

COMMON COURSE NUMBER: HCP1930**COMMON COURSE TITLE:** Fundamentals of Cardiac Catheterization Lab**PRE_REQUISITE:** 2 Year Degree; license/certification in health field**CREDIT HOURS:** 3**LECTURE:** 48**COURSE DESCRIPTION:**

This course is designed to provide the basic knowledge and skill necessary to prepare the health professional for orientation into a cath lab setting. The focus is to prepare the personnel to perform and function in a cath lab setting as related to diagnostic and interventional procedures. Topic areas include: historical perspective, techniques of cardiac catheterization, hemodynamics, pharmacology, radiology, and 4-hour field trip assignment for observation.

Term Offered: On Demand

COURSE OUTLINE:

1. Cath Lab Procedures -- Justification and Concerns
2. Cardiovascular Anatomy and Physiology
3. Hemodynamics
4. Cardiovascular Radiology
5. Pharmacology
6. Cardiovasuclar Intervention and Therapeutics
7. Cath Lab Personnel -- Roles and Responsibilities

I. Course Overview:

Upon successful completion of this course, the students should be able to function in a cath lab setting.

II. Units:

Unit 1. Cath Lab Procedures -- Justification and Concerns

General Outcome:

1.0 The students should be able to describe, in general terms, the historical development of the cath lab and current standards and criteria for its use.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 1.1 List four indications for catheterization.
- 1.2 List one absolute contraindication and four relative contraindications for catheterization.
- 1.3 Differentiate between patients with and without angina and recommend appropriate action for each.
- 1.4 Indicate appropriate studies which should be performed and the appropriate education program for the patient and family when given casestudies.
- 1.5 Differentiate between the Sones and Judkins techniques on the following points:
 - A. Indications
 - B. Advantages
 - C. Catheter selection
 - D. Insertion
- 1.6 Differentiate between right and left heart cath.
- 1.7 Differentiate between diagnostic and intervention techniques.
- 1.8 Give a plan of action for the study of and the potential complications from a mechanical valve in the AO position.
- 1.9 Propose pre op orders for a patient with known contrast reactions.
- 1.10 Summarize and indicate the rationale for typical post op orders.
- 1.11 Describe three phases of a diagnostic cath.

Unit 2. Cardiovascular Anatomy and Physiology

General Outcome:

2.0 The students should be able to describe the cardiovascular anatomy, physiology, and function.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

2.1 Differentiate between the arterial and venous blood vessels of the body.

2.2 Differentiate the structures of the right and left sides of the heart.

2.3 List the three muscle layers of the heart.

2.4 Identify and label the following when given appropriate diagrams:

A. The layers of the arterial wall

B. The three muscle layers of the heart

D. The major arteries and veins of the body

E. The cardiac conduction system

F. RAO, LAO, AP, and lat views of the coronary anatomy

2.5 Identify three sites for accessing the peripheral pulse.

2.6 Describe the structure and function of capillaries.

2.7 Differentiate AV and semilunar valves.

2.8 Describe the relationship between the normal conduction system, intracardiac electrogram, and the surface EKG.

2.9 Identify the components of the ventricular wave forms and relate them to the normal cardiac cycle using atrial and ventricular pressure curves.

2.10 Define Starling's Law of the Heart.

2.11 Define and correlate the principles of preload, afterload, heart rate, and cardiac output.

- 2.12 Describe normal and anomalous effects of vagus stimulation.
- 2.13 Identify grafts, native vessels, and chambers on angiograms.
- 2.14 Describe two methods of access to arteries and veins.
- 2.15 Define dominance and collaterals.
- 2.16 Describe the expected electrocardiographic, angiographic, and hemodynamic changes associated with coronary artery lesions.
- 2.17 Define ejection fraction and describe the two methods of determining its value.
- 2.18 Identify areas of abnormal wall motion on cine film, indicate which coronary vessels are involved, and identify any coronary lesions or thrombi
- 2.19 Define atherosclerosis and myocardial infarction.
- 2.20 Differentiate between a subendocardial and transmural MI.
- 2.21 Describe the typical symptoms of MI's.
- 2.22 Describe the normal clotting process.
- 2.23 List the studies used to diagnose sudden death and differentiate between sudden death and AMI.
- 2.24 Describe acyanotic and cyanotic lesions.
- 2.25 Define the following terms:
- A. ASD F. Tricuspid atresia
 - B. VSD G. Truncus arteriosus
 - C. CoA H. TAPVE
 - D. PDA I. ToF
 - E. PS J. TGA

Unit 3. Hemodynamics

General Outcome:

3.0 The students should be able to describe normal and abnormal patterns of blood flow and methods used to measure blood flow.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

3.1 Describe the dye dilution, thermal dilution, and Fick methods for determining cardiac output, and use each method to calculate cardiac output.

3.2 List normal values and calculate the actual values for each of the following:

A. CI F. SV

B. SI G. SVR

C. PVR H. Shunt %

D. C (a-v) O₂ I. O₂ Consumption

E. CO

3.3 Describe the operating principles of transducers.

3.4 Sketch the internal structure of transducers.

3.5 Prioritize the steps used when troubleshooting faulty transducer readings.

3.6 Describe the calibration process for transducers.

3.7 Contrast damping with ventricularization.

3.8 Define catheter whip and end-pressure artifact.

3.9 Evaluate pressure diagrams for the presence of disease and calculate the aortic and mitral valve area.

3.10 Use short cut methods to estimate valve areas and ejection fraction; confirm the results with normal calculations; indicate the types of cases in which short cut methods are inappropriate.

Unit 4. Cardiovascular Radiology

General Outcome:

4.0 The students should be able to describe essential safety precautions and common X-ray procedures utilized in the cath lab.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

4.1 Describe the method of X-ray beam generation.

4.2 Identify normal exposure settings.

4.3 Describe the X-ray equipment usually used in cath labs and the studies and information provided by that equipment.

4.4 Identify all structures visualized on cine and evaluate them for abnormalities.

4.5 Identify the various types of contrast media used in the cath lab and evaluate each for functional differences and hemodynamic effect.

4.6 List, in proper sequence, the steps required to process cine film.

4.7 Describe the importance of a QC program.

4.8 Describe the radiation safety measures used in the cath lab and list the three primary principles of radiation safety.

4.9 Demonstrate the skills necessary to load a camera/cassette.

4.10 Describe at least two alternate filming capabilities found in cath labs.

Unit 5. Pharmacology

General Outcome:

5.0 The students should be able to list all categories of drugs used in the cath lab and describe the rationale for and possible contraindications and complications arising from their use.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

5.1 List the classifications of drugs commonly used in the cath lab setting. Indicate the hemodynamic and physiologic effects of each category of drug.

5.2 List two drugs used for diagnostic purpose in the lab.

5.3 List first and second line drugs used to treat SVT, VT, CHF, spasm, and allergic reactions.

5.4 List the drugs used to manipulate SVR/afterload, preload, contractility, and heart rate.

5.5 List two drugs used in thrombolytic therapy.

5.6 Describe the assessment procedures which should be used with a patient receiving blood component therapy.

Unit 6. Cardiovascular Intervention and Therapeutics

General Outcome:

6.0 The students should be able to describe the nonpharmacologic procedures and equipment used to correct cardiac and cardiovascular abnormalities.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

6.1 Review the clinical application and physiologic consequences of the following:

- A. EPS
- B. PTCA
- C. Biopsy
- D. Temporary pacemakers

6.2 Describe special application and basic protocols for EPS.

6.3 Describe and measure basic intervals of a HIS bundle study.

6.4 Describe three indications for biopsy and two techniques for performing biopsies.

6.5 Label the components of a PTCA setup on a diagram.

6.6 Set up a PTCA (USCI) balloon.

6.7 Differentiate atria, ventricular, and AV sequential pacing.

6.8 Describe an indication for rapid atrial pacing other than EPS pacing.

6.9 Demonstrate the ability to set a pacemaker appropriately.

Unit 7. Cath Lab Personnel -- Roles and Responsibilities

General Outcome:

7.0 The students should be able to identify the various members of the cath team and the role each plays in specific situations and demonstrate the ability to perform specific requisite tasks.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

7.1 Describe the functions of circulating personnel in regards to the following:

- A. Defibrillator use
- B. Identification of the names, sizes, and uses of all catheters
- C. The appropriate course of action in emergencies

7.2 Describe the role of recording personnel in regards to the following:

- A. The three most important parts of the recorded data for patients with valve disease
- B. Identification of the most important patient parameters during intra coronary injection
- C. The proper response to inappropriate data

7.3 Describe the role of scrub technicians in regards to the following:

- A. Demonstration of proficiency in aseptic technique and sterile field setup
- B. Acceptable methods for intracoronary injections
- C. Identification of cath lab equipment and its use
- D. Detailed description of the Judkins procedure

7.4 Describe the role of radiographic personnel and cath lab equipment in regards to the following:

- A. Two ways of describing injector setting

- B. The proper setting of safety locks on an injector
 - C. The reason for having the locks set at all times
 - D. The basic X-ray positions used in the cath lab
 - E. Film processing technique
 - F. The loading technique for cine cassettes
 - G. The operating and loading technique for cine projectors
- 7.5 Describe instructional and nursing care needs of the post op patient.
- 7.6 Review the basic components of proper cath lab documentation.