RAD-535: SPECIAL PROCEDURES & VENIPUNCTURE

Effective Term
Fall 2025

BOT Approval Date
11/14/2024

Discipline
RAD - Radiologic Technology

Course Number
535

Course Title
Special Procedures & Venipuncture

Short Title
Special Procedures

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
1.00

Lab Units
0.50

Total Units
1.5

Hours

Lecture Contact Hours
16-18

Out of Class Hours Lecture
32-36

Lab Contact Hours
24-27

Out of Class Hours Lab
0.00

Total Contact Hours
40 - 45

Total Out of Class Hours
32 - 36

Total Student Learning Hours
72 - 81

Is this an existing Extensive Lab?
Yes

Distance Education

No

Catalog Description

This course provides the student with the theory and practice of basic techniques of venipuncture and the administration of contrast media. Emphasis will be placed on the types of contrast agents used for the various radiographic procedures. The student will perform both simulated and live venipuncture for contrast media injection. Basic Pharmacology will be discussed. Special imaging modalities such as Computerized Tomography, Magnetic Resonance Imaging, Diagnostic Medical Sonography, Nuclear Medicine, Interventional Radiography, and Radiation Therapy will be surveyed.

Attach Supporting Documents

ASRT 2022 radiography curriculum guide.pdf
JRCERT 2021 Radiography Standards pg 28.pdf
CA Venipuncture HEALTH AND SAFETY CODE.pdf

Requisites

Pre or corequisite(s)

Prerequisite or corequisite(s) (must be taken simultaneously if not taken before)
RAD-510 (with a grade of C or better)
and RAD-520 (with a grade of C or better).

Codes

TOP Code (CB 03)

1225.00* - *Radiologic Technology

CIP Code

51.0911 - Radiologic Technology/Science - Radiographer.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Learning Objectives

Learning Objectives

Learning Objective
1. Compare types of contrast media and explain the difference between positive and negative contrast agents.
2. Analyze the physical properties of various contrast agents used for radiographic and fluoroscopic exams.
4. Examine the precautions that must be taken when administering contrast media, including indications and contraindications for use.
5. Compare the three categories of adverse relations to contrast media and analyze treatments for each reaction.
6. Identify and define the pharmacology of common medications used in an imaging department.
7. Diagram the circulatory system of the body.
8.Select the veins most commonly used for upper extremity venipuncture.
9. Prepare the appropriate site for venipuncture using aseptic techniques and standard precautions.
10. Perform simulated venipuncture procedures while demonstrating culturally sensitive and patient-centered care, recognizing and respecting the diverse backgrounds, including gender, race, culture, and disabilities, of the patients they interact with.
11. Demonstrate, through simulation, proper use and application of venipuncture equipment and accessories in gaining venous access.
12. Evaluate the general imaging aspects of digital angiography, computerized tomography, magnetic resonance imaging, diagnostic medical sonography, nuclear medicine, and radiation therapy modalities.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will properly perform a venipuncture procedure on people that may have a different gender, race, culture, or disability, using aseptic techniques and proper patient care.
2. Students will analyze the proper use of contrast agents for different radiographic examinations.
3. Students will compare and contrast different imaging modalities for use in imaging anatomy and organ function.

Program Learning Outcomes

Learning Outcome
Apply positioning skills in all required radiographic examinations.
Select appropriate technical factors for radiographic examinations.
Practice radiation protection for all radiographic examinations.
Employ proper patient care techniques and effectively provide care for patients from diverse groups/populations.
Demonstrate oral and written communication skills.
Relate to and anticipate the needs of the doctors and technologists.
Adjust to changes, situations, patient conditions, updated evidence-based practice, and deviation from the normal routine.
Demonstrate knowledge of ethical requirements for an entry level radiographer along with ethical practices in a healthcare setting.
Understand professional obligations upon gaining the ARRT status.

Institutional Learning Outcomes

Aesthetic Awareness: The student will identify and evaluate how aesthetic expression leads to an appreciation of social and cultural context as well as the values of art and nature.
Communication: The student will effectively express and exchange ideas through listening, speaking, reading, writing, visual works, and other modes of interpersonal expression.
Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.
Cultural Awareness and Humility: The student will demonstrate knowledge of and sensitivity toward individuals of diverse ethnicity, age, gender, sexual orientation, and religious affiliations, as well as toward those individuals with diverse abilities and socio-economic classes to respectfully interact with individuals of diverse perspectives, beliefs and values while being mindful of the limitation of their own cultural frameworks.
Information and Technology Literacy: The student will access, interpret, evaluate, and apply relevant information sources and digital media effectively, and in an ethical and legal manner.
Scientific Awareness: The student will apply the scientific method of inquiry to assess potential solutions for real-life challenges by employing science-based knowledge and methodologies in daily life.
Social Awareness: The student will recognize and analyze the interconnectedness of global, national, and local concerns, analyzing cultural, political, social, and environmental issues from multiple perspectives and appreciate similarities and differences among cultures.
Civic
Personal
and Professional Responsibility

Content

Course Lecture Content

1. Contrast Media
   a. Definition and types of contrast agents
   b. Physical properties of contrast agents
      i. Miscibility
      ii. Persistence
      iii. Toxicity
      iv. Viscosity
      v. Iodine content
2. Effects on blood volume and cells

a. Contrast agents in individual exams
    i. Gastrointestinal tract
    ii. Sinuses/fistulas/tear ducts
    iii. Respiratory tract
    iv. Joint spaces
    v. Biliary system
    vi. Urinary system
    vii. Reproductive system
    viii. Central nervous system
    ix. Cardiovascular system
    x. Lymphatic system
b. Precautions in administering contrast media
    i. Patient history and communication
    ii. History of sensitivity
    iii. Any other medical problems
    iv. Maximum dosage
    v. Indications and contraindications of contrast
    vi. Knowledge of procedure and reactions
    vii. Observe vital functions
c. Adverse reactions
    i. Minor
    ii. Intermediate
    iii. Major
    iv. Emergency care and treatment drugs

3. Venous system anatomy
    a. Upper extremity venous anatomy
    b. Most common venipuncture sites
4. Venipuncture administration
    a. Site preparation
    b. Needle insertion
    c. Injection or infusion of contrast media
    d. Patient observation and needle withdrawal
5. Pharmacology
    a. Drug nomenclature
    b. Dosage forms
        i. Aqueous preparation
        ii. Alcohol preparation
        iii. Solid and semisolid preparation
    c. Routes of administration
        i. Syringes
        ii. Needles
        iii. Drug absorption, distribution, metabolism
6. Drug categories of relevance to radiography
    a. Analgesics
    b. Antianxiety drugs
    c. Antidepressant drugs
    d. Anti-inflammatory drugs
    e. Vasodilators and vasoconstrictors
    f. Antiallergic and antihistamine drugs
    g. Bronchodilators
    h. Antiseptic and disinfectant agents
7. Current practice standards
    a. Professional standards
    b. State statutes
    c. Employer prerogative

8. Informed consent
9. Patient communication and approaches
    a. Gender
    b. Culture
    c. Race
    d. Disabilities
10. Special imaging modalities
    a. Digital angiography
        i. Components, operations and procedures
        ii. Radiation protection
    b. Computerized tomography
        i. Components, operations and procedures
        ii. Data acquisition
        iii. Radiation protection
    c. Magnetic resonance imaging
        i. Components, operations and procedures
        ii. Data acquisition
    d. Ultrasound
        i. Components, operations and procedures
        ii. Data acquisition
    e. Radiation therapy and treatment planning
    f. Nuclear medicine
        i. Components, operations and procedure
        ii. Radiation protection

Course Lab Content

1. Venipuncture set up
    a. Needles
        i. Gauges
        ii. Types
    b. Cotton balls
    c. Tourniquet
    d. Alcohol
    e. Tape
    f. Saline
    g. Tubing
    h. Sterile gloves
2. Explanation of procedure to patient
    a. Patient identification
        i. Date of birth
        ii. Doctor's requisition
        iii. Full name
    b. Explanation of procedure
        i. Tourniquet placement
        ii. Needle insertion site
        iii. Fist clenching
        iv. Pinch feeling
    c. Patient consent
        i. Complete requisition
        ii. Verbal and written consent
    d. Proper patient communication
        i. Gender
        ii. Culture
        iii. Race
        iv. Disabilities
3. Needle insertion

   a. Vein selection
   b. Approach
   c. Blood return
   d. Recapping technique
4. Review of complications
   a. Extravasation
   b. Vasovagal effects
5. Post-procedure instructions
   a. Firm pressure
   b. Time for clot formation
   c. Fluids
   d. Dizziness
6. Recording successful punctures
   a. Name of patient
   b. Date
   c. Type
   d. Location
   e. Signature of supervisor

Methods of Instruction

Method

Lecture

Integration

The lecture will cover topics such as proper venipuncture techniques, various contrast media types and their administration, fundamental principles of pharmacology, and different imaging modalities. During the lecture, the instructor will provide a group demonstration of proper venipuncture techniques to all students, and they will also closely oversee each student's individual practice when simulating injections.

Method

Reading

Integration

To complement the lecture material, students are encouraged to study specific chapters from the mandatory textbook authored by J. Lampignano, namely Chapter 17-18, and 20, which covers advanced imaging procedures. Chapters 26, 27, and 38 in the S. Bushong textbook offers additional information on advance imaging procedures. Chapter 14 in Bontrager will be read for information on venipuncture. And chapters, 15-16, in the patient care textbook by Ryan will cover information on contrast media and chapter 18 includes additional information on advanced imaging procedures.

Method

Film/video Viewing and Discussion

Integration

The instructional method will involve utilizing video presentations to illustrate venipuncture techniques and contrast media procedures. Following the video presentations, an interactive discussion will be conducted to address the potential challenges radiographers may encounter when performing venipuncture on a diverse range of patients.

For instance, to enhance understanding of contrast media, students will have access to a variety of video resources, including a 30-minute video explanation by M. Frianeza. This video comprehensively covers the topic, discussing contrast media and its applications in radiography.

Additionally, to deepen their knowledge of advanced imaging modalities, students will be encouraged to explore relevant YouTube videos. For example, they can watch a 4-minute video titled "What is Computed Tomography and how does it work?" which offers a patient-centric overview of CT imaging, providing valuable insights into its operation.

This combination of video presentations and supplementary resources aims to provide students with a comprehensive understanding of venipuncture techniques, contrast media, and advanced imaging modalities, while fostering engagement and discussion to address any potential challenges in their application.

Method

Lab Activities

Integration

In order to attain certification, students must successfully complete ten venipuncture procedures. To accomplish this, students have the option to practice their venipuncture techniques using either an arm simulator or a human volunteer, all while being closely supervised by a certified radiographer possessing a venipuncture certificate.

Methods of Evaluation

Method

Exams/Tests

Integration

Exams and tests will assess the student's ability to grasp concepts related to contrast media, venipuncture and pharmacology. The examinations will consist of multiple-choice questions to effectively prepare students for the American Registry of Radiologic Technologists exam, which also employs a multiple-choice format. Grading will be based on the accuracy of responses.

Method

Role-playing/Simulation

Integration

Students will perform venipuncture techniques in the lab setting either on a simulator, human, or a combination of both. Each venipuncture procedure will be evaluated and directly supervised by an instructor with a venipuncture license. The student is required to obtain ten successful venipuncture procedures for certification. Grading is based on demonstration of proper venipuncture technique along with a sucessful blood flow return and saline injection.

Method

Homework

Integration

The instructor will regularly post a reading assignment and accompanying homework questions from the S. Bushong, J. Lampignano, and J. Ryan textbooks on Canvas CMS. These assignments will be located in the "Files" section.

Students are expected to download and print the provided homework questions. Completed homework assignments should be submitted at the beginning of the next scheduled class session.

To promote active learning and collaborative problem-solving, homework questions will be assessed for accuracy and discussed during the class session. Each student will be encouraged to select one question they found challenging and share it with a neighboring classmate. Together, they will explore why their answers may have been incorrect.

Furthermore, the instructor will lead a class-wide discussion to clarify any questions and address incorrect answers. This group interaction will provide valuable opportunities for students to enhance their understanding of the subject matter. Grades will be determined by completeness of the homework assignment questions and participation in discussions.

Assignments

Assignment Type

Writing

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Formative

Assignment

Complete the following assignment related to radiographic contrast media and its purpose. This assignment is designed to help you understand the importance of contrast media in medical imaging. Be prepared to discuss your findings in class with fellow students and the instructor.

Part 1: Understanding Radiographic Contrast Media

Define radiographic contrast media and explain its role in medical imaging.
List and briefly describe the two main types of radiographic contrast media used in medical imaging.
Explain why radiopaque contrast media are used for certain types of imaging procedures and radiolucent contrast media for others. Provide examples of procedures for each.

Part 2: Purpose and Applications
Discuss the primary purpose of using contrast media in medical imaging. How does it enhance the diagnostic value of radiographic images?
Identify and describe at least three medical imaging modalities that commonly use contrast media. Explain the specific situations or conditions where contrast-enhanced imaging is necessary for each modality.

Part 3: Risks and Precautions
Explain the potential risks and side effects associated with the use of contrast media in medical imaging. Discuss how healthcare professionals mitigate these risks.
Describe the importance of patient screening and assessment before administering contrast media. What factors should be considered during the screening process?

Part 4: Case Study
Research and select a specific medical condition or procedure that frequently requires the use of radiographic contrast media.
Describe the condition or procedure and explain why contrast media are necessary for its diagnosis or treatment.
Discuss any potential challenges or complications that healthcare providers may face when using contrast media for the selected condition or procedure.

Submission Guidelines:

Please type your responses in a document or create a digital presentation (e.g., Microsoft Word, PowerPoint).
Ensure that your answers are clear, concise, and well-organized.
Include any references or sources you used for research (if applicable).

Grading Rubric:
Responses should demonstrate a clear understanding of radiographic contrast media and its purpose, provide accurate information, and address all aspects of the questions. Participation in discussions will also be included in the final grade.

Assignment Type

Other

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

Demonstrate competency in venipuncture techniques on a simulator and/or live person under direct supervision of a qualified instructor.

Venipuncture Procedure: Perform a complete venipuncture procedure under the direct supervision of your instructor. This should include the following steps:

Patient identification and introduction.
Equipment setup and preparation.
Tourniquet application.
Vein selection and palpation.
Cleaning and sterilization of the site.
Needle insertion and blood return.
Injection of 2 cc of saline.
Removal of the tourniquet and needle.
Application of dressing or bandage.
Patient reassurance and post-procedure instructions.

Part 3: Reflective Report

Evaluation Criteria:
Your assignment will be assessed based on the following criteria:

Demonstration of correct venipuncture technique.
Adherence to safety and infection control measures.
Professionalism, communication, and empathy during the procedure.

Note: Always prioritize patient safety and ethical considerations when performing venipuncture procedures. If you have any doubts or concerns, consult with your instructor prior to evaluation.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Read chapters 26, 27, and 38 in the required course textbook by S. Bushong which covers topics in advanced imaging modalities. Make notes for discussion in class. List the advanced imaging procedure, why it may be performed (indications), options to this specialty, contraindications, patient approach to consent, and challenges to patients of diverse race, culture, gender, and disabilities.

Preparation: For each of the assigned chapters, prepare a summary that includes the following details:

Name the advanced imaging modality.
Describe the basic function and operation of the equipment.
Indications for using this modality. In other words, what anatomy is best imaged and/or type of pathology would best be seen using this modality?
What are the options to this modality. An example would be using sonography to image a kidney rather than computerized tomography for a pediatric patient.
Contraindications for this modality. For example, sonography cannot image bowel gas so intussusception would not seen in this modality.

Patient communication and approach to the modality, consideration patients of diverse race, culture, gender, and disabilities. What is an example of a challenge that may be arise during a procedure using this modality? How would you resolve this challenge to successfully complete the exam?

Class Discussion: Be prepared to actively participate in class discussions for each imaging modality. You will share your summaries and engage in a collaborative learning environment.

Questions and Clarifications: Feel free to bring any questions or seek clarifications during the class discussion. This is an opportunity to deepen your understanding of advanced imaging modality and how it advances patient care and achieves appropriate diagnosis.

Grading Criteria:

Active participation in class discussions.
Quality and completeness of the prepared summaries for each chapter.
Demonstrated understanding of the imaging modality and related concepts.
This assignment is designed to enhance your comprehension of advanced imaging modalities and procedures which are crucial skills for a radiographer. Engage actively in the discussions to maximize your learning experience.

Course Materials

Textbooks

1. Bushong, S., (2021)Radiologic Science for Technologists: Physics, Biology, and Protection, 12th Ed., Elsevier. ISBN#: 978-0323661348 2. J. Lampignano, (2020) Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Ed., Elsevier. ISBN#: 9780323653671 3. Ryan, T., (2023) Torres' Patient Care in Imaging Technology , 10th Ed., Wolters Kluwer. ISBN#: 978-1975192518

Class Size Information

Class Size

32

Class Size Category

G - Large lab 32

Diversity and Inclusion

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

This course teaches diverse content that includes patient scenarios describing situations where gender, culture, race, and disabilities have an impact on patient care during venipuncture procedures. The instructor and students will discuss in class how approach and interact with patients of different race, culture, ethnicity, gender identity, and disabilities. Students will actively role play to develop skills in communication to address the diverse population of patients they will encounter while performing venipuncture procedures. Course objectives and learning outcomes are supported through classroom discussions and simulation of patient care scenarios which are presented to foster knowledge, empathy, and patient advocacy in developing future healthcare professionals.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

The course provides a variety of resources to cater to diverse learning preferences. For auditory learners, there are in-class instructor lectures. Visual learners can make use of PowerPoint presentations, required textbook readings, YouTube videos, and instructor-led demonstrations on venipuncture techniques. Hands-on learners will actively participate in the classroom, applying and improving their skills in proper venipuncture preparation and techniques.

Interactions

Explain how the course will incorporate student-to-student interaction.

This course has a lab component which enhances the classroom discussions with hands-on student interaction through venipuncture simulation in pairs. Students will work in small groups to complete in class assignments that promote discussions and interactions between them.

Explain how the course will incorporate instructor-to-student interaction.

In this course, students have the opportunity to engage with the instructor through various demonstrations of venipuncture techniques. The instructor actively participates in classroom discussions, providing insights and facilitating conversations on the homework assignment related to contrast media. The instructor also engages in face-to-face lectures, where students can ask questions and seek clarification. Real-life experience stories are incorporated into these lectures to enhance student learning.

Explain how the course will incorporate student-to-content interaction.

In this course, there are three comprehensive textbooks required that serves as invaluable resources for future radiographers. Students are encouraged to engage with the course material by reading the textbooks, watching venipuncture demonstrations and assigned YouTube videos, and actively participating in hands-on veniputure procedures.

Explain how the course will incorporate student-to-self interaction (metacognitive).

This course offers inclusive opportunities for students to critically consider the nuances of performing venipuncture procedures while ensuring the safety and comfort of patients.
Students will not only acquire the necessary skills for venipuncture but also develop the empathy and cultural competence required to effectively interact with patients from various backgrounds, ethnicity, and disabilities. This comprehensive approach ensures that all students are well-prepared to perform venipuncture procedures on real patients within a hospital training setting upon graduation.

Key: 3075