Radiology Clerkship Curriculum

Department of Radiology, Uniformed Services University (USU) School of Medicine

Description of Rotation or Educational Experience

Participants: Medical Students (3rd and 4th year), Interns (PGY-1)

Duration: 4 weeks

Location: Departments of radiology in USU associated military treatment facilities (MTF)

Status: Elective rotation

Duty hours: 0730-1630 hours, Mon-Fri or as directed by your onsite coordinator

USU points of contact (POCs):

Course Coordinator: Ms. Prima Tandoc, prima.tandoc@usuhs.edu, 301-295-3145

Course Director: CDR Alexander Galifianakis, alexander.galifianakis@usuhs.edu, 301-295-2192

Site specific POCs*:

Bethesda (WRNMMC)

GME Clerkship Coordinator (Registers HPSP/HSCP students and interns):
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USU Clerkship Coordinator (Registers MS-3 and MS-4 USU students):
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Clerkship Course Directors:
LC DR Matthew Lutynski (Interns, HPSP/HSCP students),
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Fort Belvoir Community Hospital (FBCH)

Radiology Dept POC:

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Madigan (MAMC)

Hospital USUHS coordinator: Ms. Kathy Rogers, kathy.s.rogers.civ@mail.mil, 253-964-0211

Radiology Program Coordinator Ms. Teresa Tucker, Teresa.l.tucker15.civ@mail.mil, 253-968-3718

Assigned faculty.

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Portsmouth (NMCP)

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San Antonio (SAMMC, WHASC)

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San Diego (NMCSD)

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Travis (DGMC)

Hospital POC – GME office POC for clerkship scheduling: TSgt Gerald Harris,
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Radiology POCs –

Radiology Clerkship and Residency Program Coordinator: Ms. Stephanie Mannel
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**Note:** Any MTF or other facility with a radiologist, can be a potential site for a radiology clerkship rotation. However, these rotations will need to be coordinated on a case-by-case basis between the site and the student, and will require USU Course director approval.

**Grading:** Pass/Fail. It is the responsibility of USU medical students to ensure that Ms. Marcia Turner has received their evaluation following completion of the clerkship so that their grade can be submitted to the registrar.

**Pre-rotation preparation:**
Rotations must be scheduled through the hospital clerkship coordinator, often located within the GME office. Once your rotation has been scheduled, please follow site specific instructions regarding when and where to report on the first day of your rotation. 4th year USU medical students will need to send a Form 1304 to Ms. Marcia Turner (marcia.turner@usuhs.edu) after coordinating with the site. 3rd year USU medical students are not required to submit a Form 1304.

**Brief description of rotation and rotation structure:**
This rotation is designed to provide trainees (medical students and interns) with experience in radiology within MTFs that have radiology departments. Daily activities will vary slightly by site but typically will consist of didactic and clinical conferences/lectures, daily medical imaging interpreted by diagnostic radiologists, tumor boards, and multidisciplinary conferences. Assessment and grading will be performed by the clerkship coordinator or designated faculty that is on site during your rotation. In an effort to standardize the rotation curriculum at the different MTFs that train students in conjunction with USU (while taking into account the variability in sites and resources), we have established a minimum level of competency in order to establish passing status for the rotation. This will be accomplished via online modules delivered via the iLearning Management System referred to as Sakai currently being used by USU. Each trainee will be required to complete and pass 4 online radiology modules (general radiology—chest and abdomen, pediatric radiology, neuroradiology, and musculoskeletal radiology). A
A passing score of 70% will be required for each module but each module may be repeated as many times as required. It is anticipated that it will take approximately 10-15 hours to complete all of the modules. Please keep in mind that these modules are considered the minimum level of completion for this rotation. This will allow for increased transparency and standardization of a centrally controlled curriculum. For additional site specific requirements, please talk to your clerkship coordinator within the radiology department. It is anticipated that additional requirements may include such activities as a minimum level of participation through the different radiologic subspecialties, creation of a teaching file, oral presentations, or additional quizzes.

**Accessing Sakai Learning Management System:**


2. Select MySites (right side of webpage).

3. Select appropriate radiology clerkship based on year of graduation (e.g., Students in the graduating class of 2015 will be enrolled in RAD03100 Radiology Selective 2015).

4. Read about the modules in the “Announcements” subfolder.

5. Complete each of the modules in the “Lessons” subfolder (left hand side within Course Tools).

6. Pass the post-test (70% required for passing) associated with each module contained within the “Tests & Quizzes” subfolder (left hand column).

7. Take the student survey contained within the “Lessons” subfolder.

**Teaching Methods:**

1. Online Sakai modules
2. Didactic lectures/conferences
3. Daily workload (teaching at the PACS workstation)
4. Direct observation of technique or procedure
5. Socratic method of questioning by faculty
6. Recommended reading assignments

**Assessment Methods:**

1. Online Sakai modules – must pass each module (70%) receive a clerkship passing grade
2. Intern/student evaluation at end of rotation
3. Socratic method of inquiry during rotation about assignments and cases
4. Evaluations: Information will be gathered from technologists, radiology residents, fellows, patients and other individuals that the trainee may have encountered
5. Quizzes (may vary by site)
6. Oral presentation by trainee (may vary by site)

**Level of Supervision:** Direct supervision of trainees will be performed throughout the rotation, typically by a resident or staff physician. Indirect supervision will be virtually performed by the USU and on-site clerkship coordinators and directors in order to ensure trainee completion and passing of Sakai online modules. Self-directed reading and study will not be supervised.

**Professionalism:** Unprofessional behavior will not be tolerated. Please keep in mind that unprofessional behavior within this rotation may be grounds for failure of the rotation and additional disciplinary action. Successful completion and passing of online modules will not reverse a failing grade given for unprofessional behavior.

**Rotation hours and leave policy:** Interns and medical students do not take overnight call during this rotation. Short call or shadowing experiences may be pursued as long as Accreditation Council for Graduate Medical Education (ACGME) duty hours are not exceeded. You may take leave during this rotation with permission from your site specific clerkship coordinator or designated faculty, Program Director or Dean.

ACGME duty hour policies are in effect. Any trainee who feels he/she is near or in-violation of duty hour policies should report the violation to your Program Director and/or Graduate Medical Education office. There is no reason for trainees on this rotation to exceed duty hours.


**Radiology Clerkship Goals and Learning Objectives:**
Department of Radiology, Uniformed Services University School of Medicine

**Basic goals:**

1) Become an educated consumer of radiology consultation and services  
2) Learn the language of diagnostic radiology  
3) Develop a systematic approach to the radiologic evaluation of the acutely ill patient  
4) Reinforce clinical knowledge using radiographic and cross-sectional anatomy  
5) Understand the fundamentals of diagnostic imaging and its role in modern medicine

**Online module objectives:**

1) Radiology of the Chest  
   a) Describe the radiographic search pattern used to interpret the adult chest radiograph  
   b) Identify radiographic anatomy seen on the adult chest radiograph  
   c) Correlate basic chest computed tomography (CT) landmarks to radiographic anatomy and common abnormalities
d) Apply the systematic approach to a radiographic search pattern in the setting of abnormal radiographs

2) Imaging of the Abdomen
   a) Identify radiographic anatomy seen on the acute abdominal series
   b) Correlate basic abdominal CT landmarks to radiographic anatomy and common abnormalities
   c) Apply the systematic approach in the setting of abnormal radiographs

3) Pediatric Musculoskeletal Imaging
   a) Identify normal vs. abnormal skeletal structures (in the younger child and adolescent)
   b) Identify the hallmarks of non-accidental trauma
   c) Identify the Salter-Harris fracture classification and fractures suspicious for child abuse
   d) Assess the alignment of the pediatric elbow on a radiograph
   e) Interpret signs of slipped capital femoral epiphysis (SCFE) and Legg-Calvé-Perthes disease on radiograph and identify in which age groups these are likely to be found

4) Pediatric Chest Imaging
   a) Identify the proper positioning of an umbilical arterial catheter and an umbilical venous catheter, and where the catheter tips should be located
   b) Distinguish between respiratory distress syndrome (RDS), meconium aspiration, transient tachypnea of the newborn, and neonatal pneumonia on a radiograph
   c) Interpret abnormal chest radiographs

5) Pediatric Gastrointestinal (GI) Imaging
   a) Identify radiographic anatomy seen on abdominal radiographs
   b) Identify various radiographic findings in children, specifically newborn gastrointestinal obstruction including midgut volvulus, Hirschsprung’s disease, intussusception, hypertrophic pyloric stenosis (HPS), and appendicitis; and, identify the best imaging technique for each condition
   c) Interpret abnormal GI radiographs
   d) Interpret a basic upper GI series, small bowel series, and barium enema

6) Musculoskeletal Imaging
   a) Identify and diagnose musculoskeletal trauma radiology with an emphasis on deployment related injuries
   b) Describe a general timeline for fracture healing will be covered along with radiology pitfalls including satisfaction of search, inadequate number of projections and peripherally positioned pathology
   c) List stress fracture sites and identify these injuries by radiography that are prevalent in military training
   d) Discuss several fracture types and dislocations that are frequently missed in clinical practice
   e) Compare fractures vs. infection and identify findings associated with acute infection as may be seen as a result of open fracture in a combat setting

7) Cervical Spine Imaging
   a) Identify the basic anatomy of the cervical spine
   b) Describe the appropriate imaging modality for cervical spine trauma
c) Diagnose the types of cervical spine injuries and their mechanisms  
d) Categorize which fracture types are stable versus unstable  
8) Traumatic Brain Injury  
   a) Identify which patients need brain imaging  
   b) Select what type of brain imaging is needed  
   c) Differentiate between extraaxial lesions and intraaxial lesions  

Trainee Competencies*  
*Adapted from Alliance of Medical Student Educators in Radiology (AMSER) Student Competencies in Radiology, [http://www.aur.org/Affiliated_Societies/AMSER/amser_curriculum.cfm](http://www.aur.org/Affiliated_Societies/AMSER/amser_curriculum.cfm)  

**PATIENT CARE COMPETENCIES**  
*The trainee (medical student/intern) should provide patient care that is safe, compassionate and effective in the diagnosis and management of common health problems.*  

GOALS  

1. Diagnostic management skills  
   a. Know how to order appropriate imaging tests  
      i. Utilize the ACR (American College of Radiology) Appropriateness Criteria™  
      ii. Include patient variables into imaging selection  
   b. Understand the importance of providing appropriate information on the radiology request form (history, physical, risk and limiting factors) so radiology can perform appropriate modality selection, protocoling, and interpretation  

2. Information retrieval skills  
   a. Know how to access images and view them  
      i. Understand the basics of a PACS workstation  
      ii. Understand windows, levels, image linking, etc.  
   b. Know how to access imaging reports: preliminary and final  
   c. Perform effective, rapid clinical information search  

3. Visual interpretative skills  
   a. Know basic radiological anatomy  
   b. Understand the factors that affect image appearance and quality  
   c. Understand the importance of using prior comparison studies
d. Recognize normal and common or critical abnormal findings on basic radiographic studies including abdominal radiographs, chest radiographs, radiographs of the bones and joints, etc.

4. Information processing skills
   a. Synthesize history, physical exam and imaging findings to make appropriate differential diagnoses
   b. Correctly interpret radiology reports

5. Patient safety and radiation exposure
   a. Understand the risks of imaging including physical, financial and emotional
      i. Radiation risk (ionizing) to patients and operators and methods to reduce radiation exposure
      ii. Contrast material risks
      iii. MRI safety
      iv. Pregnant patients and imaging
      v. Interventional procure risks

LEARNING TOOLS

• Integration and application of ACR Appropriateness criteria during small and large group didactic and case-based sessions discussing imaging for specific clinical questions.
• Small group discussion of shared decision making and informed consent
  o Role playing of the consent process with the students alternating being the patient and the radiologist
• Observe informed consent for imaging/interventional procedures
• Observe discussion with pregnant patient regarding radiation and contrast risk
• Didactic presentation on safety of imaging procedures and contraindications

ASSESSMENT TOOLS

• Pass required online module post-tests
• Quizzes
• Global ratings by residents, fellows and faculty
• Direct observation and assessment of performance (eg. informed consent, counsel patient regarding contrast allergy or radiation risk)
MEDICAL KNOWLEDGE COMPETENCY

The trainee should demonstrate basic knowledge about normal anatomy, disease processes and radiology

GOALS

- Demonstrate sufficient general medical knowledge and apply this knowledge to radiologic studies
- Demonstrate radiological knowledge

LEARNING TOOLS

- Small and large group didactic sessions
- Participation in departmental and interdepartmental case conferences
- Participation in the clinical activities of the radiology department
- View Box (PACS) teaching
- Web-based modules (Sakai Learning Management System)
- Preparation of a case-based talk during the radiology rotation (may vary by site)

ASSESSMENT TOOLS

- Pass required online module post-tests
- Quizzes
- Evaluation of observed informed consent
- Global rating by residents, fellows and faculty who worked with the student

PRACTICE-BASED LEARNING AND IMPROVEMENT

The trainee(s) should continually seek to improve their knowledge and skills by multiple means, be able to self-evaluate and apply new knowledge to his or her practice.

GOALS

1. Use of information technology and data resources
   a. Demonstrate awareness of key sources of data for performing evidence-based medicine
      i. Use established medical algorithms (Ottawa ankle rule, Ottawa knee rule, NEXUS criteria for cervical spine imaging)
      ii. Use National society guidelines for imaging (e.g. Neurology stroke protocol, back pain, first trimester bleeding)
   b. Use evidence based methods for selecting imaging modalities
i. ACR Appropriateness Criteria®
c. Effectively search for additional information
   i. Use validated sources (ie. ‘Beyond the Google™’, such as Pubmed)
   ii. Know when additional information is needed and search spontaneously

2. Perform critical assessment of the literature
   a. Show an awareness of current literature on common problems
   b. Research presentation topics appropriately using peer-reviewed literature
   c. Appropriately interpret the results of scientific studies (eg. Validity of study)
   d. Be aware of some of the limitations of scientific studies (eg. Power, sample size, control subjects)

3. Application of learning
   a. Effectively apply newly learned information to appropriate clinical settings
      i. Develop new skills
      ii. Apply newly acquired knowledge and skills in the appropriate clinical setting
      iii. Be able to propose changes in the patient care plan based on the outcomes of imaging studies
   b. Demonstrate improvement in existing skills and develop new skills

LEARNING TOOLS

- Journal clubs, small group or independent critical assessment of scientific literature
- Didactic small or large group sessions on assessment of scientific literature
- Participation in departmental conferences including mortality and morbidity as well as quality improvement conferences

ASSESSMENT TOOLS

- Evaluation of critical assessment of scientific literature during a journal club, case conference or while on a rotation
- Pass required online module post-tests
- Quizzes

INTERPERSONAL COMMUNICATION COMPETENCY
The trainee can communicate and interact effectively with patients and healthcare providers.

GOALS

1. Interactions with patients
   a. Interacts effectively with patients
      i. Be compassionate, friendly, professional
      ii. Be able to take an effective history
      iii. Can calm anxious patients
      iv. Be able to develop a potentially therapeutic relationship
      v. Be able to give appropriate information within their knowledge, ability and level of responsibility

2. Interactions with physicians
   a. With radiologists (staff and residents)
      i. Be respectful, but not inhibited from asking questions
      ii. Ask appropriate insightful questions that gain knowledge
      iii. Not be overly intrusive, be aware of time limitations
      iv. Help with information technology, patient management, communication
      v. Understand the importance of the radiologist-clinician interaction
   b. With clinicians
      i. Can gather appropriate clinical information about patients/study requests
      ii. Can communicate results effectively to clinicians if asked

3. Interactions with technologists/nurses
   a. Exhibit respectful interactions and treat them as a member of the team
   b. Are aware of the knowledge and training of paramedical staff

4. Written communication skills
   a. Documents clinical data effectively when needed (e.g. electronic medical record)
   b. Understands need for recording of urgent findings
   c. Provides relevant clinical history on requisitions for medical imaging

5. Presentation skills
   a. Presents fluent, well-researched presentation
   b. Shows understanding of topic
c. Conveys information succinctly and memorably to audience

LEARNING TOOLS

- Collection of reading references on guidelines how to tell patients imaging results (Smith, Gunderman Radiology 2010 255:317-321)
- Journal club presentations
- Participation in case conferences and interdisciplinary conferences

ASSESSMENT TOOLS

- Global evaluation of communication skills
- Evaluation of a prepared oral presentation (may vary by site)
- Evaluation of journal club presentation (may vary by site)

PROFESSIONALISM COMPETENCY

The trainee should demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

GOALS

1. Demonstrate appropriate skills
   a. Maintains professional and medical competence by continuing to self-learn throughout career
   b. Seeks help and support when identifies a knowledge gap
   c. Continually gathers new scientific knowledge
   d. Strives to improve the quality of patient care by practicing at the highest level of quality

2. Demonstrates appropriate behaviors
   a. Meets professional responsibilities by working as a member of a team
   b. Demonstrates honesty with patients and all members of the health care team
   c. Respects patient confidentiality with all information transmitted during a patient encounter
   d. Maintains appropriate relationships with patients to prevent boundary transgression

3. Demonstrates social justice and service
   a. Works to improve access to care for those patients with limited resources
   b. Considers just distribution of finite sources when selecting imaging tests
c. Understands issues around conflict of interest, avoids interaction with industry for personal advantage and discloses any existing conflicts of interest

LEARNING TOOLS

- Journal clubs on ethics and professionalism in Radiology
- AMSER Professionalism module available on MedEdPORTAL
- Small group case-based discussion on professionalism issues should include debriefing sessions (may vary by site)

ASSESSMENT TOOLS

- Global evaluation by technologists, nurses, residents, fellows and radiology faculty of professional behavior
- AMSER Professionalism module before and after test available on MedEdPORTAL

SYSTEMS-BASED PRACTICE COMPETENCY

The trainee demonstrates awareness of the complexities, interactions and considerations involved in working in the modern health care environment. (i.e. the “culture” of the workplace)

GOALS

1. Demonstrate awareness of the goal of cost effective imaging
   a. Aware of common examination charges
   b. Understands the basic concepts of costs and reimbursement
   c. Understands the financial impact on patients and society of imaging
      i. Understands the importance of performing appropriate imaging
      ii. Appreciates potential future limitations to imaging availability
2. Understands the workflow patterns in radiology for effective patient management, study ordering etc
3. Demonstrates effective communication between radiology and clinicians
   a. Appreciates the importance of the radiology-clinician interaction (verbal, written)
   b. Appreciates the importance of prioritizing studies based on study urgency
   c. Understands the importance of prompt preliminary reports
   d. Understands the process of dealing with discrepancies between preliminary and final reports
4. Understands the impact of medical radiation exposure on potential cancer risk for population as a whole
   a. Demonstrates knowledge of current data regarding risk
   b. Aware of need for reducing unnecessary imaging

**LEARNING TOOLS**

- Small or large group didactic session on cost effectiveness of imaging studies
- Participation in departmental and multidisciplinary conferences that discuss appropriate imaging evaluation of specific diseases and cost-effectiveness
- ACR/APDR videotapes on non-interpretive skills that discuss systems-based practice

**ASSESSMENT TOOLS**

- Global evaluation by technologists, nurses, residents, fellows and radiology faculty of professional behavior
- Attendance at case conferences and multidisciplinary conferences
- Questions from ExamWeb on cost-effectiveness and prioritization of imaging tests