RADT-2362: INTERVENTIONAL RADIOGRAPHY AND PHARMACOLOGY

Cuyahoga Community College

Viewing: RADT-2362 : Interventional Radiography and Pharmacology

Board of Trustees:
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Academic Term:
Fall 2023

Subject Code
RADT - Radiography

Course Number:
2362

Title:
Interventional Radiography and Pharmacology

Catalog Description:
Introduction to specialized procedures and interventional imaging within diagnostic radiography. Foundational knowledge and skills to enable effective contribution as a member of a specialized imaging team. Basic concepts of pharmacology in interventional and diagnostic radiography. Laboratory demonstration of related patient care and technical skills.

Credit Hour(s):
1

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
BIO-1221 Anatomy and Physiology for Diagnostic Medical Imaging ; and concurrent enrollment in RADT-2350 Radiographic Pathology ; and departmental approval.

Outcomes

Course Outcome(s):
Demonstrate competency in information literacy required for effective documentation and communication in the clinical environment.

Objective(s):
a. Identify how patient medical information is stored in and queried from hospital information systems.
b. Classify patient informed consent forms.
c. Demonstrate effective communication through patient education and explanation of imaging procedures.
d. Demonstrate competency in taking a patient history.
e. Critique orders, requests and diagnostic reports.

Course Outcome(s):
Explain types of equipment used in the interventional imaging suite including imaging components and patient care equipment.

Objective(s):
a. Identify features of x-ray suite and equipment construction instrumental in interventional imaging.
b. Describe equipment used for image manipulation and viewing (e.g. image amplifiers and television circuits).

c. Demonstrate competency in the laboratory environment in manipulating patient care equipment to take patient vital signs to include temperature, pulse, pulse oximetry, respiration and blood pressure.

Course Outcome(s):

Describe the tubes, lines, catheters and other devices encountered by the radiographer.

Objective(s):

a. Identify specific types of tubes, lines, catheters and collection devices.
b. Describe the special problems faced in performing procedures on a patient with a tracheotomy and specific tubes, drains and catheters.
c. Outline the steps in the operation and maintenance of suction equipment.
d. Outline the steps in the operation and maintenance of oxygen equipment and demonstrate proper use.
e. Demonstrate competency in the laboratory environment in a simulated performance of the Seldinger technique.

Course Outcome(s):

Describe the role of pharmacology, contrast media and venipuncture in medical imaging.

Objective(s):

a. Distinguish between the chemical, generic and trade names of various drugs.
b. Describe pharmacokinetic, pharmacodynamic and pharmacogenetic principles of drugs.
c. Describe the use and impact on the patient of different categories of drugs.
d. Define categories of contrast agents and give specific examples for each category.
e. Explain the pharmacology of contrast agents.
f. Describe the methods and techniques for administering various types of contrast agents.
g. Identify and describe the routes of drug administration.
h. Demonstrate appropriate venipuncture technique in the laboratory environment through simulation.
i. Differentiate between the two major sites of intravenous drug administration.
j. Identify, describe and document complications associated with venipuncture and the appropriate actions to resolve these complications.
k. Discuss the steps of initiating and discontinuing intravenous access.
l. Differentiate and document dose calculations for adult and pediatric populations.
m. Prepare for injection of contrast agents or intravenous medications using aseptic technique.
n. Explain the current legal status and professional liability issues of the radiographer's role in contrast and drug administration.
o. Describe basic drug categories relevant to medical imaging including uses, side effects and impact on imaging studies.
p. State the six rights of drug safety.

Course Outcome(s):

Describe the specialized interventional procedures of the articulatory, nervous, respiratory, urinary, circulatory, digestive and reproductive systems.

Objective(s):

a. Define radiographic terms pertaining to each body system.
b. Identify indications for special/interventional procedures for each body system.
c. Identify basic anatomy on a radiographic image pertinent to each special/interventional procedure.
d. Demonstrate competency in the laboratory environment using surgical asepsis, sterile tray set-up and closed gloving and gowning for interventional procedures.

Course Outcome(s):

Accurately demonstrate the various laboratory skills associated with course outcomes that are required to assist during interventional radiography procedures.

Objective(s):

1. Perform an accurate and thorough patient history.

2. Demonstrate the proper technique for taking vital signs.
3. Demonstrate the Seldinger technique.
4. Demonstrate correct venipuncture technique.
5. Demonstrate the proper methods for preparing various forms of contrast media.
6. Demonstrate surgical asepsis and sterile tray set-up.
7. Demonstrate closed gloving and gowning techniques.

Methods of Evaluation:

a. Performance of the following patient care and technical skills:
   i. Patient history
   ii. Vital signs
   iii. Seldinger technique
   iv. Venipuncture
   v. Contrast media preparation
   vi. Sterile tray set-up
   vii. Closed gloving and gowning
b. Projects
c. Web-based activities
d. Online self-assessment quizzes
e. Corectec Online Registry Review
f. Midterm and final examinations

Course Content Outline:

a. Information literacy in the healthcare environment
   i. Storage and retrieval systems for patient health information (Hospital information systems (HIS), Radiology Information System (RIS), Picture Archive Communication System (PACS), etc.)
   ii. Effective communication for patient education
b. Understanding orders, requests and diagnostic reports
   i. Procedure orders and requests
      1. Patient identification
      2. Procedure ordered
      3. Patient history
      4. Clinical indications
      5. Ordering physician/provider
   ii. Diagnostic reports
      1. Content
      2. Interpretation
c. Patient consent
   i. Definition
   ii. Types
   iii. Condition for valid consent
   iv. Documentation of consent
d. Interventional X-ray equipment and accessories
   i. Generators
   ii. X-ray tubes
   iii. Timers
   iv. Image amplifiers and television circuits
   v. Pressure injectors
   vi. Tables
   vii. C-arms
   viii. Vital signs and associated equipment
      1. Temperature
         a. Thermometer
      2. Pulse
      3. Pulse oximetry
         a. Pulse oximeter
      4. Respiration

5. Blood pressure
    a. Sphygmomanometer
    b. Stethoscope
6. Normal values
7. Interfering factors
8. Adult vs. pediatric
9. Documentation

e. Tubes, lines, catheters and other devices
    i. Function and handling of devices
    ii. Nasogastric/nasointestinal
    iii. Suction
        1. Adult vs. pediatric
        2. Special precautions
    iv. Tracheostomy
        1. Suction techniques
        2. Cardiopulmonary resuscitation (CPR) with tracheotomy
    v. Chest (thoracostomy) tube
        1. Purpose
        2. Location
    vi. Implanted devices
        1. Types
        2. Purpose
        3. Location
    vii. Venous catheters
        1. Types
        2. Purpose
        3. Location
        4. Care (e.g. infection control)
        5. Access
    viii. Tissue drains
    ix. Oxygen administration
        1. Values
        2. Oxygen therapy
        3. Oxygen delivery systems
            a. Low-flow systems
            b. High-flow systems
        4. Special precautions
    x. Urinary collection
        1. Procedure
            a. Male
            b. Female
        2. Alternative methods of urinary drainage
    xi. Ostomies
        1. Types
        2. Purpose
        3. Location
        4. Care
        5. Access
    xii. Seldinger technique
f. Pharmacology
    i. Drug nomenclature
        1. Chemical name
        2. Generic name
        3. Trade/brand name
    ii. Drug classification
        1. Chemical group
        2. Mechanism and site of action
        3. Primary effect
    iii. General pharmacological principles

1. Pharmacokinetics
2. Pharmacodynamics
3. Pharmacogenetics

iv. Six rights of drug safety
1. Right medication
2. Right dose
3. Right patient
4. Right time
5. Right route
6. Right documentation

v. Drug categories relevant to radiography (uses and impact on patient)
1. Analgesics
2. Anesthetic agents
3. Antiallergic and antihistamine drugs
4. Antianxiety drugs
5. Antiarrhythmic drugs
6. Antibacterial drugs
7. Anticholinergics
8. Anticoagulant and coagulant drugs
9. Anticonvulsants
10. Antidepressants
11. Antidiabetics
12. Antiemetic drugs
13. Antihypertensive drugs
14. Anti-inflammatory drugs
15. Antiseptic and disinfectant agents
16. Antiviral drugs
17. Bronchodilators
18. Cathartic and antidiarrheal drugs
19. Corticosterioids
20. Diuretics
21. Hormones
22. Laxatives
23. Sedative and hypotonic drugs
24. Vasodilators and vasoconstrictors

g. Contrast agents
i. Types of compounds
1. Metallic salts
2. Organic iodides
a. Ionic contrast agents
b. Nonionic contrast agents
3. Gaseous

ii. Beam attenuation characteristics
1. Radiolucent (negative)
2. Radiopaque (positive)
3. Impact of ionic number

iii. Pharmacologic profile of contrast agents
1. Chemical comparison
2. Absorption characteristics
3. Distribution characteristics
4. Metabolic characteristics
5. Elimination characteristics
6. Indications, actions and effects
7. Interactions and contraindications
8. Patient reactions

iv. Dosage
v. Preparation

h. Routes of drug administration

    i. Enteral
        1. Sublingual
        2. Buccal
        3. Rectal
    ii. Tube or catheter
    iii. Inhalation
    iv. Topical
    v. Parenteral
        1. Intravenous
        2. Intra-arterial
        3. Intrathecal
        4. Intramuscular
        5. Subcutaneous
        6. Intradermal
        7. Intraosseous

i. Venipuncture
    i. Methods
        1. Continuous infusion
        2. Intermittent infusion
        3. Direct injection
            a. Hand injection
            b. Mechanical pressure injector
    ii. Sites of administration
        1. Peripheral
        2. Central
    iii. Venipuncture procedures
        1. Equipment and supplies
        2. Patient identification, assessment and instructions
        3. Informed consent
        4. Dosage, dose calculations and dose-response
            a. Adults
            b. Pediatric patients
        5. Patient preparation
        6. Application of standard precautions
        7. Procedure
            a. Injection through an existing line
            b. Venipuncture
        8. Site observation
        9. Emergency medical treatment procedure
            a. Appropriate codes
            b. Emergency cart (crash cart)
            c. Emergency medications
            d. Accessory equipment
            e. Radiographer's response and documentation
    iv. Complications
        1. Infiltration
        2. Extravasation
        3. Phlebitis
        4. Air embolism
        5. Drug incompatibility
        6. Low fluid level in container
    v. Discontinuation
        1. Equipment and supplies for withdrawal
        2. Patient preparation
        3. Application of standard precautions
        4. Withdrawal procedure
        5. Site observation
        6. Patient observation
        7. Postprocedural tasks

vi. Documentation of administration
vii. Technologist's response and documentation

j. Current practice standards
   i. Professional standards
      1. Scope of practice
      2. Practice standards
      3. Professional liability and negligence
   ii. State statutes
   iii. Employer prerogative

k. Classification of interventional procedures
   i. Minimally invasive
   ii. Diagnostic
   iii. Interventional/therapeutic

l. Equipment, devices and supplies
   i. Equipment
      1. Injector
      2. Ultrasound
   ii. Devices
      1. Intervascular ultrasound
      2. Mechanical thrombolytic
      3. Ablation
         a. Radiofrequency
         b. Microwave
         c. Cryo
   iii. Supplies
      1. Diagnostic
         a. Catheters
         b. Wires
      2. Interventional/therapeutic
         a. Needles
         b. Balloons
         c. Coils
         d. Stents
         e. Embolic material

m. Interventional procedures
   i. Articulatory anatomy and procedures
      1. Arthrography
         a. Knee
         b. Wrist
         c. Shoulder
         d. Hip
   ii. Nervous system anatomy and procedures
      1. Anatomy of ventricular system
      2. Myelogram
   iii. Respiratory system anatomy and procedures
      1. Nasopharynx
      2. Oropharynx
      3. Laryngopharynx
      4. Bronchography
   iv. Urinary system anatomy and procedures
      1. Cystography
      2. Cystourethrography
   v. Circulatory system anatomy and procedures
      1. Cerebral angiography
      2. Carotid angiography
      3. Cardiac catheterization studies
      4. Coronary arteriography
      5. Aortography
      6. Renal arteriography

7. Inferior vena cava (IVC) filter placement
8. Selective visceral arteriography and venography
9. Percutaneous transluminal angioplasty and stenting
10. Peripheral angiography

vi. Digestive system anatomy and procedures
1. Cholecystography
2. Cholangiography
3. Endoscopic retrograde cholangiopancreatography (ERCP)

vii. Reproductive system and procedures
1. Female reproductive
2. Male reproductive

n. Laboratory activities and competencies
i. Patient history and case study
ii. Vital signs
1. Temperature
2. Pulse
3. Pulse oximetry
4. Blood pressure
5. Respiration

iii. Seldinger technique
iv. Venipuncture
v. Contrast and intravenous medication preparation
vi. Sterile tray set-up
vii. Closed gloving and gowning

Resources

Adler, A. & Carlton, R. (2020) *Introduction to Radiologic Imaging Sciences and Patient Care*, Elsevier Saunders.

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Resources Other

1. American Society of Radiologic Technologists Radiography Curriculum www.asrt.org

2. American Registry of Radiologic Technologists radiography certification examination content specifications www.arrt.org

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