

Nursing Focus: Module 4

Cardiac Focus

Facilitator's Manual

Facilitator's Guide

Transparency Masters

Handouts

Written Test

Answer Key

Developed by the
Curriculum and Instructional Materials Center
for the Division of Health Occupations Education
Oklahoma Department of Career and Technology Education

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OBJECTIVE SHEET**CARDIAC FOCUS****4****INTRODUCTION**

You will care for patients who have a variety of cardiac conditions. It is important that you recognize the signs and symptoms of abnormal cardiac function. This module is designed to help you understand the normal structure and function of the heart and the conditions that affect the heart. It will also help you determine the nursing care and support you need to provide for patients with cardiac conditions.

MODULE OBJECTIVE

After completing this module, you will show the following competencies by mastering the activities on the Learning Activities and by scoring at least 85% on the Written Test.

SPECIFIC OBJECTIVES**Systems Focus**

1. Discuss the structure and function of the heart.
2. Describe the cardiac conduction cycle.
3. Locate and name the structures of the heart.
4. Illustrate the path of blood through the heart, lungs, and great vessels.

Nursing Focus

5. Discuss diseases and disorders that damage the heart.
6. Present researched information about nursing care of patients with heart damage. (Learning Activity)
7. Discuss diseases and disorders that affect heart conduction.
8. Illustrate selected conduction disorders. (Learning Activity)
9. Discuss heart disorders that affect lung function.
10. Compare myocardial infarction and congestive heart failure.
11. Present researched information about the care of patients with congestive heart failure. (Learning Activity)

Support Focus

12. Discuss categories of medications used to treat cardiac disorders.
13. Explain diagnostic tests and surgical procedures for cardiac disorders.

14. Use a concept map to connect selected cardiac disorders with medications, nursing care, diagnostic tests, and surgical procedures.

Recommended Activities and Resources (R)

These are fully integrated components of this CIMC curriculum. They are usually packaged in or with the curriculum and are essential in meeting the learning objectives.

- All handouts are reproducible and are contained in this document. Handouts should be copied for all students as needed.
- Non-reproducible resources are included in the student's curriculum.

Optional Activities and Resources (O)

These are suggested high-interest activities to help deliver learning objectives to students or to let students achieve objectives in an applied context. Select as many as you wish to use. Some activities use extra resources for further information about module content. You can make them available in the classroom for in-depth study or optional activities, but their use is not required for meeting CIMC module objectives.

Learning Activities (L)

These activities are integrated components of this CIMC curriculum. They are designed to increase student participation in the learning process through application-level activities that are essential in meeting the learning objectives. Some Learning Activities have prepared rubrics for student assessment while others are designed for facilitators to develop their own evaluation instruments.

Evaluation (E)

Some objectives are evaluated on the Written Test; others are evaluated on a Competency Checklist or Learning Activity. While Learning Activity objectives do not appear on the Written Test, information acquired in a Learning Activity may be used to complete other objectives and as such may be tested on the Written Test as part of those objectives.

GENERAL INSTRUCTIONS

Facilitation Activities

- R** Review the objectives and Learning Activities in the module.
- R** Make certain any supplies or equipment needed are available.
- R** When Learning Activities are completed, ensure that all learners have the correct answers for testing purposes, where appropriate.
- R** Return any Learning Activities you may have to the learners so that they may use them for later reference.
- R** Some objectives will have answers and some will be evaluated by rubrics. These will be included in the Learning Activity Answers in the Facilitator's Guide.

Competency Checklists

- R** Review the introduction and evaluation criteria for the Competency Checklist. Remind the learners that they should not fill in the blanks in the Yes/No columns.
- R** Review and explain all general guidelines, safety cautions, and warnings.
- R** Make sure that all tools, equipment, and supplies are available.
- R** Demonstrate each of the procedures outlined in the Competency Checklist.
- R** Allow the learners to practice the Competency Checklist skills before skills testing. Coach, correct, and supervise as necessary.
- R** Have the learners complete the Competency Checklist. Evaluate each learner's performance and provide remediation as necessary. Have the learners repeat the Competency Checklist until they achieve mastery.
- R** Complete each learner's Profile of Training Mastery.
- R** Return the completed Competency Checklists to the learners so that they may use them for later reference if needed.

OBJECTIVE 1**SYSTEMS FOCUS****Discuss the structure and function of the heart.**

R Assist learners in finding information about the heart on computer software and/or anatomy and physiology textbooks.

R Ensure that learners have the correct answers to the questions in the objective. These answers are:

1. Two layers of pericardium, fibrous and serous, with a few drops of fluid between them in the pericardial space, keep the heart from rubbing on surrounding structures as it beats.
2. Answers appear in the following chart:

Structure	Location	Function
Chambers		
Right atrium	upper right chamber of heart	pumps blood from vena cava to right ventricle
Left atrium	upper left chamber of heart	receives blood from lungs and pumps to left ventricle
Right ventricle	lower right chamber of heart	receives blood from the right atrium and pumps to lungs through pulmonary artery
Left ventricle	lower left chamber of heart	receives blood from left atrium and pumps to body through aorta
Valves		
Tricuspid	between the right atrium and the right ventricle	one-way door, keeps blood from flowing backwards
Pulmonary	between right ventricle and pulmonary artery	one-way door, keeps blood from flowing backwards
Bicuspid (Mitral)	between the left atrium and the left ventricle	one-way door, keeps blood from flowing backwards
Aortic	between the left ventricle and the aorta	one-way door, keeps blood from flowing backwards

Great Vessels		
Inferior Vena Cava	attaches to the right atrium from above	returns blood from the head and upper extremities to the heart
Superior Vena Cava	attaches to the right atrium from below	returns blood from lower body to the heart
Pulmonary Artery	attaches to the right ventricle and the lungs	carries deoxygenated blood from the heart to the lungs
Pulmonary Veins	attaches to the lungs and the left atrium	carries oxygenated blood from the lungs back to the heart
Aorta	attaches to the left ventricle and branches to all parts of the body	carries oxygenated blood from the heart to the rest of the body tissues

3. Pulmonary arteries and veins are unusual because they are the only arteries that carry deoxygenated blood and the only veins that carry oxygenated blood.
4. Coronary arteries are important because they supply the heart muscle with oxygen and nutrients.
5. The “lup-dup” sound you hear when you listen to the heart with a stethoscope is the sound of the heart valves opening and closing.

- R** Discuss the structure and function of the heart with learners to ensure they understand this information.
- O** Arrange to get a pig heart from a slaughterhouse. (Pig hearts that have been cleaned and are sold for consumption do not contain pericardium, endocardium, or valves). Show learners the structures of the heart and explain how they function. The coronary arteries are easy to see on a pig heart, which is very similar in size and structures to a human heart.
- E** This objective is evaluated on the Written Module.

OBJECTIVE 2

Describe the cardiac conduction cycle.

R Assist learns in finding answers to the questions in the objective. This topic may be difficult to understand using anatomy and physiology textbooks. The information in the *A.D.A.M. Essentials* animation is excellent for explaining this concept.

R Ensure that learners have the correct answers to the questions in the objective. These are:

1.

Structure	Location	Function
Nodes		
Sinoatrial	right atrium	begins heartbeat, causes atria to contract
Atrioventricular	(where atria and ventricles come together)	relays impulse from atria to ventricles
Bundle of His	(In the top part of the septum)	relays impulse to bundle branches
Bundle branches	inner walls of left and right ventricles	relays impulse down inner ventricle wall
Purkinje fibers	outside walls of ventricles	relays impulse up outer walls of ventricles, causing them to contract

2. The conduction system of the heart controls the heartbeat by conducting electrical impulses through muscle to cause contraction of the atria and ventricles.

✓ **NOTE:** Tie this to what was learned in the muscular system about involuntary muscular contraction.

3. If the SA node didn't work, the electrical stimulation to make the heart beat would not occur and the heart would not beat at all or would beat very slowly from the ventricles.

4. If the left bundle branch didn't work, the left ventricle wouldn't get the message to completely contract and would not pump blood out to the body.

OBJECTIVE 3

- R** Discuss the conduction system of the heart to ensure that learners understand the concepts presented here.
- O** Make a large poster of the heart in cross-section. Use “chasing” Christmas lights to illustrate the nerve impulse from the SA node through the atria to the AV node, then down the Bundle of His and to the Purkinje fibers. Press the lights through holes in the posterboard located at the sites of these structures. Then turn on the lights to illustrate the conduction system.
- E** This objective is evaluated on the Written Test.

Locate and name the structures of the heart.

- R** Assign learners to work individually on this activity.
- R** Assist learners in finding locations of heart structures on diagrams in textbooks or in software.
- O** Use a model heart and ask learners to locate structures on the heart.
- O** Have learners make a three-dimensional model heart and label its structures.
- L** *Learning Activity: What’s In Your Heart?*
- L** The heart puzzle on *A.D.A.M. Essentials* allows learners to click and drag heart structures to their correct locations and is a useful learning tool. The answers to the puzzle are:
 - pericardium went between the lungs and slightly lower
 - pulmonary artery went at the top of the pericardium
 - inferior vena cava went to the lower left edge of the pericardium
 - pulmonary veins went at the back of the pericardium
 - heart went on top of the pericardium
 - superior vena cava went above the right atrium
 - aortic arch went at the top of the heart between the superior vena cava and the pulmonary artery
 - coronary arteries went in the atrioventricular groove on top of the heart
 - coronary veins went on top of the heart

When you get it right the heart beats and pumps

- E** Evaluate the labeled heart drawings for accuracy.

OBJECTIVE 4

Illustrate the path of blood through the heart, lungs, and great vessels.

- R** Assist learners in finding information needed to complete the illustration.
- O** Have learners use the diagram of the heart provided for objective 3 for this activity, rather than draw a heart.
- L** *Learning Activity: Where the Blood Goes*
- L** Discussion of the “What would happen if...” questions helps connect with diseases and disorders of the heart found in the Focus section. Discussion should include:
 1. If a hole existed between the right and left atrium unoxygenated blood from the body would mix with oxygenated blood from the lungs and be pumped out through the left ventricle to the body. This condition is called *atrial septal defect*.
 2. If a hole existed between the right and left ventricle, unoxygenated blood from the body in the right ventricle could mix with oxygenated blood in the left ventricle and be pumped to the body, thereby decreasing the amount of available oxygen to the body tissues. This condition is called a *ventricular septal defect*.
 3. If the mitral valve did not open and close properly, blood from the left ventricle would push back into the left atrium when the ventricle beats. Less blood would be pumped out to the body.
- L** Evaluate the diagrams for accuracy.
- E** This objective is not included on the Written Test. However, information acquired from this Learning Activity may be used to complete other objectives and, as such, may be tested as part of those objectives. Ensure that all learners have the correct answers to the Learning Activity.

NURSING FOCUS

OBJECTIVE 5

Discuss diseases and disorders that damage the heart.

- R** Assist learners in finding answers to the questions in the objective. These answers are:

Coronary Artery Disease (CAD)

1. cholesterol, lipids, and cellular debris
2. Blood flow to the cardiac muscle (myocardium) is decreased.

3. African Americans have an early age of onset of CAD and have a higher incidence in women than in Caucasian women. African Americans also have a higher incidence of hypertension than Caucasian Americans. Native Americans younger than 35 have nearly twice the mortality rate due to heart disease of other Americans. This may be due to high incidence of obesity and diabetes. Hispanics have a lower death rate from heart disease than non-Hispanics.
4. Four nonmodifiable risk factors are:
 - family history—the tendency toward developing cardiac disease within families is documented
 - age—approximately 50% of all MIs occur in persons over 65
 - sex—men have greater incidence of heart disease than women; post-menopausal women are affected due to decrease in estrogen production
 - race—African American males have higher incidence of hypertension than Caucasian males; Native Americans younger than 35 have a greater risk for heart disease than other Americans of that age
5. Any six of the following modifiable risk factors:
 - smoking—individuals who smoke have chances for cardiovascular disease two to three times greater than those who do not smoke
 - hyperlipidemia—high lipid (fat) levels in the blood, including cholesterol and triglycerides, contribute to plaque formation on artery walls
 - hypertension—blood pressure higher than 140/90 increases the risk for developing heart disease
 - diabetes mellitus—elevated blood glucose may damage the lining of arteries and contribute to atherosclerosis; diabetes also interferes with fat metabolism, causing high serum lipid levels
 - obesity—increases the workload of the heart and contributes to other risk factors
 - sedentary lifestyle—lack of regular exercise contributes to cardiovascular disease; exercise helps decrease other risk factors such as obesity, hypertension, and hyperlipidemia
 - stress—the body's response to stress increases heart rate and affects cells in the myocardium; vasoconstriction due to stress response can further narrow arteries and raise blood pressure
 - oral contraceptives—increase risk of clots and perhaps other factors that contribute to heart disease
 - psychosocial factors—people with Type A personality traits that include aggressiveness, competitiveness, perfectionism, compulsiveness, and an urgent sense of time have been found to be more likely to develop cardiac disease, especially when combined with other risk factors

Angina Pectoris

1. decreased blood flow to an organ or body part; often causing pain
2. Any four of the following increase cardiac workload and typically bring on angina:
 - exposure to cold
 - exercise
 - unusually heavy meals
 - emotional stress
 - strenuous activity
3. Unstable angina is a prolonged episode of severe pain or discomfort that occurs at rest, has never occurred before, or is worse than previous episodes.
4. Angina pain may occur in any of the following locations:
 - beneath sternum radiating to neck and jaw
 - radiating down left arm
 - epigastric area
 - epigastric area radiating to neck, jaw, and arms
 - neck and jaw
 - left shoulder and inner aspect of both arms
 - between shoulder blades in the back
5. Nitroglycerin is given sublingually to patients with chest pain. It usually relieves angina symptoms but does not relieve the pain from an MI.
6. Any four of the following subjective assessments:
 - note location, intensity, radiation, and duration of pain
 - assess for feeling of impending death
 - assess any precipitating factors that resulted in anginal pain
 - assess for changes in frequency or worsening of symptoms
 - determine if pain has occurred before and what has relieved it
7. Any three of the following objective assessments:
 - note behavior indicating pain
 - monitor vital signs, noting changes or abnormalities
 - assess for diaphoresis
 - assess anxiety level
8. Administer a nitroglycerin tablet sublingually. If pain does not subside, give another dose in five minutes. If pain still does not subside, give a third tablet sublingually in five more minutes. Call physician if the pain has not subsided after the third nitroglycerin tablet.

9. Any three of the following nursing diagnoses:

- pain related to decreased myocardial circulation
- altered tissue perfusion related to narrowed coronary arteries
- anxiety, related to cardiac dysfunction
- activity intolerance, related to cardiac dysfunction
- knowledge deficit about angina

10. Any four of the following:

- administer oxygen as ordered
- administer nitroglycerin sublingually up to 3 tablets, then notify physician
- monitor blood pressure before and after administering nitro
- promote rest
- avoid serving large meals if that causes anginal pain
- instruct patient to stop activity at the first sign of anginal pain

11. A regular exercise program helps reduce myocardial oxygen demand during exertion because it helps condition the heart.

12. The prognosis may be grave depending on the patient's condition. With early, aggressive management, mortality can be decreased.

Myocardial Infarction

1. Symptoms of an MI are more severe and last longer than an angina attack. An MI is caused by a blockage, not just a narrowing of the coronary arteries. An MI results in necrosis of the myocardium.

2. The pain is described as crushing, vice-like, like a heavy object sitting on the chest; the pain is retrosternal and may radiate to the neck, arm, jaw, and teeth.

3. Any three of the following:

- anxiety
- dyspnea
- weakness/faintness
- nausea
- sense of impending doom

4. Any six of the following:

- pallor
- erratic behavior
- hypotension, shock
- change in cardiac rhythm
- vomiting

- fever
- diaphoresis
- shortness of breath

5. morphine and Valium

✓ **NOTE:** Oxygen is also given and may be considered a medication.

6. Thrombolytics dissolve clots.

7. They lyse the clot in the coronary artery, allowing blood to flow to the heart muscle. They help decrease the size of the infarction and maximize heart function after an MI.

8. A procedure in which a balloon-tipped catheter is inserted into an obstructed coronary artery; the balloon is inflated intermittently to push back the plaque causing the occlusion and re-open the lumen of the artery.

9. Ventricular fibrillation—occurs when the ventricles of the heart quiver rather than pump blood; this is a fatal condition unless defibrillation shocks the heart into a rhythm.

Cardiogenic shock—occurs because the heart is not able to pump effectively, so the vital organs have a poor blood supply. Blood pressure is very low or cannot be measured.

Ventricular aneurysm—occurs when damage to the ventricle causes the ventricle wall to thin and balloon out

Pericarditis—occurs when the sac around the heart becomes inflamed after the MI damages the ventricle.

Embolism—occurs when a blood clot travels through the circulation. The clot may originate in the atria or in the peripheral circulation. The clot may eventually lodge in the lungs, brain, or heart.

Congenital Heart Defects

1. The fetal artery that connects the pulmonary artery to the aorta fails to close after birth, causing unoxygenated blood to mix with oxygenated blood.
2. Symptoms of CHF, a “machinelike” heart murmur, widened pulse pressure, and bounding pulses.
3. Medical management includes giving indomethacin (Indocin). Surgical management involves an incision into the chest to close the ductus arteriosus by ligation (tying it off).

4. An abnormal opening exists between the left and right atria, which allows unoxygenated blood to mix with oxygenated blood.
5. The characteristic murmur is a harsh systolic murmur.
6. Open heart surgery is performed. The opening is closed with purse-string sutures or a patch, depending on size.
7. An abnormal opening exists between the right and the left ventricles, allowing unoxygenated blood to mix with oxygenated blood.
8. Eventually, children show signs of CHF.
9. 50%
10. Open-heart surgery is performed. The opening is repaired with a patch or, if the opening is small, closed with sutures.

Valvular Heart Disease

1. A condition in which the valve tissue thickens, causing the valve to narrow.
2. A condition in which the valve is unable to close completely.
3. Rheumatic fever is an inflammatory disease that is usually caused by childhood throat and upper respiratory infections. Such infections are caused by group A, beta-hemolytic streptococci; and, if the treatment is not adequate, the infection can progress to rheumatic fever. The effects of the infection on the heart valves may not be seen for 10 to 40 years after the illness. Rheumatic fever can also affect the joints, skin, subcutaneous tissue, central nervous system, and layers of the heart. Rheumatic fever typically causes vegetative growth on the valve leaflets, called Aschoff's nodules. This causes the valve to thicken and become fibrous, which interferes with its ability to open and close correctly.
4. Any two of the following objective assessments:
 - assess for heart murmur
 - assess for wheezes or crackles in the lungs
 - assess for edema, pitting or non-pitting

Any four of the following subjective assessments:

- history of rheumatic fever
- fatigue or weakness when performing ADLs
- quality, duration, and onset of chest pain
- dizziness, fainting

- complaints of heart palpitations
- weight gain
- exertional dyspnea, nocturnal dyspnea

Inflammatory Heart Disorders

1. An inflammation of the sac around the heart, which can lead to fibrosis and constriction of the pericardium
2. When pericardial effusion restricts heart movement
3. A pericardiocentesis might be performed if the patient is at risk for cardiac tamponade. Removing the fluid will help restore normal heart function.
4. An infection or inflammation of the inner lining of the heart, particularly the heart valves
5. Those with rheumatic heart disease, CHF, or degenerative heart disease, and IV drug users
6. Prophylactic antibiotics before any invasive procedure if the patient has preexisting valvular heart disease.
7. Infective organisms embed into the heart lining and valve tissue; then vegetative growth occurs. The vegetation may scar the valves or break away causing emboli, infection, or abscesses in organs where they lodge.
8. Myocarditis is an inflammation of the myocardium; it may be caused by infection, rheumatic heart disease, endocarditis, or pericarditis. The cause may be unknown.
9. This is a term used to describe a group of heart muscle diseases that affects the structure or function of the myocardium.
10. The majority of patients over age 55 die within two years of the onset of symptoms. Death is usually caused by CHF or ventricular dysrhythmia.

O Divide class into groups. Have each group answer the questions about one of the diseases that damage the heart. Have each group present the answers and information to the rest of the class.

O Have learners do case studies on patients with a diagnosis presented in the objective. Have the learners share the case study information with their clinical group or the rest of the class.

E This objective is evaluated on the Written Test.

OBJECTIVE 6

Present researched information about nursing care of patients with heart damage.

- R** Assign learners to work in groups of three or individually on this activity.
- R** Ensure that all topics are chosen for research and presentation.
- R** Determine date for presentations and the length of time allowed for presentations.
- O** Add or delete topics in the objective.
- L** *Learning Activity: Nursing Care for Patients with Heart Damage*
Arrange for learners to present their researched information to the class.
- E** Evaluate the presentation using the rubric in the objective.

OBJECTIVE 7

Discuss diseases and disorders that affect heart conduction.

- R** Discuss the rate at which demand pacemakers are usually set in your area.
- R** Assist learners in finding the answers to the questions in the objective. These answers are:

Atrial Fibrillation

1. Sinus tachycardia is a regular rhythm at a rate of 100 or more beats per minute. The stimulus for the heartbeat arises from the SA node. Sinus bradycardia is a regular rhythm at a rate below 60 beats per minute. It also arises from the SA node.
2. The atria are quivering, rather than pumping blood. The atrial rate can be as high as 350-600 per minute. The ventricles respond to some of the electrical stimulus and have a rate of 100-180 beats per minute.
3. Digoxin slows the heart rate and strengthens the heart beat, increasing cardiac output. Calcium channel blockers relax smooth muscle in the coronary arteries so they dilate and carry more blood to the heart. Anticoagulants prevent emboli from forming in the atria, which would circulate to the brain causing CVA.
4. Cardioversion is an electrical shock to the heart that helps restore normal sinus rhythm. Two metal paddles are placed on the patient's chest and a lower-level electric shock passes through them to the heart. This is not as much electricity as used in defibrillation.

Premature Ventricular Contractions (PVCs)

1. Heartbeats that originate in the ventricle, not the SA node, and come earlier than the next anticipated beat would occur.
2. Any four of the following:
 - irritability of ventricle wall
 - exercise
 - stress
 - electrolyte imbalance
 - digitalis toxicity
 - hypoxia
 - MI
3. PVCs that last long enough to cause ventricular tachycardia can lead to a patient's death.
4. Treating the cause and prescribing antidysrhythmics such as lidocaine, procainamide, or bretylium

Ventricular Tachycardia

1. Any two of the following:
 - hypoxemia
 - drug toxicity (digitalis)
 - quinidine
 - electrolyte imbalance
 - bradycardia
2. The ventricular rate is greater than 100 beats/min, usually between 140 and 240.
3. It depresses the excitability of cardiac muscle to electrical stimulation and slows conduction through the ventricles.
4. Lidocaine is used only if acute myocardial ischemia or MI is the cause of the VT.

Ventricular Fibrillation

1. The ventricles are quivering, rather than pumping blood.
2. Because the heart is no longer pumping blood to vital organs or the rest of the body; there is no blood pressure; death will occur if treatment is not quickly instituted.
3. CPR, defibrillation, and medications (IV) to decrease ventricular arrhythmias

Atrioventricular Block

1. Impulses from the SA node are slowed or impaired as they go through the AV node to the ventricles.
2. Third-degree block indicates the worst impairment in the AV junction, so the impulse does not get from the atria to the ventricles. Atria and ventricles beat separately.
3. A pacemaker is usually needed for third-degree block.

O Invite a cardiac nurse to speak about types of conduction disorders and their treatment.

E This objective is evaluated on the Written Test.

OBJECTIVE 8

Illustrate selected conduction disorders.

R Assign learners to work in groups of five.

R Ensure that a topic is assigned to each of the learners in the group. Each learner will become an “expert” on the chosen topic.

O Assign this activity to learners when they have clinical experience in a monitor station. Have them collect strips of each of the dysrhythmias and give the information about each one.

L *Learning Activity: Picturing Dysrhythmias*

Monitor groups to ensure that each “expert” is presenting appropriate illustrations and information.

E Evaluate the illustrations using the rubric in the objective.

OBJECTIVE 9

Discuss heart disorders that affect lung function.

R Discuss circulation of the blood through the heart and lungs.

R Discuss right- and left-sided heart failure.

R Assist learners in finding answers to the questions in the objective. These answers are:

Congestive Heart Failure

1. Any five of the following:

- MI
- prolonged hypertension
- diabetes mellitus
- heart valve disease
- inflammatory heart disease

- infection
 - stress
 - hyperthyroidism
 - anemia
 - fluid replacement therapy
2. Cardiac output is the amount of blood ejected from the left or right ventricle per minute.
- ✓ **NOTE:** Learners may need to use a medical encyclopedia or dictionary to find this information.
3. Any five of the following:
- fatigue
 - angina
 - anxiety
 - oliguria
 - decreased gastrointestinal motility
 - pale, cool skin
 - weight gain
 - restlessness
4. Left ventricular failure occurs when the left ventricle cannot pump enough blood to meet the needs of the body. Blood that is not pumped out of the left ventricle fails to reach the peripheral circulation. Congestion occurs in the lungs because blood is not able to leave the lungs and go to the left ventricle. Fluid leaks from the blood into the air spaces of the lungs, causing shortness of breath.
5. Any four of the following:
- dyspnea
 - paroxysmal nocturnal dyspnea (PND)
 - orthopnea
 - pulmonary crackles
 - hemoptysis
 - cough
6. Right ventricular failure occurs when the right ventricle cannot pump blood efficiently to the lungs. This may be due to back up from left ventricular failure or may be due to lung disease. When the blood cannot be pumped forward into the lungs, it backs up in the systemic circulation. Fluid leaves the blood, causing peripheral edema.

7. Any four of the following:

- distended jugular veins (DJV)
- anorexia, nausea, and abdominal distension
- liver enlargement
- ascites
- edema of feet, ankles, and sacrum which may progress up the legs

8. Left ventricular failure causes lung congestion. Lung congestion or dysfunction causes right ventricular failure. In both situations, blood is not pumped into and out of the lungs efficiently, causing congestion and gas exchange impairment.

Pulmonary Edema

1. Air mixes with fluid in the air sacs (alveoli) of the lungs causing frothy (bubbly) sputum. It is pink, or blood-tinged, because red blood cells have left the blood and moved into the alveoli due to fluid congestion.

2. Any five of the following:

- restlessness
- agitation
- disorientation
- diaphoresis
- severe dyspnea
- tachypnea
- tachycardia
- pallor or cyanosis
- productive cough of large amount of pink, frothy sputum
- audible wheezing, crackles
- cold extremities

3. Orthopneic position or high Fowler's position

4. Helps expand the lungs

5. Analgesic (morphine); nitroglycerin, diuretics, vasodilators, inotropics

6. Analgesics—decrease pain and anxiety, decrease respirations and oxygen demand
Nitroglycerin—increase blood flow to the myocardium
Diuretics—decrease fluid in the lungs
Vasodilators and inotropics—decrease the workload of the heart

7. *Cor pulmonale* is an abnormal cardiac condition characterized by enlargement of the right ventricle due to hypertension in the pulmonary circulation. It is often caused by lung disease such as COPD. It is another name for right-sided congestive heart failure.

✓ **NOTE:** Learners may need to find this information in a medical dictionary or in the respiratory chapter of a medical-surgical nursing text.

- O** Invite a cardiac nurse or nurse practitioner to speak about congestive heart failure and pulmonary edema.

- E** This objective is evaluated in the Written Test.

OBJECTIVE 10

Compare myocardial infarction and congestive heart failure.

- R** Discuss the differences in these two common cardiac conditions.

- R** Ensure that learners have the correct answers to the questions in the objective. These answers are:

1. A blockage occurs in the coronary artery, obstructing blood flow to a portion of the myocardium. The myocardium becomes necrotic, then fibrotic with scar tissue.
2. The heart is unable to pump blood effectively because the muscle of the ventricle (myocardium) can no longer contract strongly. The blood is not pumped throughout the body as it should be; it pools in extremities and causes edema.
3. MI
4. CHF
5. An MI damages the ventricular muscle. An area becomes fibrotic and can no longer help the heart pump well. The larger the MI damage, the worse the pump failure, causing CHF.

- O** Rather than answer the questions in the objective, have the class brainstorm and list on the board characteristics of MI and characteristics of CHF. Compare the symptoms and their causes.

- E** This objective is evaluated in the Written Test.

OBJECTIVE 11

Present researched information about the care of patients with congestive heart failure.

- R** Assign learners to work in groups of three.
- R** Review components of a nursing diagnosis. Review nursing interventions and how they should be written.
- O** Require learners to write a complete care plan with goals and expected outcomes for the patient in the scenario.
- O** Add to the scenario, or write additional scenarios for groups to use.
- L** *Learning Activity: Nursing Care and CHF*

Have groups present their diagnosis, interventions, and rationales.

Assist the class in prioritizing diagnoses and interventions.
- E** This objective is not included on the Written Test. However, information acquired from this Learning Activity may be used to complete other objectives and, as such, may be tested as part of those objectives. Ensure that all learners have the correct answers to the Learning Activity.

SUPPORT FOCUS

OBJECTIVE 12

Discuss categories of medications used to treat cardiac disorders.

- R** Assist learners in finding answers to the questions in the objective. These answers are:
 1. Dopamine and other inotropic agents increase myocardial contractility without increasing oxygen consumption. They raise systemic arterial pressure and cardiac output.
 2. Anticoagulants decrease the incidence of clotting; antiplatelets decrease vasoconstriction and platelet clumping (aggregation) on vessel walls.
 3. Nitroglycerin (Nitrobid) and isosorbide (Isordil) are examples of nitrates.
 4. Nitrates dilate coronary blood vessels and increase blood flow to the myocardium.

5. Stool softeners reduce straining at stool to reduce chance of Valsalva maneuver, which could cause severe changes in heart rate, blood pressure, and heart rhythm. Decreased mobility and administration of narcotics can cause constipation in patients with cardiac disorders. Stool softeners also reduce this problem.

✓ **NOTE:** Facilitators may need to further discuss Valsalva's maneuver and its affect on the cardiac system.

6. Diuretics that do not spare potassium, such as Lasix, remove potassium with excess fluid. The diuretics decrease edema, but may also cause hypokalemia. A potassium supplement, such as Slow-K, may be ordered to prevent hypokalemia.
7. ACE inhibitors reduce peripheral vascular resistance (dilate peripheral arteries) and help improve cardiac output.
8. Cardiac glycosides strengthen the force of the heart beat and slow the heart rate, which helps increase circulation.
9. Signs of digitalis toxicity are: bradycardia, nausea, vomiting, anorexia, dysrhythmias, tachycardia, headache, fatigue, and blurred or colored vision.
10. Check for a digitalis level before giving digitalis (Lanoxin, Digoxin). A level above 2.0 is considered toxic.

Check for a potassium level before administering a potassium supplement. Values greater than 5.0 (or reference value from lab) indicate hyperkalemia, which can cause fatal dysrhythmias.

Check for a prothrombin time (Pro-Time, PT) before giving warfarin (Coumadin). A value that is greater than 2 1/2 times the control is considered excessive. Check with the physician before administering Coumadin.

Check the partial thromboplastin time (PTT) before administering therapeutic doses of heparin. Check lab reference values for indications of excessive anticoagulation.

✓ **NOTE:** This question involves critical thinking more than looking up information. Facilitators may need to assist learners in thinking through the answers.

- R** Provide reference information for labs at your clinical sites for pro-times and PTTs.
- O** Add or delete questions about medications in the objective.
- E** This objective is evaluated on the Written Test.

OBJECTIVE 13

Explain diagnostic tests and surgical procedures for cardiac disorders.

- R** Assist learners in finding answers to the questions in the objective. These answers are:

Heart Tests

1. Cardiac catheterization is a procedure used to visualize the heart's chambers, valves, great vessels, and coronary arteries. A catheter is inserted through the groin into the femoral artery and threaded through to the heart. The physician measures the pressures within the different heart chambers to determine how effectively the heart is beating. Angiography refers to the injection of dye into the heart and blood vessels.
2. Cardiac catheterization is used to detect valvular defects, arterial occlusion, and congenital abnormalities of the heart. The physician uses angiography to visualize the size and shape of the heart chambers and to see narrowing or obstruction of the coronary arteries.
3. A Holter monitor is a small portable EKG recorder. It is attached to a patient using one to four electrodes, and the monitor is carried on a belt or shoulder strap. The Holter monitor keeps a 24-hour record of the person's heartbeat. The patient keeps a diary of activities, and symptoms during the 24-hour period he or she is wearing the monitor. The physician compares the diary to the dysrhythmias on the EKG strip to determine events that may contribute to heart irregularities. The Holter monitor is used for patients who complain of irregular heartbeats that do not show up on a resting 12-lead EKG.
4. The patient's EKG is monitored in a laboratory setting during exercise. The patient is connected to EKG monitors and given a specific, controlled type of exercise to do, such as walking on a treadmill that gradually increases in speed and incline. The patient is monitored closely to prevent over-exertion of the heart.
5. This test helps physicians evaluate the patient's cardiac status in relation to exercise.
6. A thallium scan shows areas of the heart that are ischemic or infarcted. The thallium, which is an intracellular ion transported into normal cells, will not enter abnormal cells. A "cold spot" appears on the image, a dark spot that indicates inadequate oxygenation to those tissues.

7. An echocardiogram uses high-frequency ultrasound to bounce off of the heart. A graph shows where the sound waves reflect heart tissue. It shows the size, shape, and position of cardiac structures. An echocardiogram shows pericardial effusion, ventricular function, chamber size, muscle wall thickness and motion, cardiac output, tumors, valvular function, and congenital heart disorders.
8. A PET scan uses radioactive substances to examine the function of a specific organ. It distinguishes between viable and nonviable myocardial tissue, which helps physicians identify the most appropriate candidates for angioplasty and bypass surgery. A PET scan can also detect CAD without inserting a catheter and dye.

Laboratory Tests

Complete blood count (CBC)

A low hemoglobin indicates a decreased ability of red blood cells to carry oxygen; it also indicates anemia; a patient with chest pain may have a very low hemoglobin count instead of heart disease.

An elevated white blood cell count indicates infection or inflammation.

An elevated red blood cell count indicates that the body is compensating for chronic hypoxemia, which is often noted with CHF.

Coagulation studies

An elevated PT or PTT may indicate that the patient is receiving anticoagulation therapy. It is very important that these values not rise above the therapeutic level.

Erythrocyte sedimentation rate

An elevated sed rate may indicate MI and/or infective endocarditis; it is also elevated in rheumatic fever.

Serum electrolytes

A low potassium and an elevated potassium can both cause life-threatening EKG changes. Other electrolytes affect the contractility of cardiac muscle.

Serum lipids

Elevated cholesterol and triglycerides indicate vascular disease, particularly CAD.

An elevated HDL (good cholesterol) indicates a decrease in the risk for cardiac disease.

Arterial blood gases

An elevated pH indicates the patient is in alkalosis, a low blood pH may indicate acidosis.

A patient with low blood oxygen (PaO₂) does not have good blood and tissue oxygenation. This may be due to disease of the heart, the lungs, or both.

Cardiac enzyme studies

An elevated CPK-MB isoenzyme helps determine the severity and the onset of an MI. This lab value helps the physician determine the appropriateness of thrombolytic therapy. An elevated LDH with an elevated CPK-MB is indicative of an MI. Presence of cardiac troponin I indicates ischemic myocardial injury.

Surgical Procedures

A coronary artery bypass graft (CABG) is done by using the saphenous veins in the legs or the internal mammary artery to graft around occlusions in the coronary arteries. When the leg veins are used, one end is surgically attached to the aorta and the other end is sutured to the coronary artery, distal to the blockage. When an internal mammary artery is used, the distal end of the artery is freed from the chest wall and sutured to the coronary artery, distal to the blockage.

Percutaneous transluminal coronary angioplasty (PTCA) is performed in the cardiac catheterization laboratory. A catheter is inserted into the femoral artery and threaded through to the coronary arteries. The catheter is positioned in the coronary artery where the plaque is causing a blockage. A balloon along the sides of the catheter is inflated, pushing the plaque back against the artery wall, opening the lumen of the artery so blood can flow through unimpeded. A wire mesh stent may be placed to hold the vessel open.

Valve replacement surgery involves replacing a stenosed or insufficient heart valve with a mechanical valve, a valve from a pig heart (porcine), or a valve from a cadaver. The old valve is removed and the replacement valve is sutured into place.

Open mitral commissurotomy is done when the mitral valve is very stenosed. The valve leaflets that have been fused are surgically separated, so they can open and close correctly.

- R** Discuss the diagnostic tests and surgeries so learners have a clear understanding of the procedures.
- O** Use this objective as an assignment when learners rotate through specialty areas in the hospital such as the cardiac catheterization lab.
- O** Divide learners into groups and have each group be an “expert” on a lab finding, diagnostic test, or surgical procedure.
- E** This objective is evaluated on the Written Test.

OBJECTIVE 14

Use a concept map to connect selected cardiac disorders with medications, nursing care, diagnostic tests, and surgical procedures.

- R** Divide the class into groups of eight.
- R** Ensure that each topic is assigned to one of the members of the group.
- R** Review the components of a concept map with learners, if needed.
- O** Add or delete topics for the learners to map.
- L** *Learning Activity: Mapping Out the Connections*
Have the learners explain their concept map to others in their group.
- E** Evaluate the concept maps using the rubric in the objective.

EVALUATION

Pretest

- Use the module Written Test for *both* the pretest and posttest. Give the learners the pretest before they begin the module.
- You may wish to use the CIMC publication *Measuring Learning and Competency Gains: The Pretest/Posttest Approach* for instructions and suggestions on giving pretests and using the results. Information for ordering this material is included in the optional resources section.
- Use pretest results to guide individual learners in progressing through the module, doing enrichment work, or moving to the next module.

Learning Activities

- Evaluate according to the answers or rubric provided.
- Ensure learners have the correct answers (when appropriate) as this information will be used to meet other module objectives.

Skill Test

- Explain to the learners that they will be asked to demonstrate the procedures on the Competency Checklists as a skills test.
- Describe the rating scale used on the skills test.
- Reteach and retest as necessary.
- Complete each learner's Profile of Training Mastery.

REQUIRED RESOURCES

Posttest

- After they have completed the module, give learners the Written Test again.
- Explain to the learners that they will be asked to demonstrate on the Written Test actions listed in the non-activity objectives.
- You may wish to use the CIMC publication *Measuring Learning and Competency Gains: The Pretest/Posttest Approach* for instructions and suggestions on giving posttests and using the results. Information for ordering this material is included in the optional resources section.
- Reteach and retest as necessary to meet individual learner needs and state standards for learner learning and competency gains.
- Complete the appropriate sections of the Profile of Training Mastery.
- Review individual and group performance to evaluate teaching effectiveness. Adjust scope, sequence, or instructional methods for additional lessons as required.

Publications

- A comprehensive nursing textbook or medical-surgical nursing textbook.

Software

- *A.D.A.M. Essentials* software CD-ROM, other software, or an anatomy and physiology textbook.

Videos

- *Open Heart Surgery*. Princeton, NJ: Films for the Sciences and Humanities.
- *Arrhythmias*. St. Louis, MO: Mosby, Inc.
- *Heart Failure and Pulmonary Edema*. St. Louis, MO: Mosby, Inc.
- *Nursing Management of Congestive Heart Failure*, St. Louis, MO: Mosby, Inc.
- *Nursing Management of Myocardial Infarction*, St. Louis, MO: Mosby, Inc.

MODULE REFERENCES

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- *A.D.A.M. Essentials*. Atlanta, GA: A.D.A.M. Software.

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