

## Effective Date 07/15/2025

<b>Name of Rotation:</b>	Musculoskeletal
<b>PGY Level:</b>	2, 3, 4, 5
<b>Supervising Attending(s):</b>	Bresler, Atueyi, Lin, Arnett

### Introduction

The Accreditation Council for Graduate Medical Education (ACGME) has established six General Competencies that residents in all specialties must achieve, and has determined that each residency must be able to assess their residents' progress in achieving these competencies through Practice Performance Measurements. The Competencies include patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. The Residency Review Committee for Diagnostic Radiology has defined the Competencies as they apply to radiology and has provided a list of required and suggested Practice Performance Measurements for each Competency. This information is available at the ACGME website, [www.acgme.org](http://www.acgme.org).

This document is intended to provide a robust framework for a musculoskeletal radiology curriculum, with the hope that it will be inclusive but flexible enough to satisfy the ACGME's requirements. It is based heavily on the curriculum developed by the Society of Skeletal Radiology which can be found on the website [www.skeletalrad.org](http://www.skeletalrad.org).

**Musculoskeletal radiology learning occurs on multiple rotations at UIC and includes the general rotations at both campuses where the practical plain film interpretation is taught; GI/Flourosocopy is where joint injections and aspirations are taught; IR is where bone biopsy and/or ablations are taught; CT body rotations at both campuses where practical CT interpretation is taught; and MR body rotation on both campuses where practical MR interpretation is taught Faculty: Dr. Winnie Mar is the resident musculoskeletal program director**

**Conferences: Core didactic series (Tuesday 7 AM -12 noon), Noon Case Conferences**

**Rotation requirements: Although each rotation can vary, the resident is expected to be present at 8AM and review the imaging studies prior to review with the attending physician. After discussion, a report is dictated, proof read and sent to the attending physician who reviewed the case with the resident. The resident is expected to stay until the last study is reported or when the attending physician dismisses the resident for the day.**

## General Goals

After completing their first year in residency, the resident will:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Generate accurate and concise radiographic reports
- Communicate effectively with patients, referring clinicians, technologists and supervisory staff (appropriate to the resident's level of training)
- Understand standard radiographic positioning and anatomy
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate knowledge of clinical indications for radiography and indications for urgent computed tomography (CT) and magnetic resonance (MR) examinations
- Demonstrate a responsible work ethic
- Participate in any quality improvement / quality assurance activities
- Participate in the education of any students and interns on the service
- Participate in basic image-guided procedures (e.g., hip/shoulder aspiration/injection)

After completing the second year of residency, the resident will:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second rotation
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protocoling and monitoring CT and MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for musculoskeletal imaging
- Participate in the education of junior residents, interns, and medical students □ Perform basic image guided procedures as the primary operator

After completing the third year of residency, the resident will:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the third rotation
- Continue to refine skills developed during the first two rotations
- Effectively use information technology to address clinical problems
- Participate in the education of junior residents and medical students
- Become a more independent provider of musculoskeletal radiologic interpretive services
- Manage clinical and technical questions from technical and support staff

## Objectives

### Medical Knowledge

- Year 1** ○ Recognize and describe positioning and anatomy of standard radiographic examinations of the musculoskeletal system

- Demonstrate learning of normal radiographic anatomy of the axial and appendicular skeleton
- Demonstrate learning of normal CT anatomy of the appendicular skeleton
- Demonstrate learning of normal MRI anatomy of the knee and shoulder
- Recognize and accurately describe common fractures and dislocations of the appendicular skeleton
- Recognize and describe fractures and dislocations of the cervical, thoracic and lumbar spine. Understand basic mechanisms of injury and distinguish stable from unstable injuries
- Demonstrate learning of pathophysiology and radiology of fracture healing and complications of healing such as delayed union, malunion and nonunion
- Demonstrate learning of radiographic presentation and evaluation of osteomyelitis and septic arthritis
- Recognize and describe complications of orthopedic devices including fracture fixation and spine and arthroplasty hardware

- Evaluation:**
- Direct observation by faculty during patient care activities (e.g., interpreting imaging studies) and during sectional teaching case conferences [assessed as part of global end-of-rotation evaluation]
  - Performance on written case-based end-of-**first**-year examination
  - ACR in service examination

- Year 2**
- Recognize and describe the radiographic presentation of Paget disease
  - Demonstrate learning of a systematic approach to arthritis. Be able to describe and differentiate salient radiologic (radiographic, CT and MR) features of common arthropathies including osteoarthritis, inflammatory arthropathy (rheumatoid, psoriatic, reactive, juvenile chronic, and septic), crystal deposition diseases (calcium pyrophosphate deposition, gout, hydroxyapatite deposition), neuropathic arthropathy, connective tissue disease (systemic lupus erythematosus, scleroderma, dermatomyositis), pigmented villonodular synovitis, and synovial chondromatosis
  - Demonstrate a systematic assessment of a solitary lesion of bone and be able to categorize the lesion as aggressive or nonaggressive. Develop an appropriate differential diagnosis based on patient age, lesion location, and lesion characteristics (margin, matrix, periosteal reaction, soft tissue extension). Demonstrate knowledge of systematic, safe and cost effective radiologic work-up of bone lesions including biopsy approach and compartmental anatomy.
  - Recognize and describe common locations of and radiologic manifestations of osteonecrosis.
  - Demonstrate knowledge of MRI safety issues including contraindication to scanning and use of contrast.
  - Demonstrate learning of the use of various pulse sequences and planes of imaging used in MRI of musculoskeletal disorders
  - Demonstrate learning of common knee and shoulder pathology on MRI (meniscal tear, tendon and ligament injury, fracture, chondral disease, rotator cuff tear, and labral pathology)

- Demonstrate learning of the normal MRI anatomy of the hip and ankle ○  
Demonstrate ability to monitor CT and MRI examinations to ensure the patient is adequately evaluated
- Demonstrate an understanding of indications, contraindications, needle path, risks and post procedural management of CT and US guided procedures including management of complications
- Demonstrate an understanding of indications, contraindications, radiation risks, and post procedural management of fluoroscopically guided procedures including management of complications

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., prescribing, monitoring and interpreting imaging studies) and during sectional teaching case conferences [assessed as part of global end-of-rotation evaluation]

- ACR in service exam

**Year 3 and Year 4** ○ Recognize radiologic findings and describe pathophysiology of endocrine disease including hyperparathyroidism, renal osteodystrophy, osteomalacia/rickets, hypophosphatasia, hypophosphatemia

- Recognize the radiologic findings of hematopoietic and storage diseases including sickle cell anemia, thalassemia, mastocytosis, and Gaucher's disease.
- Demonstrate systematic approach to relatively common dysplasias and congenital conditions such as achondroplasia, osteogenesis imperfecta, osteopetrosis
- Demonstrate learning of common pathology of the hip and ankle on MRI ○  
Demonstrate learning of anatomy and common injuries/pathology of the elbow and wrist on MRI

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., prescribing, monitoring and interpreting of imaging studies of increasing complexity) and during sectional teaching case conferences [assessed as part of global end-ofrotation evaluation]

## **Patient Care**

**Year 1** ○ Communicate all unexpected or significant findings to the ordering provider and document whom was called and the date and time of the discussion in the report

- Obtain relevant patient history from electronic records, dictated reports, the patient, or by communication with referring provider
- Recognize when it is appropriate to obtain help from senior residents or faculty when assisting referring clinicians
- Participate in basic image guided procedures (e.g., hip/shoulder aspiration/injection)

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., obtaining relevant patient data pertinent to exam interpretation, appropriately communicating results of studies to clinicians) [assessed as part of global end-ofrotation evaluation]

- *Optional:* Formal evaluation of procedural competence while performing joint aspiration/injection (e.g., washes hands before/after procedure, completes consent and “time-out” forms, performs procedure safely and appropriately); competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> rotation)

**Year 2** ○ Demonstrate the ability to gather essential and accurate patient information (electronic, personal communication) to appropriately prescribe MRI protocols ○ Demonstrate ability to monitor CT and MRI examinations to ensure the patient is adequately evaluated

- Demonstrate an understanding of indications, contraindications, needle path, risks and post procedural management of CT and US guided procedures including management of complications
- Safely perform fluoroscopically guided joint injections and aspirations with faculty supervision
- Demonstrate an understanding of indications, contraindications, radiation risks, and post procedural management of fluoroscopically guided procedures including management of complications
- Demonstrate an ability to counsel a patient and obtain informed consent before performing a procedure, including a description of the procedure, risks, benefits, and alternatives; and solicit and respond to patient questions without discrimination based on religious, ethnic, sexual, economic, or educational differences

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., obtaining relevant patient data pertinent to exam interpretation, prescription and monitoring) appropriately communicating results of studies to clinicians) [assessed as part of global end-of-rotation evaluation

- Formal evaluation of procedural competence after performing joint aspiration/injection (e.g., washes hands before/after procedure, completes consent and “time-out” forms, performs procedure safely and appropriately); competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> year)

**Rotation 3 and Subsequent Rotations** ○ Demonstrate the ability to teach a junior colleague how to protocol examinations and plan procedures

- Demonstrate the ability to assess and prioritize requests for add-on procedures ○ Demonstrate the ability to answer common procedural and policy questions from technologists and support staff

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., answering procedural/policy questions, educating junior residents, prioritizing/planning

procedures, developing management plans) [assessed as part of global end-ofrotation evaluation]

## Interpersonal and Communication Skills

- Year 1** ○ Dictate clear, detailed, and accurate reports that include all pertinent information as established in the American College of Radiology (ACR) Guidelines for Communication ○ Use appropriate nomenclature when reporting radiographic, CT, MR or ultrasound (US) findings of musculoskeletal disease
- Communicate all unexpected or significant findings to the ordering provider and document whom was called and the date and time of the discussion in the report
  - Effectively provide feedback to radiology technologists regarding quality of exposure and patient positioning

- Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., reviewing dictated reports, orally communicating results of studies to clinicians, communicating with technologists) [assessed as part of global end-of-rotation evaluation]
- *Optional:* Formal evaluation of procedural competence while performing joint aspiration/injection (e.g., explanation of procedure to patient): competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> year)
  - Formal evaluation (by faculty) of quality of reports during “mini-rotation” (at end of PGY2 year)

- Year 2** ○ Demonstrate the ability to gather essential and accurate patient information (electronic, personal communication) to appropriately prescribe MRI protocols ○ Provide effective and timely feedback and education to CT and MRI technologists regarding quality of examinations
- Provide technical and educational guidance to junior residents and students ○ Demonstrate an ability to counsel a patient and obtain informed consent before performing a procedure, including a description of the procedure, risks, benefits, and alternatives; and solicit and respond to patient questions without discrimination based on religious, ethnic, sexual, economic, or educational differences

- Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., communicating with patients, technologists, staff and other members of the health care team) [assessed as part of global end-of-rotation evaluation] ○ Formal evaluation of procedural competence after performing joint aspiration/injection (e.g., explanation of procedure to patient): competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> rotation)
- Formal evaluation (by faculty) of quality of dictated reports during “minirotation” (at end of PGY2 year)

- Year 3 and Year 4** ○ Demonstrate the ability to teach a junior colleague how to protocol examinations and plan procedures
- Demonstrate the ability to answer common procedural and policy questions from technologists and support staff

**Evaluation:** ○ Direct observation by faculty during patient care activities (e.g., educating junior residents, answering procedural/policy questions) [assessed as part of global endof-rotation evaluation]

## Professionalism

- Year 1** ○ Communicate all unexpected or significant findings to the ordering provider and document whom was called and the date and time of the discussion in the report
- Recognize when it is appropriate to obtain help from senior residents or faculty when assisting referring clinicians
  - Demonstrate responsible, ethical behavior; positive work habits; and professional appearance; and adhere to principles of patient confidentiality

**Evaluation:** ○ Direct observation by faculty during patient care activities and non-patient care activities (e.g., consistent timely arrival to work, personal appearance and hygiene, appropriate communication of findings of imaging studies to clinicians)  
[assessed as part of global end-of-rotation evaluation] ○ *Optional:* Formal evaluation of procedural competence while performing joint aspiration/injection (e.g., proper dress, respect for patient privacy, wearing of protective garments and radiation badge): competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> rotation)

- Year 2 and Subsequent Rotations** ○ Demonstrate an ability to counsel a patient and obtain informed consent before performing a procedure, including a description of the procedure, risks, benefits, and alternatives; and solicit and respond to patient questions without discrimination based on religious, ethnic, sexual, economic, or educational differences

**Evaluation:** ○ Direct observation by faculty during patient care activities and non-patient care activities (e.g., consistent timely arrival to work, personal appearance and hygiene, appropriate communication of findings of imaging studies to clinicians)  
[assessed as part of global end-of-rotation evaluation] ○ Formal evaluation of procedural competence while performing joint aspiration/injection (e.g., proper dress, respect for patient privacy, wearing of protective garments and radiation badge): competence demonstrated once Procedural Competency Checklist is signed by faculty member (recommended competence by end of 2<sup>nd</sup> year)

## Practice-Based Learning and Improvement

- Year 1** ○ Dictate clear, detailed, and accurate reports that include all pertinent information as established in the American College of Radiology (ACR) Guidelines for Communication ○ Maintain a log of all procedures performed including complications ○ Recognize and correct errors

**Evaluation:** ○ Direct observation by faculty during patient care activities and non patient care activities (e.g., evidence of adhering to reading assignments, entering of procedures

into electronic log, responsiveness to faculty feedback and evidence of remediation of deficiencies) [assessed as part of global end-of-rotation evaluation]

- Performance on written case-based end-of-rotation examination

**Year 2 and Subsequent Years** ○ Demonstrate the ability to locate, appraise and assimilate evidence from scientific studies related to the performance and interpretation of musculoskeletal imaging

- Participates in QA/QI activities as needed

**Evaluation:** ○ Direct observation by faculty during patient care activities and non patient care activities (e.g., displays point-of-care learning) [assessed as part of global end-ofrotation evaluation]

## **Systems-Based Practice**

**Year 1** ○ Effectively provide feedback to radiology technologists regarding quality of exposure and patient positioning

- Participate in discussions with faculty and staff regarding operational challenges and potential system solutions regarding all aspects of radiologic services and patient care

**Evaluation:** ○ Direct observation by faculty during patient care activities and non patient care activities (e.g., provision of appropriate feedback to technologists, appropriate utilization of department resources, suggestions for systems improvement, if necessary) [assessed as part of global end-of-rotation evaluation]

**Year 2 and Subsequent Years** ○ Provide effective and timely feedback and education to CT and MRI technologists regarding quality of examinations

- Demonstrates understanding of appropriateness criteria

**Evaluation:**

- Direct observation by faculty during patient care activities and non patient care activities (e.g., provision of appropriate feedback to technologists, appropriate utilization of department resources, suggestions for systems improvement, if necessary, understanding of appropriateness criteria) [assessed as part of global end-of-rotation evaluation]

### **I. Regularly scheduled didactic educational experiences:**

**a. See Appendix A**

### **II. Radiology resident training encompasses 5 total years of training. Trainees start in the PGY2 year, having successfully completed a prelim clinical year in a medicine or surgical specialty typically. The new residents are paired with senior residents and/or attending faculty at all times. This is true for daily PACS side read out**

**sessions and procedural skills in the interventional radiology lab. As the residents progress in knowledge and skills, they are evaluated with both written and practical skills by the faculty. If deemed proficient, they are advanced to more senior levels of residency, with indirect supervision from faculty. A CCC committee meeting twice a year meets and formally evaluates and decides on advancement of every resident candidate based on faculty monthly rotational evaluations and feedback. Residents do not take independent call in the first radiology year. Instead they are under the direct supervision of a senior resident and/or attending for “buddy” mini-calls in the latter part of the academic year. There are two tests given for independent ER proficiency, and once passed, the resident is allowed to take call in the PGY3 year. However, there is always an attending/fellow/senior backup for cases that need extra attention. Residents at all levels of training are responsible with a team approach to maintain the highest degree of patient care, ranging from direct interaction during procedures to indirect interaction after diagnostic testing (ie. CT/MR/X-ray/US read out sessions). As residents become more proficient and senior, the supervision gradually shifts from more direct to indirect. Once the resident reaches the PGY5 year, there is a formal CCC evaluation as to competency for independent practice based on all faculty feedback.**