ROTATION 1: (Radiology Year 1)

Patient Care

Residents must be able to provide age appropriate patient care that is compassionate, appropriate and effective for the diagnosis and treatment of health problems. Residents are expected to:

1. Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families.
2. Gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled.
3. Make informed decisions about diagnostic and therapeutic interventions based on patient information, up-to-date scientific evidence and clinical judgment.
4. Work with health care professionals, including those from other disciplines to provide patient focused care.
5. Dictate examinations accurately after review by the attending radiologist.

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care.

At the end of this rotation, residents are expected to:

1. Discuss basic bone physiology.

2. 
   a. Identify, with a high level of accuracy, most types of bone fractures.
   b. Describe the stages different types of fractures go through in the process of healing.

3. 
   a. List and describe the basic principles of examinations of musculoskeletal studies.
   b. Recognize the commonly used radiographic projections in musculoskeletal radiology.

3. State the indications for computed tomography, MRI and bone scans.

4. Identify normal musculoskeletal structures and some of the normal variants.

5. Identify and describe normal and abnormal knee MR anatomy.
Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of musculoskeletal imaging and its role in clinical care of the patient

Use information technology to manage information, access on-line medical information; and support their own education

Facilitate the learning of students and other health care professionals

Locate, appraise and assimilate evidence from scientific studies about musculoskeletal imaging

Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

1. Work professionally and effectively with the technologists
2. Communicate findings effectively with the referring clinicians
3. Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion
4. Given a musculoskeletal radiographs that are not diagnostic without further study, state whether the patient should have additional exams in CT, MRI or nuclear imaging.
5. Preliminary review plain films and discuss findings with the radiologist, then dictate as directed
6. Suggest the appropriate study to answer clinical questions after consultation with attending radiologists

Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Residents are expected to

Demonstrate respect, compassion and integrity
A commitment to excellence and on-going professional development
Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
Demonstrate sensitivity and responsiveness to patients’ culture, age, gender and disabilities
Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
System Based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

Understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice.

Assist referring clinicians in providing cost effective healthcare.

Practice cost effective health care and resource allocation that does not compromise quality of care.

Recognize when the submitted study does not answer the posed clinical question.

ROTATION 2: (Radiology Year 2)

Patient care

Residents must be able to provide age appropriate patient care that is compassionate, appropriate and effective for the diagnosis and treatment of health problems. Residents are expected to:

1. Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families.
2. Gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled.
3. Make informed decisions about diagnostic and therapeutic interventions based on patient information, up-to-date scientific evidence and clinical judgment.
4. Work with health care professionals, including those from other disciplines to provide patient focused care.
5. Dictate examinations accurately after review by the attending radiologist.

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. At the end of this rotation, residents are expected to:

Name and describe the various common types of bone and joint trauma, other than fractures.
Name and differentiate between various forms of arthritis, including the laboratory and clinical findings of each type.
State the radiographic features that distinguish benign and malignant bone tumors.
Name and describe clinical/pathological/radiological features of congenital and acquired bone pathologies.
Name and describe clinical/pathological/radiological features metabolic bone disease.
Describe the radiographic features of inflammatory bone/joint disease.
Identify and describe normal and abnormal findings on an MRI of the shoulder.
**Practice Based Learning and Improvement**

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

1. Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of musculoskeletal imaging and its role in clinical care of the patient.
2. Use information technology to manage information, access on-line medical information, and support their own education.
3. Facilitate the learning of students and other health care professionals.
4. Locate, appraise and assimilate evidence from scientific studies about musculoskeletal imaging.
5. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.

**Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to:

- Work professionally and effectively with the technologists.
- Communicate findings effectively with the referring clinicians.
- Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion.
- Given a musculoskeletal radiographs that are not diagnostic without further study, state whether the patient should have additional exams in CT, MRI or nuclear imaging.
- Preliminary review plain films and discuss findings with the radiologists, then dictate as directed.
- Suggest the appropriate study to answer clinical questions after consultation with attending radiologist.

**Professionalism**

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Residents are expected to:

1. Demonstrate respect, compassion and integrity.
2. A commitment to excellence and on-going professional development.
3. Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices.
4. Demonstrate sensitivity and responsiveness to patients’ culture, age, gender and disabilities.
5. Recognize limitations impersonal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
**Systems Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

1. Understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
2. Assist referring clinicians in providing cost effective healthcare
3. Practice cost effective health care and resource allocation that does not comprise quality of care
4. Recognize when the submitted study does not answer the posed clinical question

**ROTATION 3: (Radiology Year 3)**

**Patient Care**

Residents must be able to provide age appropriate patient care that is compassionate, appropriate and effective for the diagnosis and treatment of health problems. Residents are expected to:

1. Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
2. Gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled
3. Make informed decisions about diagnostic and therapeutic interventions based on patient information, up-to-date scientific evidence and clinical judgment
4. Work with health care professionals, including those from other disciplines to provide patient focused care
5. Dictate examinations accurately after review by the attending radiologist

**Medical Knowledge**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. At the end of this rotation, residents are expected to:

Name and describe all types of bone and joint trauma
Name and differentiate between various types of arthritides and supply a thorough differential diagnosis
Give a logical differential diagnosis in any case of suspected bone tumor
Describe the radiographic features if inflammatory bone/joint disease
Name and describe clinical/pathological/radiological features of metabolic bone disease
Name and describe clinical/pathological/radiological features of congenital and acquired bone pathologies
Identify and describe normal and abnormal findings on MRI imaging of the spine, elbow and wrist
Practice Based learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

1. Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of musculoskeletal imaging and its role in clinical care of the patient
2. Use information technology to manage information, access on-line medical information and support their own education
3. Facilitate the learning of students and other health care professionals
4. Locate, appraise and assimilate evidence from scientific studies about musculoskeletal imaging
5. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to:

Work professionally and effectively with the technologists
Communicate findings effectively with the referring clinicians
Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion
Given a musculoskeletal radiographs that are not diagnostic without further study, state whether the patient should have additional exams in CT, MRI or nuclear imaging
Preliminary review plain films and discuss findings with radiologist, then dictate as directed
Suggest the appropriate study to answer clinical questions after consultation with attending radiologist

Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Residents are expected to:

1. Demonstrate respect, compassion and integrity
2. A commitment to excellence and on-going professional development
3. Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
4. Demonstrate sensitivity and responsiveness to patients’ culture, age, gender and disabilities
5. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence
System Based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

1. Understand how their professional practice affects other health care professionals, the health care organization and the larger society and how these elements affect their own practice
2. Assist referring clinicians in providing cost effective healthcare
3. Practice cost effective health care and resource allocation that does not compromise quality of care
4. Recognize when the submitted study does not answer the posed clinical question

Rotation in Musculoskeletal MRI

Patient Care

Residents must be able to provide age appropriate patient care that is compassionate, appropriate and effective for the diagnosis and treatment of health problems. Residents are expected to:

1. Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
2. Gather essential and accurate medical and radiologic history pertinent to procedure to which the patient is scheduled
3. Make informed decisions about diagnostic and therapeutic interventions based on patient information, up-to-date scientific evidence and clinical judgment
4. Work with health care professionals, including those from other disciplines to provide patient focused care
5. Dictate examinations accurately after review by the attending radiologist

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical and cognate sciences and the application of this knowledge to patient care. At the end of this rotation, residents are expected to:

1. Identify and describe normal anatomy and pathology on musculoskeletal MRI with a high degree of sophistication
2. Identify on MRI
   a. Sports injuries
   b. Bone tumors (benign and malignant)
   c. Soft tissue tumors

Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:
Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of musculoskeletal imaging and its role in clinical care of the patient
Use information technology to manage information, access on-line medical information; and support their own education
Facilitate the learning of students and other health care professionals
Locate, appraise and assimilate evidence from scientific studies about musculoskeletal imaging
Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence

**Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

- Work professionally and effectively with the technologists
- Communicate findings effectively with the referring clinicians
- Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion
- Protocol and appropriate time efficient MRI
- Preliminary review studies and discuss findings with the radiologist, then dictate accurately
- Suggest the appropriate study to answer clinical questions after consultation with attending radiologist

**Professionalism**

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Residents are expected to:

1. Demonstrate respect, compassion and integrity
2. A commitment to excellence and on-going professional development
3. Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
4. Demonstrate sensitivity and responsiveness to patients’ culture, age, gender and disabilities
5. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence

**System Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide are that is of optimal value. Residents are expected to:

1. Understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
2. Assist referring clinicians in providing cost effective healthcare
3. Practice cost effective healthcare and resource allocation that does not compromise quality of care
4. Recognize when the submitted study does not answer the posed clinical question

**Reading List:**


CURRICULUM

1. Trauma
   a. Cervical Spine – fractures, dislocations, mechanisms, stability
   b. Thoracolumbar Spine
   c. Pelvis
   d. Upper Extremity
   e. Lower Extremity

2. Articular Disorders
   a. Classification
   b. Approach
   c. Osteoarthritis
   d. Rheumatoid Arthritis
   e. Seronegative Spondyloarthropathies
   f. Ankylosing Spondylitis
   g. Psoriatic
   h. Reiter’s
   i. Enteropathic
   j. Crystal induced and other depositional disorders
   k. Gout
   l. CPPD
   m. Amyloid
   n. Hemochromatosis
   o. Miscellaneous
   p. Neuropathic

3. Collagen Vascular Disease
   a. Systemic Lupus Erythematosus
   b. Scleroderma
   c. Dermatomyositis
   d. Polymyositis
   e. Mixed Connective Tissue Disorder

4. Metabolic Diseases
   a. Osteoporosis
   b. Rickets/ Osteomalacia
   c. Paget’s
   d. Vitamin Deficiencies and Hypervitaminosis states

5. Endocrine Disease
   a. Acromegaly
   b. Thyroid Dysfunction
      I. Hypothyroidism
      II. Hyperthyroidism
   c. Primary and Secondary Hyperparathyroidism/Renal Osteodystrophy

6. Bone Neoplasms
   a. Analysis of the Solitary Bone Lesion
   b. Characteristics of Aggressive vs. Non-aggressive Lesions
c. Primary Bone Lesions
   I. Fibrous lesions
   II. Bone cysts – UBC, ABC
   III. Giant Cell Tumors
   IV. Lesions and osteoid matrix
       Osteoma
       Osteoid
       Osteoblastoma
       Osteosarcoma
   V. Cartilaginous Lesions
       Enchondroma
       Osteochondroma
       Soft tissue chondroma
       Chondrosarcoma
   VI. Vascular Lesions
       Hemangioma
       Lymphangioma
       AVM
       Hemangioma
   VII. Langerhans Cell Dysplasia

d. Skeletal Metastases
e. Plasmacytoma/Multiple Myeloma
f. Leukemias/Lymphomas

7. Tumor-Like Conditions of Bone/Joints
   a. Synovial Osteochondromatosis
   b. Pigmented Villonodular Synovitis/Giant Cell Tumor of Tendon Sheath

8. Infection
   a. Appearance – Plain film, nuclear medicine, MRI
   b. Septic Arthritis
       a. Acute – bacterial
       b. Subacute - TB
       c. Osteomyelitis
           I. Acute vs. Chronic
       d. Discitis
   e. Soft tissue infections

9. Osteonecrosis
   a. Pathogenesis
   b. Appearance
   c. Etiologies

10. Osteochondroses
    a. Legg–Calvé Perthes disease
    b. Freiberg’s infraction
    c. Kienbock’s disease
    d. Kohler’s disease
    e. Osgood–Schlatter disease
    f. Blount’s disease
    g. Scheuermann’s disease

11. Miscellaneous Disorders
    a. Sarcoidosis
    b. Neurofibromatosis
c. Hyperostosis
d. Periostitis
   Differential from birth through adulthood
e. Skeletal Dysplasias
f. Metaphyseal
g. Epiphyseal
h. Syndromes

12. Spinal Pathology
   a. Congenital
      I. Segmentation anomalies
      II. Midline fusion defects
      III. Diastematomyelia/Tethered cord
   b. Scoliosis
      I. Etiologies
      II. Measurement
   c. Acquired
      I. Spondylolysis/Spondylolisthesis

13. Musculoskeletal MRI
   a. Major joints
      I. Shoulder
      II. Hip
      III. Knee
      IV. Hand/Wrist
      V. Ankle
   b. Spine Pathology (complementary coverage with neuroradiology division)
      I. Soft Tissue Lesions
HARLEM HOSPITAL RESIDENCY PROGRAM DIDACTIC LECTURE SERIES:
MUSCULOSKELETAL IMAGING

1. Aspects of Basic Science Related to the Musculoskeletal System: Physiology, Normal Features and Variants, and Imaging Techniques
2. Trauma – Introduction and Upper Extremity
3. Trauma – Pelvis and Lower Extremity
4. Arthritis – Introduction
5. Arthritis – Inflammatory arthropathy and Spondyloarthropathy
6. Arthritis – Crystal-related, Connective-tissue and Miscellaneous
8. Bone tumors II – Review of Specific Entities
9. Soft tissue masses
10. Miscellaneous tumors and tumor-like conditions, marrow and hematological disorders
11. Infections of bone, joints and soft tissues and unusual infections
12. Orthopedic hardware
13. Metabolic disease of bone and poisoning
14. Congenital and developmental dysplasias, anomalies and disorders
15. MRI of knee
16. MRI of ankle and foot
17. MRI of shoulder
18. MRI of hip

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Alexander Steever