

RADIOLOGY

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General Description

Elective/Selective Rotation

This rotation is a two (2) week experience structured to expose the student to the scope of radiology. This rotation will focus on imaging management skills- appropriate imaging ordering – cost effective, evidence based medicine, tailoring studies to patient and case specifics; management of negative or equivocal findings; concepts of positive and negative predictive values of imaging methods; knowledge of how imaging and procedures are performed including preparation of the patient for particular imaging studies; image interpretation with a focus on plain radiography, particularly chest radiography and emergency radiographic films with some exposure to cross sectional imaging, including CT, MRI and ultrasound. Upon completion of the rotation, the student should be able to scan an x-ray film for the key diagnostic x-ray findings and use these findings to arrive at the most likely diagnosis. The student should be able to demonstrate knowledge of the use of the resources of the radiology department in an appropriate and cost effective way to solve common clinical problems. Most students electing this rotation will be in their third year of medical school; however some may be in their fourth year. Post-rotation examination is **not** required.

Purpose

Clinical experiences are intended to assist the students' transition from didactics to integrated clinical evaluation, decision-making and management of patients with medical problems. In addition to gaining specific skills, the student should also develop skills in systematic medical problem solving, patient management, establish or reinforce patterns of independent learning and self-evaluation and improve skills in communication as well as medical record keeping.

Objectives

We recognize that two weeks is an insufficient time to cover this comprehensive list of objectives. Clearly, subjects addressed in any clinical rotation are dependent on the numbers of patients and kinds of disease entities presenting to a particular service. Nevertheless, certain minimum content **must** be addressed, either by clinical exposure or by didactic materials so that students are prepared for Board examinations and other testing. Therefore, the following sections contain relatively broad, basic objectives for which students are responsible.

Affective

At the completion of the radiology rotation, the student should be able to:

1. Understand the role of the radiologist on the health care team and the relationship of radiology to other clinical disciplines.
2. Develop an appreciation of the radiologist's needs for adequate clinical history and a clear statement of indications for examinations being requested.

Basic Psychomotor Objectives

The student should demonstrate development and expansion of competence in performing the following skills:

1. Demonstrate and discuss the appropriate and judicious ordering of various radiologic examinations.
2. Demonstrate a basic understanding of the investigative approach for interpretations of examinations.
3. Demonstrate a thorough understanding of methods, indications, and contraindications for commonly ordered radiologic examinations.
4. Demonstrate knowledge of the use of the radiology department as an appropriate and cost effective way to solve common clinical problems.

5. Demonstrate ability to interpret (appropriate to the level of training) the more common examinations with an emphasis on the interpretation of chest radiography and emergent plain film examinations.
6. Demonstrate knowledge of the proper sequence of procedures to evaluation for specific clinical problems.
7. Demonstrate and discuss radiation safety including radiation biology, dosimetry, exposure limits, radiation protection and waste disposal.
8. Describe/discuss the many procedures of interventional radiology, and how they complement traditional surgical options.
9. Understand the use of PACS (picture archiving and communication system), access to radiology ordering and reporting systems
10. Describe the use, indications for, risks of, complications of and differences of contrast used in CT scanning, interventional radiology and MRI.

The student should be able to perform the following, with staff supervision:

1. Interpret radiographic studies commonly seen by nonradiologists, specifically chest, spine, extremity, and abdomen radiographs.
2. Synthesize data and approach radiological problems in a logical manner.
3. Correlate clinical presentations with radiological findings.

Basic Cognitive Objectives

For each of the following core examinations/procedures, the student should be able to apply osteopathic principles and practices to:

1. Describe the basics of the procedure and technique.
2. Describe its capabilities and limitations.
3. Describe and explain what is required from the patient.
4. Be familiar with the indications for and complications of the examination/procedure.
5. Describe the basic approach to interpreting the results.
6. Understand key concepts including what produces density differences on radiographic images, radiographic nomenclature for particular exams including: plain films – lucency, opacity, reticular, interstitial, linear, nodule, mass, atelectasis, alveolar; CT – attenuation, enhancement, density, Hounsfield units; Ultrasound – anechoic, hypoechoic, hyperechoic, attenuation; MRI – increased and decreased signal

Basic Examinations/Procedures: The emphasis will be on plain radiography particularly chest radiography and radiography performed in the emergency setting supplemented with cross sectional imaging

1. Plain Films: Spine
2. Plain Films: Extremity
3. Plain Films: Chest
4. Plain Films: Abdomen/Pelvis
5. Contrast Studies: Upper Gastrointestinal/small bowel
6. Contrast Studies: Barium Enema
7. Contrast Studies: Intravenous Pyelogram
8. Computed Tomography
 - a. head and neck
 - b. abdomen/pelvis
 - c. chest
 - d. spine
 - e. extremities
9. Ultrasound
 - a. abdomen
 - b. pelvis
 - c. carotid arteries of the neck
 - d. other superficial organs (thyroid)
 - e. peripheral vascular
 - f. testicular

10. Angiograms
 - a. neuro-angiography
 - b. peripheral visceral angiography
 - c. angioplasty
11. Magnetic Resonance Imaging
 - a. head & neck
 - b. neck
 - c. abdomen/pelvis
 - d. spine
 - e. musculoskeletal
 - f. vascular – MRA/MRV
12. Nuclear Medicine
 - a. gallbladder
 - b. bone scan
 - c. thyroid
 - d. parathyroid
 - e. cardiac (if applicable to department)
 - f. tumor specific scans (PET)
13. Mammography
14. Interventional Studies/Procedures
 - a. percutaneous biliary drainage
 - b. percutaneous abscess drainage
 - c. percutaneous transluminal angioplasty
 - d. percutaneous biopsy
 - e. percutaneous nephrostomy
 - f. percutaneous cholecystostomy

Understand Appropriate Imaging Algorithms for Common Diagnostic Situations Based on ACR Appropriateness Criteria

1. Appropriate imaging for suspected acute cholecystitis
2. Appropriate imaging for suspected appendicitis adult and child
3. Appropriate imaging for suspected CVA
4. Appropriate imaging for suspected pulmonary embolus
5. Appropriate imaging for suspected ectopic pregnancy
6. Appropriate imaging for suspected diverticulitis
7. Appropriate imaging for suspected foreign body aspiration in a child
8. Appropriate imaging for suspected renal stone disease
9. Appropriate imaging for suspected ruptured aortic aneurysm
10. Appropriate imaging for acute chest pain, atypical for MI
11. Appropriate imaging for suspected child abuse

This is not meant to be a comprehensive list but one which includes many common clinical scenarios.

Implementation

Course objectives are to be accomplished in a College-affiliated hospital or clinical facility, under supervision. Basic objectives **must** be covered during the rotation to assure adequate student preparation for Board examinations and other evaluations such as post-rotation examinations. The use of diverse methods appropriate to the individual and the clinical site are encouraged, but patient-centered teaching is optimal.

Didactic methods to achieve required objectives include:

- reading assignments
- lectures
- one on one teaching using PACS
- web based tutorials
- student attendance at/participation in formal clinical presentations by medical faculty

Clinically oriented teaching methods may include:

- assignment of limited co-management responsibilities under supervision
- participation in clinic visits, daily patient rounds and conferences
- supervised and critiqued clinical work-ups of patients admitted to the service
- assigned, case-oriented readings

Three levels of achievement are identified:

- familiarity with a variety of radiological procedures through observation and assisting
- proficiency in common radiological procedures through actual supervised performance
- awareness of the availability of various radiological procedures and their use in diagnosis/therapy.

At the beginning of the rotation, the attending physician should review expectations/guidelines of performance with the student. On the last day of service, the supervising physician should review the student's performance with the student. A student's signature simply indicates that the student has received a grade directly from the attending; it does not indicate agreement with the grade. Evaluations of students should be completed within one week of completion of the rotation using the E*Value on-line evaluation form when possible.

Texts and Resources

REQUIRED:

Goodman, RL, Felson's Principles of Chest Roentgenology, Saunders, 2007. Great introduction to chest X-ray interpretation.

OTHERS:

Mettler, FA, Essentials of Radiology, Latest Edition, Philadelphia: W.B. Saunders.
Novelline, RA, Squire's Fundamentals of Radiology, Harvard University Press

WEB SITES:

Interactive case-based teaching: Lieberman's eRadiology Learning Sites: <http://www.eradiology.bidmc.harvard.edu/>

TUTORIALS:

Chest X-ray.com: <http://www.chestx-ray.com>

University of Virginia Radiology Teaching: <http://www.med-ed.virginia.edu/courses/rad/radmain.jpg>

RSNA Clerkship Companion: <http://cc.rsna.org/public/aboutus/> this will put you into the RSNA website. To use the Clerkship Companion you will have to become a member of the RSNA which is free for med students and there is a link for this on the clerkship companion page.

APPROPRIATENESS CRITERIA:

<http://www.acr.org> once on the site, click the ACR appropriateness criteria box.

Med U – CORE Radiology Course – Available through DMU beginning July 1, 2014

ADDITIONAL HELPFUL READING RESOURCES

Weir, J and Abrahams, PH (eds), Imaging Atlas of Human Anatomy. Latest Edition, Baltimore: Mosby-Wolfe.

Required Assignments

Each Student is required to complete **ALL** of the CORE radiology cases from Med-U during this two-week rotation. The Department of Internal Medicine will be monitoring progress on these cases and will contact any student that is performing unsatisfactory in this area of study. The link to Med-U is www.med-u.org. Students sign in using their regular Med-U log-in information.