

Lecture 8 : Critical Care Nursing

Heart Failure:

Statistics:

- Leading cause of hospitalization.
- 50 % of patients with heart failure over a 4-year period will die of the disease.
- 287,000 people die annually of heart failure
- 40 % of patient's admitted to the hospital die or are readmitted within 1 year.
- 5 million Americans - have heart failure
- 25-50 billion dollars a year to care for people with HF.

Definition OF Heart Failure:

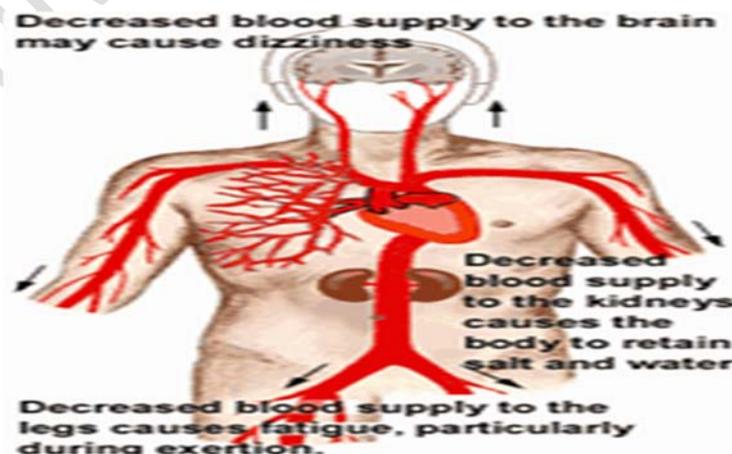
- The heart's inability to pump enough blood to meet the body's oxygen and nutrition demands.
- Also the HF a state in which the heart cannot provide sufficient cardiac output to satisfy the metabolic needs of the body.
- Heart Failure- Clinical syndrome can result from any structural or functional cardiac disorder that impairs ability of ventricle to fill with or eject blood.

Ejection Fraction: The ejection fraction (EF) is the percentage of blood that is pumped out with each heartbeat. This measures the heart's capacity and functioning ability. During each heartbeat, the heart contracts and relaxes. The ventricles (the heart's lower chambers) are the pumping chambers. In contraction (systole), the heart ejects blood from the ventricles. When the heart relaxes (diastole), the ventricles fill with blood. A normal ejection fraction in a person at rest is typically between 55 and 70 percent. If the heart muscle has been damaged by heart attack, heart muscle disease or heart valve problems, the ejection fraction may be below normal. Certain imaging tests are used to measure ejection fraction such as an echocardiogram, cardiac catheterization, magnetic resonance imaging (MRI) and computerized tomography (CT).

Pathophysiology of Heart Failure :

- Heart failure means heart muscle has weakened and cannot pump blood efficiently throughout the body. This causes: blood to pool in legs, feet and ankles, liver, kidneys to retain excess water and sodium; and fluid to back up into lungs, leading to shortness of breath. This buildup of fluid is called heart failure.
- When heart begins to fail weaken > unable to pump blood forward- fluid backs up > Increase pressure within all organs.

Heart Failure:

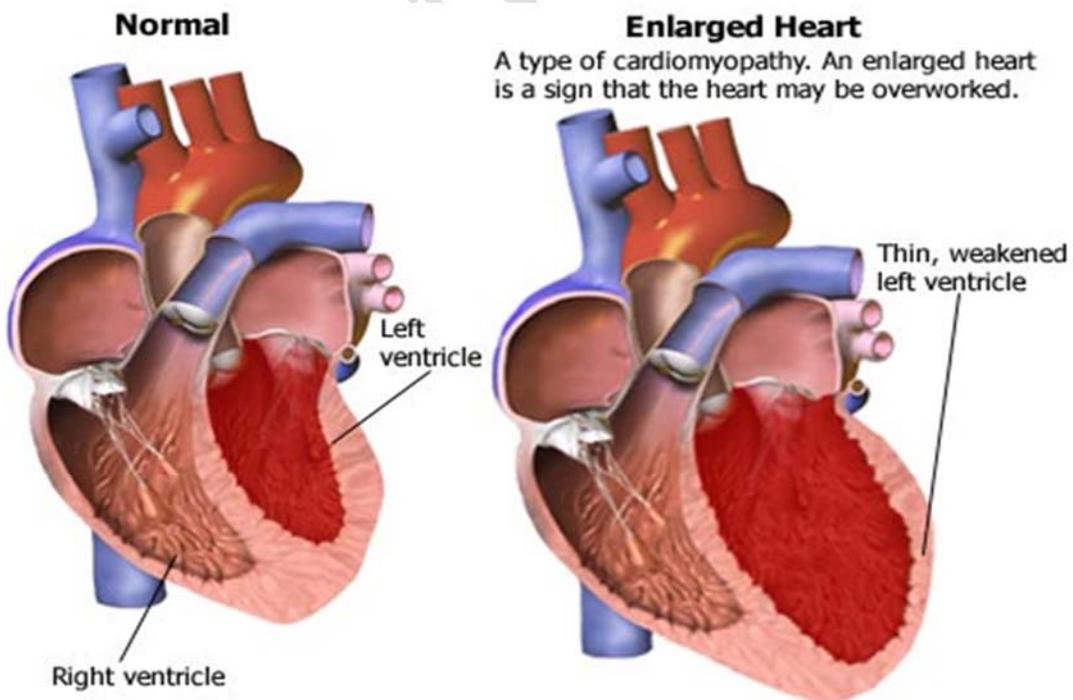


Heart Failure:



The X-Ray on the left shows a normal heart.

On the right, the heart is enlarged.



Types of Heart Failure :

1. Based on type of function affected:

- Systolic (pumping problem): Inability of the heart to contract to provide enough blood flow forward due to (MI) , Hypertension, valve disease.
- Diastolic (filling problem): Inability of the left ventricle to relax normally, resulting in fluid back up into the lungs.

2. Based on side of heart involved:

- Left-sided: Inability of the left ventricle to pump enough blood, causing fluid back up into the lungs. The lungs: congested > “stiffer” , increase effort to breathe; fluid starts to escape into alveoli; fluid interferes with O₂ exchange, aggravates shortness of breath, Shortness of breath during exertion, may be early symptoms > progresses > later require extra pillows at night to breathe > dyspnea , Pulmonary edema .
- Right-sided: Inability of the right ventricle to pump blood efficiently, causing fluid buildup in the abdomen, legs, ankles and feet - blood from feet and legs > back-up of fluid and pressure in these areas, heart unable to pump blood as received > increase fluid within feet and legs causes fluid to "seep" out of blood vessels ; increase weight.

3. Based on duration :

- Acute: an emergency situation in which a patient was completely asymptomatic before the onset of heart failure; seen in acute heart injury such as MI.
- Chronic: long-term syndrome in which a patient exhibits symptoms over a long period of time, usually as a result of a preexisting cardiac condition.

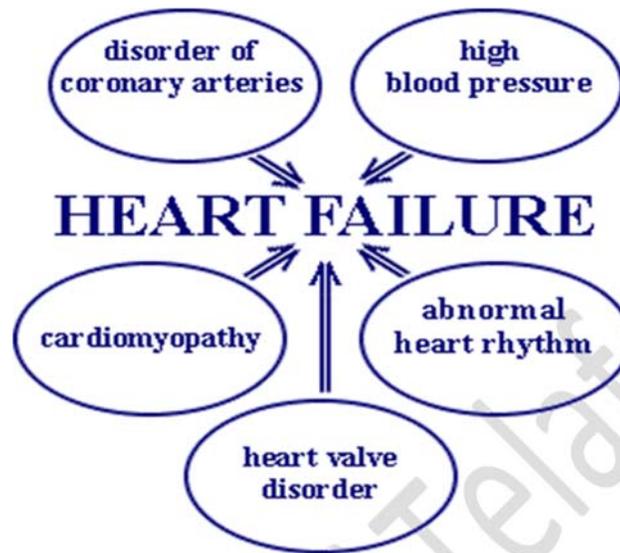
Stages of Heart Failure:

Class	Patient Description
I (<i>Stage A</i>) or class I	Asymptomatic, no limitation of normal physical activity, identifies patients at high risk for heart failure because of conditions such as hypertension, diabetes, and obesity.
II (<i>Stage B</i>) or class II	Mild HF symptoms, comfortable at rest but symptoms on mild exertion, includes patients with structural heart disease, such as left ventricular hypertrophy, or previous M I, slight limitation of physical activity.
III(<i>Stage C</i>) or class III	Moderate, comfortable at rest but symptoms on moderate or severe exertion. Modify fluid and dietary intake, Use additional drug therapies, such as diuretics, aldosterone inhibitors, and ACE inhibitors, digoxin, and vasodilators, Administer anticoagulation therapy to patients with a history of previous embolic event, marked limitation of physical activity .
IV(<i>Stage D</i>) or class IV	Sever inability to perform any physical activity with discomfort, which may be present at rest. advanced heart failure having symptoms at rest or with minimal exertion and frequently requiring intervention in the acute setting because of clinical deterioration , may require I.V. diuretics, (dopamine), or vasodilators (nitroglycerin), experimental surgery or drugs, or a heart transplant or end-of-life.

Etiology and Risk Factors of Heart Failure:

- Hypertension: increases cardiac workload, leads to hypertrophy.
- Coronary artery disease : (CAD) primary cause of heart failure in 60% of patients .
- Age : Advancing age, Heart failure is more common in people older than 65.
- Diabetes
- Tobacco use
- Obesity
- High serum cholesterol
- African American descent(Race)
- Valvular heart disease: increases pressure within the heart.
- Cardiomyopathy: disease of the myocardium; three types: dilated, hypertrophic, and restrictive.
- Abnormal heart rhythm(Cardiac arrhythmia)
- Hypervolemia
- Electrolyte abnormalities
- Increased metabolic rate
- Iron overload
- Hypoxia
- Severe anemia
- Lack of exercise

Figure the conditions that can lead to Heart Failure:



Signs & Symptoms of Left-Sided Heart Failure:

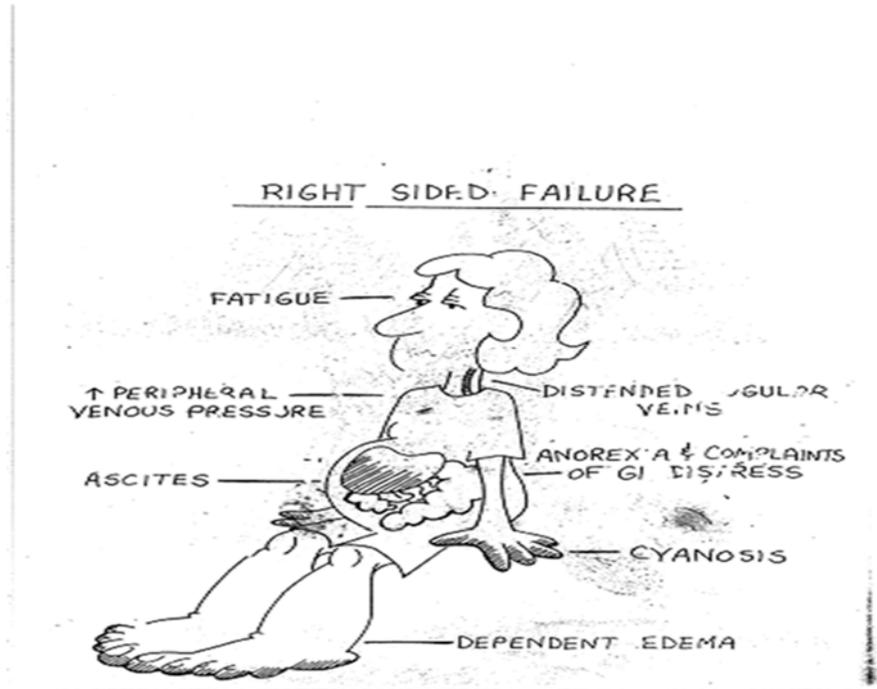
- Dyspnea
- Unexplained cough
- Pulmonary crackles
- Low oxygen saturation
- Third heart sound
- Reduced urine output
- Altered digestion
- Dizziness and light-headedness
- Confusion
- Restlessness and anxiety
- Fatigue and weakness

Signs & Symptoms of Right-Sided Heart Failure :

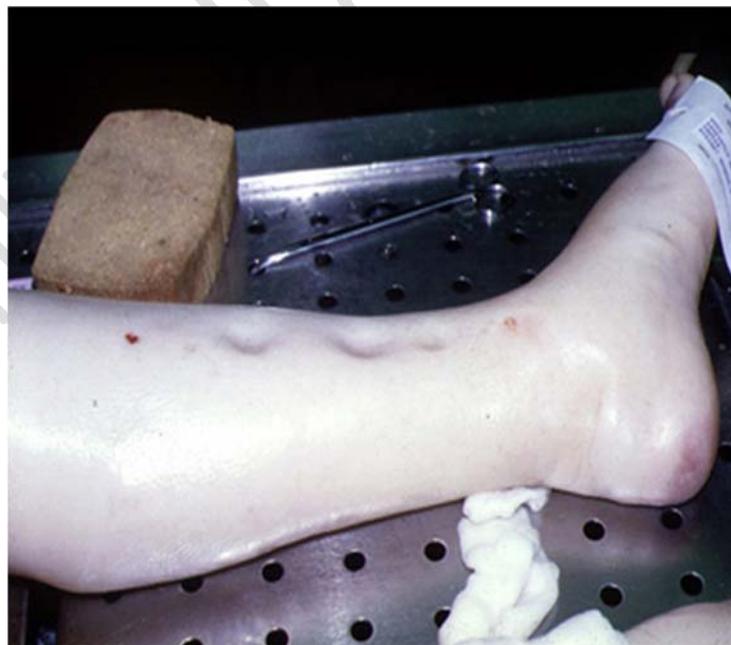
- Lower extremity edema
- Ascites
- Anorexia and Nausea
- Liver enlargement
- (Hepatomegaly)
- Abdominal pain
- Weight gain
- Weakness and fatigue

Symptoms of HF:





Lower extremity edema



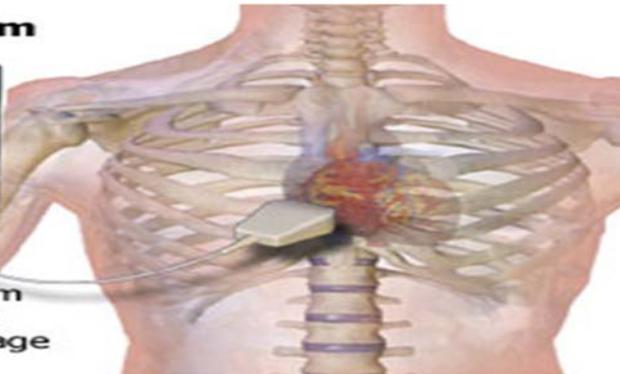
Diagnostic Tests:

- Medical history and physical exam (dyspnea)
- Brain natriuretic peptide measurement(BNP) normal value less than 100 .
- Lab tests: complete blood cell count, liver function studies, and urinalysis, cardiac enzymes.
- Other tests: thyroid function tests and fasting lipid profile.
- Echocardiogram to assess ejection fraction (EF)
- Chest X-ray
- Cardiac stress test
- Cardiac catheterization
- Cardiac computed tomography scan (CT) or magnetic resonance imaging(MRI).
- ECG monitoring
- Pulmonary function tests
- Heart biopsy
- Exercise testing and Halter monitor (6-minute walk)

Echocardiogram

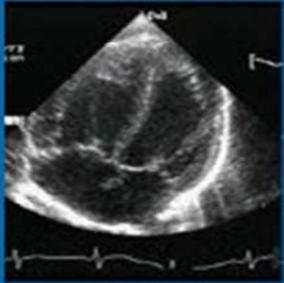


An echocardiogram uses sound waves to produce an image of the heart.



Echocardiography

- EF is the "single most important measurement in HF"
- It helps define etiology and type of HF
- There is no correlation between symptoms and EF



Podder B, Coats TJ. Cost-effective treatment strategies for acute decompensated heart failure. J Am Coll Cardiol 1999; 33: 22A-30A.

Management Strategies for Acute Decompensated Heart Failure: From ER to Discharge

Three Basic Treatment Strategies of Heart Failure:

- Pharmacologic management
- Lifestyle management
- Devices and surgical management

Pharmacologic Management:

- ACE inhibitor (Vasodilators):

(angiotensin-converting enzyme) inhibitors. such as captopril and enalapril .These drugs alleviate heart failure symptoms by causing vasodilation, Lower blood pressure, Decrease heart's workload, Improves ventricular function.

- A beta-blocker should be started on all patients with an EF less than 40%. such as bisoprolol, and metoprolol, reduce heart rate,

help lower blood pressure, peripheral vasoconstriction, and myocardial ischemia.

- An aldosterone antagonist may be added for patients whose EF is less than 35% and who are on an adequate ACE inhibitor .
- Hydralazine/ Isorbide.
- Digoxin. Makes the heart pump more strongly. It may also help control certain types of irregular heartbeats.
- Diuretics (furosemide ,Thiazide, Spironolactone). Diuretics prompt kidneys to excrete sodium, chloride, and water, reducing fluid volume. They make urinate more . This helps to lower high levels of fluid in people with heart failure.
- Nitrates (nitroglycerin) to help relieve chest pain.
- Statins to lower cholesterol.
- Blood-thinning medications to help prevent blood clots.

Lifestyle Management:

- Adherence to treatment regime
- Symptom recognition
- Weight monitoring
- Diet and nutrition
- Control of Hypertension
- Fluid restriction may be required
- Alcohol and smoking cessation
- Physical activity
- Sodium- usually restricted to 2.5 g per day

Devices and Surgical Management:

- First option if the cause of heart failure can be treated surgically.
- An ICD may be used in patients with arrhythmias to prevent sudden cardiac death.
- A left ventricular assist device may be used as a bridge to transplant .
- End-stage heart failure patients may consider heart transplant.

Nursing Assessment:

- Vital signs
- Urine output

Nursing diagnoses

- Activity intolerance
- Decreased cardiac output
- Fluid volume excess
- Impaired gas exchange
- Anxiety.
- Deficient knowledge.

Nursing care of Decreased cardiac output:

- Plan frequent rest periods.
- Monitor VS and O2 sat at rest and during activity.
- Take apical pulse
- Review lab results
- Fluid restriction

- Elevate legs when sitting
- Teach relaxation and ROM exercises

Nursing care of Activity Intolerance:

- Provide O2 as needed
- Practice deep breathing exercises
- Teach energy saving techniques
- Monitor progression of activity
- Offer 4-6 meals a day

Nursing care of Fluid Volume Excess:

- Give diuretics
- Teach side effects of medications
- Teach fluid restriction
- Teach low sodium diet
- Daily weights
- Position in semi or high fowlers

Nursing care of Knowledge deficit:

- Low Na diet
- Fluid restriction
- Daily weight
- When to call Dr.
- Medications

Nursing Planning:

- Decrease in symptoms (e.g., shortness of breath, fatigue)
- Decrease in peripheral edema
- Increase in exercise tolerance
- Compliance with the medical regimen
- No complications related to HF

Nursing Interventions of HF:

- Administer medications and monitor response
- Weigh the patient daily.
- Auscultate lung sounds
- Monitor vital signs
- Identify and evaluate edema severity
- Examine skin turgor

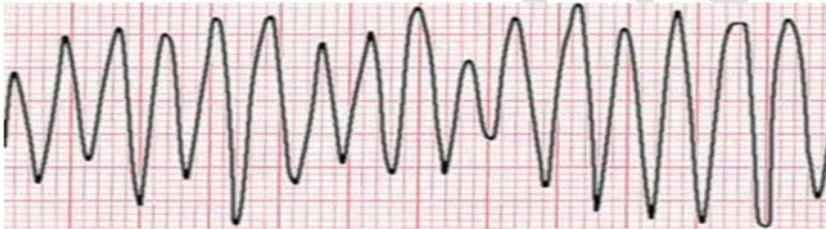
Patient Teaching of HF:

- The disorder, diagnosis, and treatment.
- Signs and symptoms of worsening heart failure.
- When to notify the healthcare provider.
- The importance of follow-up care.
- The need to avoid high-sodium foods
- The need to avoid fatigue
- Instructions about fluid restrictions

- The need for the patient to weigh himself every morning at the same time, before eating and after urinating, to keep a record of his weight.
- The importance of smoking cessation.
- Medication (lifelong) dosage, administration, side effect , and monitoring.

Complications of Heart Failure:

- Pleural effusion
- High risk of fatal dysrhythmias (e.g., sudden cardiac death, ventricular tachycardia) with HF and an EF <35%.



- HF lead to severe hepatomegaly, especially with RV failure .
- Fibrosis and cirrhosis - develop over time .
- Renal insufficiency or failure .
- Pulmonary Edema (advanced L side HF).
- **Atrial fibrillation (most common dysrhythmia)**
- Loss of atrial contraction .
- Thrombosis/embolism formation and increase risk for stroke.
- Treatment may include cardioversion, antidysrhythmics, and/or anticoagulants .

Pulmonary Edema (advanced L side HF):

Signs and symptoms

1. Wheezing
2. Pallor, cyanosis
3. Increase HR and BP
4. s3 gallop The Auscultation
5. Copious بلغم رغوة pink, frothy sputum غزير

Goals of Treatment/Pulmonary Edema): MAD DOG :

M- Morphine –decrease anxiety/afterload

A- (Airway/head up/legs down)

D- (Drugs) Digitalis not first now- but drugs as IV nitroglycerin; IV Nipride, Natrecor.

D- Diuretics.

O- Oxygen : Start O2 /intubate, careful observation

G- Blood gases

