

Course Description

NMT2834C | Nuclear Medicine Clinical Education 4 | 5.00 credits

This is the final course in the series of three clinical courses. Students will learn to apply all didactic competencies in the Nuclear Medicine department setting, as well as perform all procedures from the two Nuclear Medicine Procedures courses with minimal supervision. The ARRT Competency Requirements must be completed in this course.

Course Competencies:

Competency 1: The student will be able to practice non-emergency patient care and prepare patients for Nuclear Medicine procedures by:

1. Using correct body mechanics and support holds when moving or assisting patients
2. Using side rails or stretcher/wheelchair straps on patients as appropriate
3. Monitoring the disoriented, unconscious, sedated, or pediatric patient
4. Providing for patient comfort before, during and after the nuclear medicine procedure
5. Using correct medical asepsis techniques during veno-puncture procedures
6. Using correct isolation procedures when indicated
7. Observing and maintaining intravenous tubing, naso-gastric tubing, chest tubes, urinary retention catheters, surgical dressing, CVP lines, T-tube colostomy and oxygen administration, as appropriate
8. Assisting patients with use of bedpans/urinals or emesis basins, as needed

Competency 2: The student will be able to implement primary emergency patient care by:

1. Reading & recording vital signs as needed, including blood pressure, pulse, respiratory rate and temperature
2. Identifying an emergency that requires immediate notification of a physician and make the proper notification
3. Identifying an emergency that requires immediate notification of the hospital "code" team and make the proper notification
4. Performing Cardiopulmonary resuscitation techniques, if necessary
5. Finding and assisting with the use of the emergency cart as appropriate
6. Maintaining life support equipment as appropriate
7. Providing appropriate care in response to patient seizures, hemorrhage and/or fainting

Competency 3: The student will be able to exhibit professional behavior and awareness for the patient's comfort by:

1. Welcoming the patient to the department, introducing yourself and addressing the patient by name
2. Addressing patients, families, co-workers and hospital personnel by appropriate names or titles
3. Describing the level of respect given to patients, families, co-workers, and hospital personnel
4. Controlling one's emotional reactions such as distaste, disgust and/or surprise
5. Refraining from discussing confidential or potentially alarming news in front of or near the patient
6. Preventing unnecessary exposure of the patient's body
7. Utilizing time management skills to minimize patient waiting periods
8. Assessing the patient's comfort level and providing pleasantness as conditions allow
9. Explaining why a patient has been kept waiting and assuring them they have not been forgotten
10. Maintaining in confidence any information offered by the patient, unless it is understood by the patient that it will become a part of the medical record
11. Reporting any changes in the patient's condition to the appropriate person
12. Discussing with the patient what the examination involves, what the patient will feel and what the patient will be required to do, prior to beginning the examination

13. Explaining the procedure to the patient, taking into consideration age, degree of illness, intelligence, and possible language difficulties of the patient
14. Communicating with the patient throughout the procedure

Competency 4: The student will be able to perform essential administrative/management functions of the department by:

1. Reviewing inventory supplies and determining when to restock routine items as well as radiopharmaceuticals and/or radio-assay kits that have specific shelf lives
2. Communicating with hospital and departmental staff to schedule patients studies effectively, including determination of the correct sequence for multiple procedures, both in nuclear medicine and in radiology
3. Maintaining appropriate records of patient doses, quality control procedures, radioactive waste disposal, patient reports, film reports and all other records required by the hospital, JCAHO, NRC or licensing bodies
4. Interpreting and following the departmental procedure manual
5. Developing a personal procedure manual to reflect the level of knowledge of procedures performed in the facility

Competency 5: The student will be able to recognize in vivo imaging procedures by:

1. Reviewing the requisition for completeness of information
2. Retrieving and/or preparing the patient file
3. Identifying relevant data from the medical record and requisition as appropriate
4. Obtaining positive patient identification, conducting a patient interview, and explaining the study (obtain formal consent when needed)
5. Determining whether the patient has undergone the necessary pre-examination procedures when appropriate
6. Determining whether the patient has received any medication or had any examination that would interfere with or contraindicate the nuclear medicine study
7. Implementing corrective action or making appropriate notation on requisition if the patient has either not undergone necessary pre-examination procedures or has had any medication or examination that would interfere with the nuclear medicine study
8. Preparing the patient and/or instructing the patient as to any particular preparation necessary for the imaging procedure
9. Calculating the correct radiopharmaceutical dose to be administered
10. Determining the radio-pharmaceutical administration time and time at which imaging should be performed post- administration
11. Preparing the administration tray and applying the correct radio-pharmaceutical in the appropriate dosage
12. Administering the radio-pharmaceutical according to protocol where permitted by law or policy
13. Selecting instrument, collimator and auxiliary equipment for the study and determining that all equipment is functioning properly
14. Selecting and adjusting instrument parameters for the images as each view is performed
15. Selecting and adjusting the photo display unit for the study

Competency 6: The student will be able to operate Nuclear Medicine instruments by:

1. Preparing the scintillation camera (planar or SPECT) for a procedure
2. Selecting and attaching the proper collimator
3. Selecting and adjusting the imaging parameters
4. Recognizing imaging artifacts that reflect malfunctioning or incorrectly adjusted instruments
5. Performing and analyzing a field uniformity check
6. Selecting a radio-nuclide source of appropriate quantity and energy
7. Adjusting pulse-height analyzer photo peak
8. Constructing uniformity images using standardized technique

9. Comparing a current field uniformity image with previous images and identifying any non-uniformities
10. Performing and analyzing a detector linearity check
11. Performing a sensitivity check according to the established protocol and procedures on the departmental camera
12. Performing each exam within the expected frequency

Course Competency 7: The student will be able to practice the skills of dose calculation and administration by:

1. Calculating the dose of a specific radio-pharmaceutical for a certain study using a calculator and decay chart
2. Verifying and recording patient name and age and the study requested
3. Identifying from the label on the radio-pharmaceutical vial the concentration, total activity, total volume, assay time, and date of assay
4. Determining lapsed time and calculate activity remaining
5. Analyzing the activity needed for the procedure
6. Calculating the volume of the radio-pharmaceutical required to provide the appropriate patient dosage
7. Recording the appropriate data into radio-pharmaceutical dispensing records for the procedure.
8. Calculating the correct radio-pharmaceutical dose
9. Demonstrating the correct method for dispensing a liquid radiopharmaceutical for an intravenous administration
10. Using aseptic techniques
11. Using gloves and shields to minimize self-contamination problems
12. Drawing up the radio-pharmaceutical behind a lead shield to within +/- 5% of the calculated dose
13. Calculating the radioactivity with the dose calibrator
14. Recording patient data and radio-pharmaceutical data according to approval policy
15. Labeling the syringe and/or syringe shield

Course Competency 8: The student will be able to demonstrate an understanding of radio-pharmacy by:

1. Demonstrating the correct procedure for elution of a Mo/99mTc generator
2. Assembling the shield, vials, and all materials necessary for aseptic elution of the generator
3. Performing the complete procedure behind a lead shield using gloves
4. Attaching vials to correct input and output needles
5. Using a shield on the vial that will contain eluate assay
6. Eluting in the dose calibrator and recording the eluate activity in appropriate radiopharmaceutical accountability log
7. Checking to determine whether volume and activity eluted are appropriate to volume used and activity expected for that day
8. Labeling the vial/shield with the appropriate information to include activity, volume, concentration, date and time of assay and radio-pharmaceutical
9. Performing a 99Mo breakthrough Verify test on a 99Mo/99mTc eluate
10. Determining 99mTc activity per volume using the appropriate dose calibrator setting
11. Determining 99Mo activity per volume using the appropriate dose calibrator setting

Course Competency 9: The student will be able to implement radiation safety and protection techniques by:

1. Wearing whole-body and ring badges at all times in the clinical area
2. Reviewing the monthly and cumulative personnel exposure records with regard to dose limits
3. Recognizing and taking appropriate measures to reduce exposure
4. Using appropriate protection techniques to keep exposure as low as reasonably achievable
5. Performing area surveys of the hot lab and department
6. Checking survey instruments for proper function and calibration
7. Using department protocol to determine areas for survey
8. Using correct survey instrument for each type and level of radiation
9. Interpreting results and notifying personnel, as appropriate

10. Performing wipe tests and decontamination procedures as appropriate
11. Receiving and processing radioactive shipments, including the generator, in the laboratory
12. Recording in the receipt of radioactive shipments
13. Identifying damaged packaging, and taking appropriate precautions

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information
- Demonstrate knowledge of ethical thinking and its application to issues in society
- Use computer and emerging technologies effectively