Miami Dade College

Course Description

NMT2804C | Nuclear Medicine Clinical Education 1 | 3.00 credits

This course will introduce the student to the fundamentals of clinical nuclear medicine, primarily through hospital involvement. The student will learn practical experience in a Nuclear Medicine department by performing the principles taught in class. Prerequisites: NMT1002L, NMT1312C, NMT1705C, NMT2613; Corequisites: NMT1713C, NMT2102, NMT2534C

Course Competencies:

Competency 1: The student will be able to demonstrate an understanding of the basic operations of the nuclear medicine department and the facility's rules and regulations through an orienting process by:

1. Obtaining vital signs, including blood pressure, pulse, respiratory rate, and temperature
2. Recognizing an emergency that requires immediate notification of a physician and making the proper notification
3. Recognizing an emergency requiring immediate notification of the hospital "code" team and notify properly
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 fainting

Competency 2: The student will exhibit professional behavior and awareness for the patient's comfort by:

1. Introducing himself/herself to the patient, welcome the patient to the department, and address the patient by name
2. Addressing patients, families, co-workers, and hospital personnel by appropriate names or titles
3. Respecting all patients, families, co-workers, and hospital personnel
4. Avoiding emotional reactions such as distaste, disgust, and surprise
5. Maintaining private anything confidential or potentially alarming within the patient's hearing
6. Refraining from discussing patients with colleagues in patient areas and in any way that is not pertinent to the procedure or patient care
7. Preventing unnecessary exposure of the patient's body
8. Working proficiently and scheduling carefully to minimize patient waiting periods as much as possible
9. Providing patients who must wait before or during a procedure with as much comfort and pleasantness as conditions allow
10. Explaining and apologizing when a patient must be kept waiting and assuring the patient that he/she has not been forgotten
11. Confidentially hold any information the patient offers unless the patient understands that it will become part of the medical record
12. Reporting any changes in the patient's condition to the appropriate person
13. Explaining the procedure to the patient, taking into consideration the patient's age, degree of illness, intelligence, and possible language difficulties
14. Communicating with the patient throughout the procedure to ensure patient comfort and cooperation
15. Demonstrating sensitivity to the patient's feelings, fears, doubts, and embarrassment
16. 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

Competency 3: The student will perform essential administrative/management functions of the department by:

1. Reviewing inventory supplies and determine when to restock routine items, as well as radiopharmaceuticals and/or radio-assay kits with specific shelf lives

2. Interacting with hospital and departmental staff to schedule patients' studies effectively, including determining the correct sequence for multiple procedures, both in nuclear medicine and 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. Following the departmental procedure manual
5. Developing a personal procedure manual to reflect the level of knowledge of procedures performed in the facility

Competency 4: The student will recognize in vivo imaging procedures by:

1. Reviewing the requisition for completeness of information
2. Retrieving and 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. Establishing 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. Taking appropriate 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 instructing the patient as to any particular preparation necessary for the imaging procedure
9. Calculating the correct radio-pharmaceutical dose to be administered
10. Determining the radio-pharmaceutical administration time and time at which imaging should be performed post-administration
11. Setting up the administration tray and preparing the correct radio-pharmaceutical in the appropriate dosage
12. Administering the radio-pharmaceutical according to procedure 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 vie is performed
15. Selecting and adjusting the photo display unit for the study
16. Selecting correct parameters for computer data acquisition as appropriate
17. Positioning the patient for all views normally performed with the study, considering specific patient conditions
18. Processing all films and reloading the cassettes
19. Labeling and assemble all films for presentation to the physician or supervisor, including notating anatomical landmarks as appropriate
20. Completing all departmental forms/paperwork
21. Evaluating the study for technical mistakes and identifying additional or repeat images that may be needed

Competency 5: The student will 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. Obtaining uniform images using a 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

Competency 6: The student will practice the skills of dose calculation and administration by:

1. Calculating the dose of a specific radio-pharmacological product for a certain study using a calculator and decay chart
2. Verifying and record the patient's name, age, and the study requested
3. Identifying the concentration, total activity, total volume, assay time, and date of assay from the label on the radio- pharmaceutical vial
4. Determining the lapsed time and calculating the activity remaining
5. Ascertaining the activity needed for the procedure
6. Calculating the volume of the radio- pharmaceutical required to provide the appropriate patient dosage
7. Logging the appropriate data into radio-pharmaceutical dispensing records for the procedure
8. Verifying the radio-pharmaceutical dose calculation
9. Demonstrating the correct method for dispensing a liquid radio-pharmaceutical 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. Verifying the radioactivity with the dose calibrator
14. Recording patient data and radio-pharmaceutical data according to approval policy
15. Labeling the syringe and syringe shield
16. Demonstrating the correct method for dispensing a gaseous radio-pharmaceutical

Competency 7: The student will demonstrate an understanding of radio-pharmacy by:

1. Demonstrating the correct procedure for eluting 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 (A shield on the vial will be used to contain the eluate assay)
5. Eluting in the dose calibrator and recording the eluate activity in the appropriate radiopharmaceutical accountability log
6. Checking whether the volume and activity eluted are appropriate to the volume used and activity expected for that day
7. Labeling the vial/shield with the appropriate information, including activity, volume, concentration, date and time of assay, and radio-pharmaceutical
8. Performing a 99Mo breakthrough Verify test on a 99Mo/99mTc eluate
9. Determining 99mTc activity per volume using the appropriate dose calibrator setting
10. Determining 99Mo activity per volume using the appropriate dose calibrator setting

Competency 8: The student will 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 about 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 the survey
8. Using the 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. Logging in the receipt of radioactive shipments
13. Visually determining damaged packaging and taking appropriate precautions
14. Monitoring packaging material

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Demonstrate knowledge of ethical thinking and its application to issues in society
- Use computer and emerging technologies effectively