

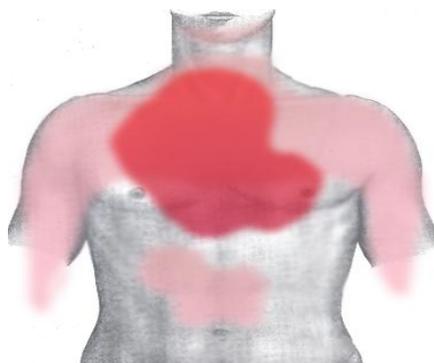
## **WEEK 6: Nursing care for patient with Myocardial infarction, Congestive heart failure, & Endocarditic.**

### **Myocardial infarction**

**Myocardial infarction** (MI), commonly known as a heart attack, occurs when blood flow decreases or stops in one of the coronary arteries of the heart, causing infarction (tissue death) of the heart muscle. This typically arises from the rupture of an atherosclerotic plaque, leading to thrombus formation and arterial blockage.

### **Signs and Symptoms**

Chest pain is the most typical symptom, often described as a sensation of tightness, pressure, or squeezing, and may radiate to the left shoulder, arm, jaw, or back. Other symptoms include shortness of breath, nausea, dizziness, cold sweat, and a feeling of tiredness. Women often present atypically with neck pain, arm pain, or fatigue rather than chest pain. Approximately 30% of people exhibit atypical symptoms, and about 5% of those over 75 years old may have had an MI with little or no history of symptoms. Silent MIs, occurring without any symptoms, are more common in the elderly, diabetics, and post-heart transplant patients.



Areas where pain is experienced in myocardial infarction, showing common (dark red) and less common (light red) areas on the chest.



Areas where pain is experienced in myocardial infarction, showing common (dark red) and less common (light red) areas on the back.

### **Diagnosis**

Diagnosis involves a combination of clinical evaluation, ECG, and biomarkers. An ECG is central in diagnosing MI, showing abnormalities like ST elevation, T wave inversion, or new Q waves. Elevated cardiac biomarkers, particularly troponins, are highly specific and indicate myocardial damage. Echocardiography and other imaging techniques like coronary angiography can further assess and confirm the diagnosis.

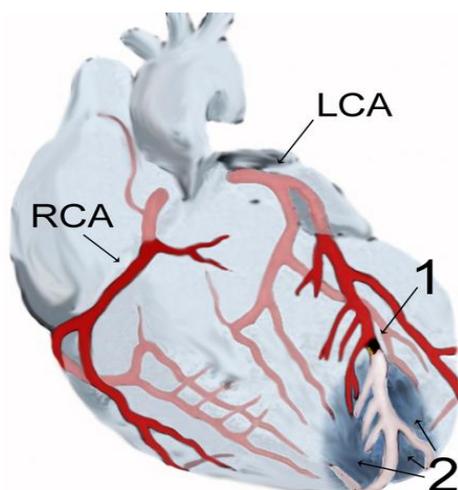


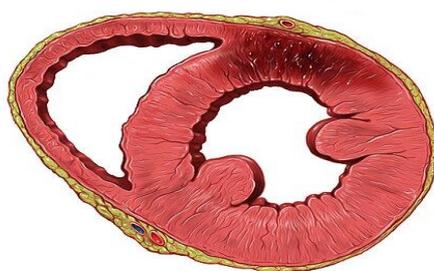
Diagram showing the blood supply to the heart by the two major blood vessels, the left and right coronary arteries.

### Risk Factors

Major risk factors for MI include high blood pressure, smoking, diabetes, lack of exercise, obesity, and high blood cholesterol. Genetics also play a role, with a family history of ischaemic heart disease increasing risk. Other factors include diet, stress, and certain medical conditions such as endometriosis in women under 40.

### Mechanism

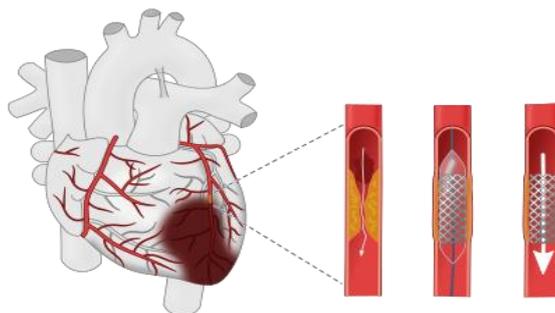
The primary mechanism is the rupture of an atherosclerotic plaque in a coronary artery, leading to thrombus formation and arterial occlusion. This blockage prevents oxygen-rich blood from reaching the heart muscle, resulting in tissue death. Other causes include coronary artery spasms and increased oxygen demand in a heart with limited blood supply.



Cross section showing anterior left ventricle wall infarction.

### Nursing Management

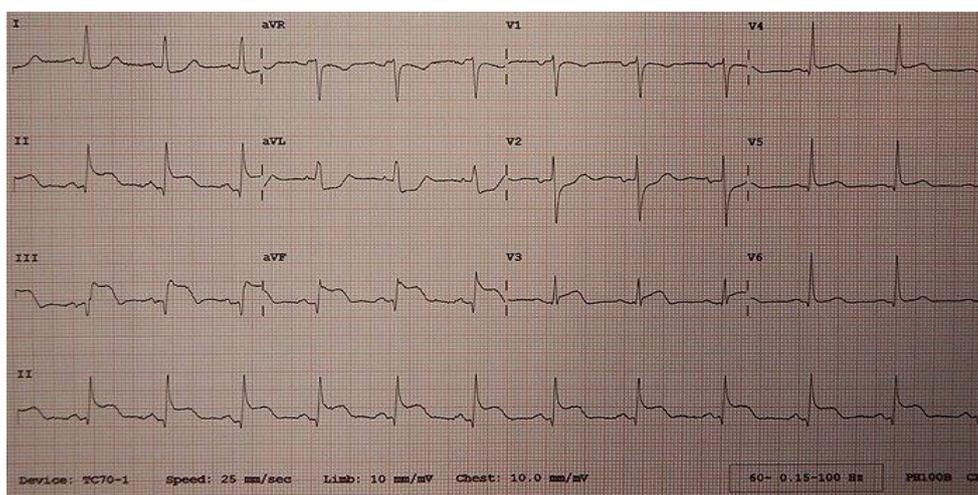
Immediate treatment aims to restore blood flow and minimize heart damage. Aspirin is administered to reduce clot size, and nitroglycerin may be used for pain relief. In STEMI, primary percutaneous coronary intervention (PCI) is preferred if performed within 90-120 minutes; otherwise, thrombolysis is recommended. For NSTEMI, early PCI is considered within 1-3 days. Long-term management includes lifestyle modifications and medications like aspirin, beta blockers, ACE inhibitors, and statins to prevent recurrence.



Inserting a stent to widen the artery.

## Prognosis

The prognosis varies depending on the extent of heart damage and the development of complications. Factors such as age, social isolation, and infarct location affect outcomes. Without treatment, the mortality rate is high, but early and effective treatment has significantly improved survival rates.



A 12-lead ECG showing an inferior STEMI due to reduced perfusion through the right coronary artery. Elevation of the ST segment can be seen in leads II, III and aVF.

## Prevention

Prevention strategies include lifestyle modifications such as regular exercise, maintaining a healthy weight, a balanced diet, quitting smoking, and moderating alcohol intake. Medications like statins are used to manage cholesterol levels, and aspirin may be prescribed for those at high risk. Public health measures and patient education are essential in reducing the incidence of MI.

## Self-assessment MCQs (select the best answer)

1. What is the primary cause of a myocardial infarction (MI)?
  - a. Coronary artery spasm
  - b. Atherosclerotic plaque rupture
  - c. Heart valve disease
  - d. Arrhythmia
  - e. Pericarditis

- 2. Which symptom is most commonly associated with myocardial infarction?**
  - a. Headache
  - b. Chest pain
  - c. Leg cramps
  - d. Skin rash
  - e. Blurred vision
  
- 3. In an ECG, which abnormality is indicative of a myocardial infarction?**
  - a. Lack of P wave
  - b. Shortened PR interval
  - c. ST elevation
  - d. Prolonged QT interval
  - e. T wave flattening
  
- 4. Which cardiac biomarker is highly specific for indicating myocardial damage?**
  - a. C-reactive protein
  - b. Troponins
  - c. Myoglobin
  - d. Creatine kinase
  - e. Lactate dehydrogenase
  
- 5. What is the preferred immediate treatment for STEMI if performed within 90-120 minutes?**
  - a. Thrombolysis
  - b. Primary percutaneous coronary intervention (PCI)
  - c. Coronary artery bypass grafting (CABG)
  - d. Administration of beta blockers
  - e. Use of calcium channel blockers
  
- 6. Which of the following is considered a major risk factor for myocardial infarction?**
  - a. Low blood pressure
  - b. Regular physical activity
  - c. High blood cholesterol
  - d. Moderate alcohol intake
  - e. Young age
  
- 7. Which medication is commonly administered to reduce clot size during a myocardial infarction?**
  - a. Beta blockers
  - b. ACE inhibitors
  - c. Aspirin
  - d. Statins
  - e. Diuretics
  
- 8. What is the primary goal of immediate treatment for myocardial infarction?**
  - a. Lowering blood pressure
  - b. Managing cholesterol levels
  - c. Restoring blood flow and minimizing heart damage
  - d. Reducing patient anxiety

- e. Increasing heart rate
- 9. Which demographic is more likely to experience a silent myocardial infarction?**
- a. Young adults
  - b. Non-diabetics
  - c. Post-heart transplant patients
  - d. Regular exercisers
  - e. Individuals with low cholesterol
- 10. What lifestyle modification is NOT a recommended strategy for preventing myocardial infarction?**
- a. Regular exercise
  - b. Quitting smoking
  - c. High-fat diet
  - d. Balanced diet
  - e. Maintaining a healthy weight

## Heart Failure

**Heart failure (HF)**, also known as congestive heart failure (CHF), is a syndrome characterized by the heart's inability to pump blood effectively to meet the body's needs. This results in symptoms such as shortness of breath, fatigue, and swollen legs. HF can be caused by various conditions, including heart attacks, high blood pressure, and infections.

### Signs and Symptoms

Symptoms of heart failure are often categorized based on which side of the heart is affected. Common symptoms include shortness of breath, excessive fatigue, and swelling of the legs.

### Left-Sided Heart Failure

The left side of the heart pumps oxygen-rich blood from the lungs to the rest of the body. Failure here leads to blood backing up into the lungs, causing respiratory symptoms like increased respiratory rate, laboured breathing, and pulmonary oedema. Other signs include a displaced apex beat and a gallop rhythm. Patients may also experience orthopnea (difficulty breathing while lying down) and paroxysmal nocturnal dyspnea (sudden nighttime shortness of breath).

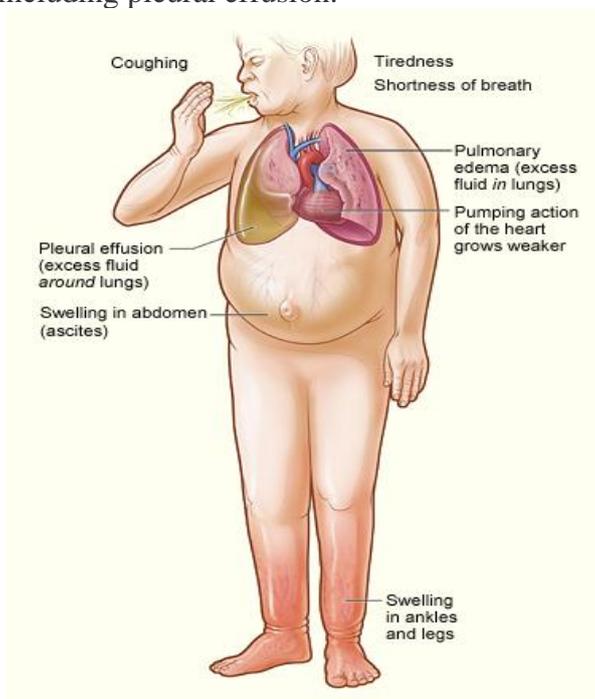
### Right-Sided Heart Failure

Right-sided heart failure, often caused by pulmonary hypertension or pulmonic stenosis, results in fluid accumulation in the body's tissues, leading to peripheral oedema, ascites, and liver enlargement. Jugular venous pressure is often elevated.



## Biventricular Failure

In biventricular failure, both sides of the heart are affected, leading to symptoms of both left and right heart failure, including pleural effusion.



## Causes

Heart failure can result from various conditions that alter the heart's structure or function.

Common causes include:

- Coronary artery disease
- Heart attack
- High blood pressure
- Atrial fibrillation
- Valvular heart disease
- Excessive alcohol consumption
- Cardiomyopathy

## Diagnosis

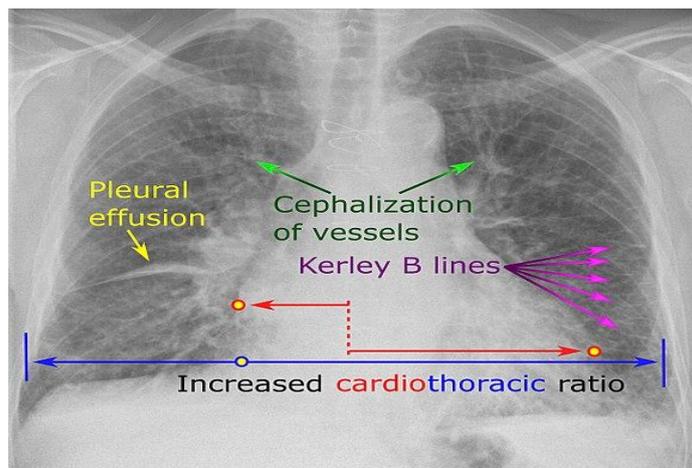
Diagnosis involves assessing symptoms, physical findings, and using diagnostic tools such as echocardiography, blood tests, and chest X-rays.

## Echocardiography

An echocardiogram is commonly used to evaluate heart function, determine ejection fraction, and identify structural abnormalities.

## Chest X-ray

Chest X-rays can show cardiomegaly and signs of pulmonary oedema, such as Kerley B lines.



## Blood Tests

N-terminal pro-BNP (NT-proBNP) and brain natriuretic peptide (BNP) levels are biomarkers used to diagnose heart failure.

## Treatment

Treatment focuses on improving symptoms and preventing disease progression. Management strategies include lifestyle changes, medications, and sometimes device therapy or surgery.

## Lifestyle Changes

Patients are advised to stop smoking, engage in physical exercise, and follow a heart-healthy diet. Fluid and salt intake may need to be restricted.

## Medications

First-line medications include:

- **Diuretics:** To reduce fluid retention.
- **ACE inhibitors/ARBs:** To lower blood pressure and decrease heart workload.
- **Beta blockers:** To slow heart rate and reduce blood pressure.
- **Mineralocorticoid receptor antagonists:** For further blood pressure control.
- **SGLT2 inhibitors:** For patients with reduced ejection fraction.

## Devices and Surgery

In severe cases, implanted devices such as pacemakers or implantable cardiac defibrillators may be recommended. In advanced heart failure, ventricular assist devices or heart transplantation may be necessary.

## Palliative Care

For end-stage heart failure, palliative care focuses on symptom management and quality of life.



Heart failure is a complex condition requiring comprehensive management to improve patient outcomes and quality of life. Early diagnosis and intervention are critical for managing symptoms and slowing disease progression.

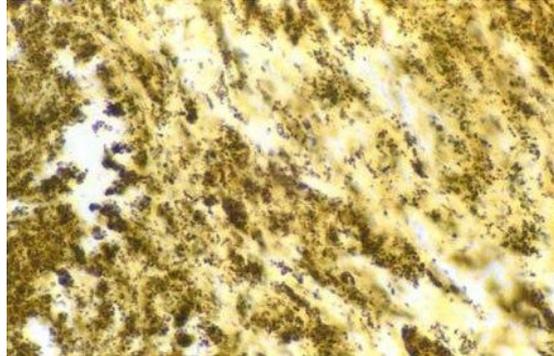
### Self-assessment MCQs (select the best answer)

1. **Which of the following is the most common cause of right-sided heart failure?**
  - a. Myocardial infarction
  - b. Pulmonary hypertension
  - c. Diabetes mellitus
  - d. Valvular heart disease
  - e. Hyperthyroidism
  
2. **What is a common symptom of left-sided heart failure?**
  - a. Ascites
  - b. Peripheral oedema
  - c. Jugular venous distension
  - d. Pulmonary oedema
  - e. Hepatomegaly
  
3. **Which diagnostic tool is most commonly used to assess ejection fraction in heart failure patients?**
  - a. Electrocardiogram (ECG)
  - b. Chest X-ray
  - c. Echocardiogram
  - d. Cardiac MRI
  - e. Angiography
  
4. **What is the primary goal in the acute management of decompensated heart failure?**
  - a. Reducing blood cholesterol levels
  - b. Re-establishing adequate perfusion and oxygen delivery
  - c. Increasing sodium intake
  - d. Long-term weight management
  - e. Initiating cardiac rehabilitation

- 5. Which medication is recommended for patients with heart failure with reduced ejection fraction (HFrEF) and has shown to improve survival?**
- Calcium channel blockers
  - Beta blockers
  - Digoxin
  - Antiplatelet drugs
  - Statins
- 6. Which condition is NOT commonly associated with causing heart failure?**
- Hypertension
  - Coronary artery disease
  - Diabetes mellitus
  - Hepatitis B
  - Valvular heart disease
- 7. What is the most likely physical finding in a patient with right-sided heart failure?**
- Pulmonary rales
  - Ascites
  - Displaced apex beat
  - S3 gallop
  - Cyanosis
- 8. Which of the following is a non-pharmacological treatment recommended for managing chronic heart failure?**
- Increased sodium intake
  - Regular physical exercise
  - Sedentary lifestyle
  - High-fat diet
  - Smoking
- 9. In which patient population is heart failure most commonly seen?**
- Infants
  - Teenagers
  - Adults aged 20-30 years
  - Adults over 70 years
  - Pregnant women
- 10. What is a characteristic feature of high-output heart failure?**
- Low cardiac output
  - Increased blood flow demand that the heart cannot meet
  - Reduced peripheral resistance
  - Low heart rate
  - Hypercholesterolaemia

## Endocarditis

Endocarditis is an inflammation of the inner layer of the heart, the endocardium, typically involving the heart valves. Other structures that may be involved include the interventricular septum, the chordae tendineae, the mural endocardium, or the surfaces of intracardiac devices. Endocarditis is characterized by lesions known as vegetations, which are composed of masses of platelets, fibrin, microcolonies of microorganisms, and scant inflammatory cells. In subacute cases, these vegetations may also include granulomatous tissue, which can fibrose or calcify.



*Bartonella henselae* bacilli in cardiac valve of a patient with blood culture-negative endocarditis. The bacilli appear as black granulations.

### Classification

Endocarditis can be classified as either infective or non-infective, depending on whether a microorganism is the source of the inflammation.

### Signs and Symptoms

Common signs and symptoms of endocarditis include fever, chills, sweating, malaise, weakness, anorexia, weight loss, splenomegaly, a flu-like feeling, cardiac murmur, heart failure, petechia (red spots on the skin), Osler's nodes (subcutaneous nodules on hands and feet), Janeway lesions (nodular lesions on palms and soles), and Roth's spots (retinal haemorrhages).

### Infective Endocarditis

Infective endocarditis is an infection of the inner surface of the heart, usually the valves. Symptoms may include fever, small areas of bleeding into the skin, heart murmur, feeling tired, and low red blood cells. Complications may include valvular insufficiency, heart failure, stroke, and kidney failure.

### Causes and Risk Factors

The cause is typically a bacterial infection and less commonly a fungal infection. Risk factors include valvular heart disease (including rheumatic disease), congenital heart disease, artificial valves, hemodialysis, intravenous drug use, and electronic pacemakers. The bacteria most commonly involved are streptococci or staphylococci.

### Diagnosis

The diagnosis relies on the Duke criteria, initially described in 1994 and modified in 2000. Clinical features and microbiological examinations are the first steps to diagnose infective endocarditis. Imaging is also very important, with echocardiography being the cornerstone.

Alternative imaging modalities like computer tomography, magnetic resonance imaging, and positron emission tomography/computer tomography (PET/CT) with 2-[18F]fluorodeoxyglucose (FDG) play an increasing role in the diagnosis and management.

## **Treatment**

Treatment generally involves intravenous antibiotics, with the choice based on blood cultures. Occasionally, heart surgery is required. Prevention is recommended in high-risk patients, such as those with previous infective endocarditis, surgical or transcatheter prosthetic valves, or untreated congenital heart disease.

The number of people affected is about 5 per 100,000 per year, with males being more affected than females. The risk of death among those infected is about 25%, but without treatment, it is almost universally fatal.

## **Non-infective Endocarditis**

Nonbacterial thrombotic endocarditis (NBTE) is most commonly found on previously undamaged valves. Unlike infective endocarditis, the vegetations in NBTE are small, sterile, and tend to aggregate along the edges of the valve or the cusps. NBTE usually occurs during a hypercoagulable state such as system-wide bacterial infection or pregnancy.

It may also occur in patients with cancer, particularly mucinous adenocarcinoma. Typically, NBTE does not cause many problems on its own, but parts of the vegetations may break off and embolize to the heart or brain, or they may serve as a focus where bacteria can lodge, thus causing infective endocarditis.

Another form of sterile endocarditis is Libman–Sacks endocarditis, which occurs more often in patients with lupus erythematosus and is thought to be due to the deposition of immune complexes. Libman-Sacks endocarditis involves small vegetations and does not have a preferred location of deposition, potentially forming on the undersurfaces of the valves or even on the endocardium.

## **Self-assessment MCQs (select the best answer)**

- 1. What is the primary structure affected by endocarditis?**
  - a. Myocardium
  - b. Pericardium
  - c. Endocardium
  - d. Epicardium
  - e. Pleura
  
- 2. What are the vegetations in endocarditis composed of?**
  - a. Only platelets and fibrin
  - b. Platelets, fibrin, microcolonies of microorganisms, and scant inflammatory cells
  - c. Only microcolonies of microorganisms and fibrin
  - d. Platelets, fibrin, and red blood cells
  - e. Only inflammatory cells
  
- 3. Which of the following is NOT a common sign or symptom of endocarditis?**
  - a. Fever
  - b. Splenomegaly
  - c. Cardiac murmur

- d. Cough
- e. Roth's spots

**4. Which bacteria are most commonly involved in infective endocarditis?**

- a. Escherichia coli
- b. Streptococci or staphylococci
- c. Pseudomonas aeruginosa
- d. Listeria monocytogenes
- e. Clostridium difficile

**5. What is the primary diagnostic tool for infective endocarditis?**

- a. Chest X-ray
- b. Electrocardiogram (ECG)
- c. Echocardiography
- d. Serum electrolytes
- e. Liver function tests

**6. Which of the following is NOT a risk factor for infective endocarditis?**

- a. Valvular heart disease
- b. Intravenous drug use
- c. Artificial valves
- d. Asthma
- e. Hemodialysis

**7. What is the prevalence of endocarditis?**

- a. 1 per 100,000 per year
- b. 5 per 100,000 per year
- c. 10 per 100,000 per year
- d. 20 per 100,000 per year
- e. 50 per 100,000 per year

**8. What is the main treatment for infective endocarditis?**

- a. Oral antibiotics
- b. Intravenous antibiotics
- c. Antiviral medication
- d. Corticosteroids
- e. Antifungal medication

**9. Which form of endocarditis is more likely to occur in patients with lupus erythematosus?**

- a. Nonbacterial thrombotic endocarditis (NBTE)
- b. Infective endocarditis
- c. Libman-Sacks endocarditis
- d. Rheumatic endocarditis
- e. Viral endocarditis

**10. In nonbacterial thrombotic endocarditis (NBTE), what is the nature of the vegetation?**

- a. Large and infected

- b. Small, sterile, and tend to aggregate along the edges of the valve or the cusps
- c. Composed mainly of red blood cells
- d. Located primarily on the mural endocardium
- e. Large and sterile