NMED-2960: NUCLEAR MEDICINE FIELD EXPERIENCE III

Cuyahoga Community College

Viewing: NMED-2960 : Nuclear Medicine Field Experience III

Board of Trustees:
June 2022

Academic Term:
Fall 2022

Subject Code
NMED - Nuclear Medicine Technology

Course Number:
2960

Title:
Nuclear Medicine Field Experience III

Catalog Description:
Capstone course in nuclear medicine. Supervised sessions emphasizing team approach to daily operation of a nuclear medicine department. Includes patient care, procedures, radiation safety, quality control, equipment manipulation and patient positioning. Clinical rotations through a variety of specialty areas including nuclear medicine studies of various patient age groups (pediatrics/ geriatric) and pathologies. Preparation for employment in nuclear medicine and for the American Registry of Radiologic Technologists' examination in Nuclear Medicine to include mock examinations.

Credit Hour(s):
4

Lecture Hour(s):
1

Other Hour(s):
640

Other Hour Details:
Field Experience: 640 hours of experience at a clinical site per semester (average of 40 hours per week)

Requisites

Prerequisite and Corequisite
NMED-2950 Nuclear Medicine Field Experience II or departmental approval.

Outcomes

Course Outcome(s):
Follow compliance with hospital policies and procedures for the successful completion of clinical training and professional preparedness.

Objective(s):
1. Demonstrate professional ethical behavior at all times with patients, hospital personnel, college staff and visitors.
2. Function in all department clerical capacities with demonstrated efficiency.
3. Route patients to and from their destination within the hospital.

Course Outcome(s):
Use safe operation of imaging and ancillary equipment under the supervision of a registered nuclear medicine technologist and/or physician.

Objective(s):

1. Explain how to prepare the room and equipment prior to beginning each nuclear medicine procedure.
2. Demonstrate proficiency in operating nuclear medicine equipment.
3. Recognize variance in patient's body habitus and/or patient's pathological conditions and demonstrate the proper imaging adjustments to accommodate anticipated imaging expectations.

Course Outcome(s):

Practice proper radiation protection and safety techniques at all times and comply with ALARA (As Low As Reasonably Achievable) standards.

Objective(s):

1. Demonstrate ability to perform quality control of nuclear medicine equipment, explain the safe limits of operation and report malfunctions to the proper authority.
2. Describe the nuclear medicine technologist, radiologist and physicist roles within the nuclear medicine department.
3. Explain and differentiate radiation safety limits for both patients (pregnant and non-pregnant) and a radiation safety worker.
4. Determine proper biohazard signage of areas that handle radiation and/or bodily fluids.

Course Outcome(s):

Produce quality images of all nuclear procedure(s) with the use of technique guides, positioning skills, computers, nuclear medicine instrumentation, and ancillary devices.

Objective(s):

1. Demonstrate competency in quality control procedures.
2. Describe how to produce quality images using correct imaging equipment parameters.
3. Evaluate and critique nuclear medicine images/results as to their quality and demonstrate ability to correct for miscalculations/positioning accuracy.

Course Outcome(s):

Use a team approach in assisting the radiologist or nuclear medicine technologist in the handling, selection, dosage and quality control in preparation, administration and disposal of radiopharmaceuticals.

Objective(s):

1. Properly select, prepare and determine if a radiopharmaceutical meets quality control measures prior to administration to the patient.
2. Demonstrate the steps to dispose of and store radioactive materials.
3. Demonstrate the steps to dispose of and store biohazard materials.
4. Correctly administer radiopharmaceuticals via proper route of administration to the patient.

Course Outcome(s):

Review and perform a variety of nuclear medicine procedures.

Objective(s):

1. Describe clinical and practical application of the procedures in nuclear medicine.
2. Perform accurately procedures required of a nuclear medicine technologist, including the computer analysis.
3. Determine if the reported result is the proper conclusion given the information that is presented.

Course Outcome(s):

Prepare for the national registry examinations in nuclear medicine by completing a variety of Mock Registry examinations.

Objective(s):

1. Successfully complete mock registry exams (75% or better) in order to prepare for the nuclear medicine national registry examinations.
2. Demonstrate the skills required by the Nuclear Medicine Technology Certification Board (NMTCB) and American Registry of Radiologic Technologists.
3. Complete, and be approved by Clinical Site Supervisors, the competencies to sit for the nuclear medicine national registries.

Course Outcome(s):

Prepare a resume and develop interview skills for employment in the field of medical imaging.

Objective(s):

1. Practice principles of good writing with emphasis on analytical skills.
2. Complete peer review and evaluation of student cohort submissions in order to understand effective interview techniques.

Course Outcome(s):

Prepare and present a Capstone Research Project in order to prepare for public speaking.

Essential Learning Outcome Mapping:

Oral Communication: Demonstrate effective verbal and nonverbal communication for an intended audience that is clear, organized, and delivered effectively following the standard conventions of that language.

Objective(s):

1. Select an appropriate topic or case review pertinent to current trends of nuclear medicine.
2. Research and prepare a power point presentation which will be given to colleagues and staff members at the end of course.
3. Discuss information learned about disease development, comparison to other imaging or diagnostic modalities, scans depicting normal versus abnormal anomalies, and prognosis within the capstone project.

Course Outcome(s):

Use a team approach in assisting the Radiologist or PET/CT Technologist in the patient preparation, quality control, positioning, imaging and processing of PET/CT studies in preparation of the NMTCB national registry.

Objective(s):

1. Accurately prepare the PET/CT patient in regards to contrast administration, contraindications of study, medicinal contraindications, proper pregnancy precautions and renal impairment identification.
2. Understand and participate in the quality control processes necessary within a working PET/CT department, under the direct guidance of a registered nuclear medicine technologist.
3. Position patients accurately for a basic PET/CT scan under direct supervision of a nuclear medicine technologist.
4. Perform and process basic PET/CT scans accurately and under direct supervision of a registered nuclear medicine technologist any basic PET/CT scan.
5. Observe special procedures performed by a registered nuclear medicine technologist.
6. Correctly identify major structures, label and process images, describe and analyze any basic PET/ CT scan they participated in acquiring.

Methods of Evaluation:

1. Site supervisor evaluation
2. Written tests
3. Competency performance evaluations
4. Professional/ethical evaluations
5. Advanced technical evaluations
6. Completion of all clinical requirements
7. Completion of "Mock" Registry exams
8. Case studies
9. Oral presentations
10. Research Projects

Course Content Outline:

1. Hospital protocols and departmental policies
    a. Clinical site handbook
    b. Radiology information system
    c. Film library
2. Effective communication skills
    a. Patient communication
        i. identify and assess patient
        ii. verify and explain procedure

   iii. safety
   iv. comfort and cooperation
b. Patient clinical history
c. Communication with radiologists, nuclear medicine technologists and staff

3. Nursing procedures for nuclear medicine
   a. Standard (universal) precautions for patients and self
   b. Monitor, observe and respond to patients
   c. Provide general patient care as needed
      i. CPR
      ii. vital signs (BP, pulse, respiration, temperature)
      iii. venipuncture
      iv. O2 administration
4. Clinical rotations (pediatrics/geriatrics):
   a. Respiratory
      i. perfusion
      ii. ventilation or aerosol
      iii. quantitative
   b. Skeletal system
      i. planar - static
      ii. planar - whole body
      iii. single photon emission tomography (SPECT)
      iv. three-phase
   c. Cardiovascular
      i. cardiac first pass
      ii. gated blood pool studies
      iii. myocardial perfusion - stress/rest or rest/stress SPECT and/or planar
      iv. myocardial perfusion gated with SPECT
      v. myocardial perfusion using positron emission tomography (PET)
      vi. cardiac viability - PET
   d. Abscess and infection
      i. gallium
      ii. tagged leukocytes
   e. Central nervous system
      i. brain - planar
      ii. brain - SPECT
      iii. brain - dynamic
      iv. brain - PET
      v. cisternography - cerebrospinal fluid leak
   f. Endocrine/exocrine
      i. thyroid - scan
      ii. thyroid - metastatic survey
      iii. parathyroid
   g. Gastrointestinal
      i. biliary function
      ii. gastroesophageal reflux
      iii. gastric emptying
      iv. GI bleeding
      v. Meckel's diverticulum
   h. Liver/spleen
      i. planar
      ii. SPECT
      iii. hemangioma
   i. Genitourinary
      i. renal - dynamic perfusion
      ii. renal - sequential imaging
      iii. testicular
      iv. cystography
   j. Tumor/Antibody

i. gallium
ii. monoclonal antibodies
iii. breast imaging
iv. lymphoscintigraphy
v. Positron emission tomography (PET)

k. Fusion Imaging
i. SPECT/CT (computed tomography)
ii. PET/CT
iii. SPECT/MR (magnetic resonance)
iv. PET/MR

l. Miscellaneous/shunt studies
m. Non-Imaging procedures
i. thyroid uptake
ii. therapeutic - palliative bone
iii. therapeutic - thyroid (excluding dose administration)
iv. therapies for cancer
v. radioimmunotherapy

5. Equipment operation
a. Radiation safety and protection for self, patients and others
b. Room preparation
c. Equipment preparation and configuration
d. Process images
i. darkroom
ii. daylight
iii. computed imaging
e. Image quality and evaluation
f. medical informatics

6. Radiopharmaceutical protocols
a. Radiation safety
i. major spills
ii. minor spills
b. Preparation and handling
i. selection
ii. dosage
iii. quality review
c. Administration and recording

7. Quality control
a. Gamma camera
b. Dose calibrators
c. Well counters/uptake probes
d. Survey meter

8. Review of material for Registry examination
a. Radiation protection
b. Radiopharmaceutical preparation
c. Instrumentation quality control
d. Diagnostic procedures
e. Patient care

9. Preparation for employment.
a. Resume writing and professional correspondence
b. Interviewing skills

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Resources

American Registry of Radiologic Technologists (ARRT). "Content Specifications for the Examination in Nuclear Medicine Technology" current.

American Registry of Radiologic Technologists (ARRT). "Competency Requirements for Nuclear Medicine Technology"

Cherry, Simon, James Sorenson and Michael Phelps. *Physics in Nuclear Medicine*. 4th ed. Philadelphia, PA: Saunders/Elsevier, 2013.

Early, Paul J. and Sodee, D. Bruce. "Principles and Practices of Nuclear Medicine" 2nd ed. St. Louis, MO: Mosby, 1995.

Mettler, Jr., Fred and Guiberteau, Milton. *Essentials of Nuclear Medicine Imaging*. 7th ed. Philadelphia, PA: W.B. Saunders, 2018.

Christian, Paul, Bernier, Donald, and Langan, James. "Nuclear Medicine and PET/CT Technology and Techniques" 8th ed. St. Louis, MO: Mosby/Elsevier, 2016.

Shackett, Pete. "Nuclear Medicine Technology: Procedures and Quick Reference" 3rd ed. 2019.

NMTCB. "Nuclear Medicine Technology Certification Board (NMTCB) Exam Content" current.

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