+, and worsening renal function.

Hydralazine and Isosorbide Dinitrate (Dilatrate):

Indications: Dilates blood vessels, ↓ BP and ↓ afterload

Nursing actions: Observe for symptomatic hypotension

Beta-Adrenergic Blocking Agents (Beta-Blockers): Metoprolol (Lopressor), Carvedilol (Coreg)

Indications: Dilates blood vessels and ↓ afterload, ↓ Signs and symptoms of HF, Improves exercise capacity

Nursing considerations: Observe for decreased heart rate, symptomatic hypotension, dizziness, and fatigue.

Diuretics

Loop diuretic: Furosemide (Lasix)

Thiazide diuretics: Metolazone (Zaroxolyn), Hydrochlorothiazide (HCTZ)

Aldosterone antagonist: Spironolactone (Aldactone)

Indications: ↓ Fluid volume overload, ↓ Signs and symptoms of HF, Improves HF symptoms in advanced HF

Nursing considerations: Observe for electrolyte abnormalities, renal dysfunction, diuretic resistance, and decreased B P. Carefully monitor I&O and daily weight. Observe for hyperkalemia, hyponatremia.

Digitalis: Digoxin (Lanoxin)

Indications: Improves cardiac contractility, ↓ Signs and symptoms of HF

Nursing actions: Observe for bradycardia and digitalis toxicity.
**Pulmonary edema**

Pulmonary edema is the abnormal accumulation of fluid in the interstitial spaces and alveoli of the lungs. It is a diagnosis associated with acute decompensated HF that can lead to acute respiratory failure.

**Patho:** Pulmonary edema is an acute event that results from left ventricular failure. It can occur following acute MI or as an exacerbation of chronic HF. When the left ventricle begins to fail, blood backs up into the pulmonary circulation, causing pulmonary interstitial edema. This may occur quickly in some patients, a condition sometimes called *flash pulmonary edema*.

*Clinical manifestations:* restlessness, anxiety, dyspnea, cool and clammy skin, cyanosis, weak and rapid pulse, cough, lung congestion (moist, noisy respirations), increased sputum production (sputum may be frothy and blood tinged), decreased level of consciousness

**Nursing actions:** Proper positioning can help reduce venous return to the heart. The patient is positioned upright, preferably with the legs dangling over the side of the bed. This has the immediate effect of decreasing venous return, decreasing right ventricular SV, and decreasing lung congestion.

**Cardiogenic shock**

Hyperperfusion of all tissue. Cardiogenic shock is failure of the heart to pump adequately, thereby reducing cardiac output and compromising tissue perfusion. It also can occur as a result of end-stage HF, cardiac tamponade, pulmonary embolism (PE), cardiomyopathy, and dysrhythmias. Cardiogenic shock is a life-threatening condition with a high mortality rate. Cardiogenic shock may occur following MI when a large area of myocardium becomes ischemic and hypokinetic.

*Clinical manifestations:* symptoms of HF, shock state, and hypoxia

**Tx:** Correct underlying problem
Treated in an ICU
Assess cardiac rhythm, monitor hemodynamic parameters, monitor fluid status, and adjust medications and therapies based on the assessment data

**Medications**
Diuretics, positive inotropic agents and vasopressors
Circulatory assist devices
Intra-aortic balloon pump (IABP)
**Thromboembolism**

Patients with cardiovascular disorders are at risk for the development of arterial and venous thromboemboli. Intracardiac thrombi can form in patients with atrial fibrillation because the atria do not contract forcefully. Decreased mobility and other factors in patients with cardiac disease also can lead to clot formation in the deep veins of the legs. Although signs and symptoms of deep vein thrombosis (DVT) can vary, patients may report leg pain and swelling. These clots can also break off and travel through the inferior vena cava and through the right side of the heart into the pulmonary artery, where they can cause a pulmonary embolus.

**Pulmonary embolism**

PE is a potentially life-threatening disorder typically caused by blood clots in the lungs. This disorder poses a particular threat to people with cardiovascular disease. Blood clots that form in the deep veins of the legs and embolize to the lungs can cause a pulmonary infarction where emboli mechanically obstruct the pulmonary vessels, cutting off the blood supply to sections of the lung. Clinical indicators of PE can vary but typically include dyspnea, pleuritic chest pain, and tachypnea. Other signs include cough, hemoptysis, tachycardia, and hemodynamic instability. Diagnostic tests often include a chest x-ray, ventilation–perfusion lung scan, high-resolution helical computed tomography, or computed tomographic pulmonary angiogram. A blood D-dimer assay is a helpful screening test that identifies whether clotting and fibrinolysis are taking place somewhere in the body.

**Anticoagulant therapy**

These are dissolved by TPA, pt may be placed on heparin or Coumadin.

**Pericardial Effusion and Cardiac Tamponade**

Pericardial effusion is the accumulation of fluid in the pericardial sac. Cardiac tamponade is the restriction of heart function because of this fluid, resulting in decreased venous return and decreased CO. Clinical manifestations: ill-defined chest pain or fullness, pulsus paradoxus, engorged neck veins, labile or low BP, shortness of breath. Cardinal signs of cardiac tamponade: falling systolic BP, narrowing pulse pressure, rising venous pressure, distant heart sounds.

**Beck’s triad** is a collection of three medical signs associated with acute cardiac tamponade, an emergency condition wherein fluid accumulates around the heart and impairs its ability to pump blood. The signs are low arterial blood pressure, distended neck veins, and distant, muffled heart sounds.

**Management:**

**Pericardiocentesis:** puncture of the pericardial sac to aspirate pericardial fluid

**Pericardiotomy:** a portion of the pericardium is excised to permit the exudative pericardial fluid to drain into the lymphatic system.