Curriculum Objectives for MS4 Radiology Elective

The field of diagnostic imaging encompasses a vast amount of information, which may seem overwhelming as a medical student. Our curriculum is designed to provide you with a logical approach and focused guidance. It covers many relevant topics in our field, from radiation safety to basic physics principles, and incorporates a wide range of medical topics in order for the student to develop basic interpretation skills. Our hope is for our students to become competent in the appropriate utilization of diagnostic imaging, as well as to achieve a competency in novice interpretation for a wide range of common disease states. To acquire this level of competency, the following goals should be met:

A. General Principles:
   1. To learn about the various applications of diagnostic imaging, including its use in the diagnosis of complex pathology, as a screening modality, and in guiding invasive procedures.
   2. To understand and utilize appropriateness criteria in ordering diagnostic imaging studies and to learn where to this information can be accessed throughout their medical career (See “appropriateness criteria” section below).
   3. To realize the role of the radiologist, working in tandem with the other medical and surgical professions as part of the healthcare team.
   4. To appreciate the role of evidence-based medicine within diagnostic imaging.
   5. To identify basic concepts of risk management, both medical and legal, and patient confidentiality as it applies to radiology.

B. Medical Knowledge:
At the successful completion of this course, the medical student should understand the following basic radiology principles and acquire a novice level of interpretation skills for the common disease processes listed below:

Plain Radiographs
   1. Discuss principles of radiology and radiation safely (both occupational and for the patient).
   2. Identify normal anatomy on PA, AP, and lateral chest films.
   3. Recognize the following entities on chest radiographs: pleural effusion, pneumothorax, pneumonia and its location, pulmonary edema, chronic obstructive pulmonary disease, atelectasis, pulmonary nodules/masses, and hyaline membrane disease of the newborn.
   4. Identify normal anatomy on four views of the abdomen.
   5. Recognize abnormal abdominal films including ileus, small bowel obstruction, large bowel obstruction, free air, and calcifications.
6. Identify normal anatomy of the spine and long bones in both adults and children.

7. Recognize abnormal bone radiographs including fractures, degenerative joint disease, osteoporosis (including vertebral collapse), and primary/metastatic bone malignancy.

8. Identify normal anatomy upper GI and small bowel follow through.

**Computed Tomography**
1. Discuss principles of CT acquisition and its role in diagnostic imaging.
2. Recognize and treat contrast allergy, and be familiar with the pre-treatment regimen.
3. Understand general indications of when to use CT as the imaging modality of choice.
4. Identify normal anatomy found on CT of the head, spine, chest, abdomen, and pelvis.
5. Recognize abnormal head CTs, including acute hemorrhage (subarachnoid, subdural, and parenchymal), infarcts, edema, mass effect, and hydrocephalus in an infant and adult.
6. Recognize abnormal chest CTs including acute aortic injury, airspace disease, and findings of malignancy.
7. Recognize abnormal abdominal/pelvis CTs including diverticulitis, appendicitis, small bowel obstruction, abdominal aortic aneurysms, pancreatitis, intra-abdominal fluid collections (abscesses, hemorrhage, etc.), ascites, and large solid organ masses.
8. Recognize abnormal musculoskeletal findings, including osseous and soft tissue malignancy and/or metastasis and degenerative joint disease.

**Magnetic Resonance Imaging**
1. Discuss basic principles of magnetic resonance imaging, including differences in the applications between MRI versus CT.
2. Identify normal brain and spine anatomy on MRI.
3. Recognize abnormalities on brain and spine MRIs, including infection, mass, cerebral vascular injury, demyelinating disease, degenerative disc disease, metastasis, and cord compression.
4. Recognize basic abnormalities on musculoskeletal MRI, septic joint and hip and/or pelvic fracture.

**Ultrasound**
1. Discuss general principles of ultrasound.
2. Understand indications and limitations of ultrasound for:
   - OB/Gyn (ectopic pregnancy, ovarian torsion, fetal anatomic survey, endometrial malignancy)
– Vascular Doppler (aneurysm and vascular patency, including deep vein thrombosis)
– Abdominal (gall bladder and biliary system, solid organs, and hydronephrosis)
– Pediatric (head, hip dysplasia, kidneys, abdominal mass surveillance)
– Echocardiogram (transthoracic versus transesophageal echocardiography)
– Ultrasound for trauma and intervention (prostate biopsy, abscess drainage, thorocentesis etc.)

**Mammography**
1. Discuss basics of normal and abnormal mammograms.
2. Discuss indications and utility of mammography, including its utility for breast cancer screening.
3. Understand its use in intervention.

**Nuclear Medicine**
1. Discuss general principles and therapeutic uses of nuclear medicine.
2. Recognize the various NM imaging options available.

**Angiography**
1. Discuss diagnostic and therapeutic principles of angiography.
2. Recognize normal anatomy of the great vessels and other large and medium sized arteries on angiograms.
3. Discuss indications for both diagnostic and therapeutic angiograms, including peripheral vascular disease, aneurysms, thrombosis, and active bleeding (trauma, malignancy, inflammatory disease, etc.).

**C. DIAGNOSTIC IMAGING APPROPRIATENESS CRITERIA:**
Upon completing this elective, the student will be able to discuss the differences between CT, MRI, radiography, and US, including a basic understanding between the strengths and weaknesses of each modality. Through this newly acquired knowledge, the student should be able to select the best imaging modality to arrive to the correct diagnosis for a given presentation. These entities include of:

- Concern for pulmonary embolism
- Acute aortic syndrome and aortic aneurysm
- Acute abdomen
- Gastrointestinal bleeding
- Hematuria and flank pain
- Staging of common cancers
- Normal and abnormal pregnancy
- Trauma
- Neck and back pain
• Neurological syndromes including spinal cord compression, seizures, cerebrovascular accident, headaches, focal neurological findings, mental status changes, and head trauma
• Bone and joint pain
• Child abuse
• Physical findings including ascites, bruits, testicular masses, thyroid nodules, and breast lumps

As well, the student will learn how to access the appropriateness criteria guidelines to ensure that the proper study is being ordered for the clinical question at hand. As well, the student should also understand when diagnostic imaging is NOT indicated. Throughout this elective, current topics including public perception of radiology and its over-usage will be discussed.

D: RADIATION SAFETY
Upon completing this elective, the student will have a basic understanding of radiation safety, including the potential risks of radiation exposure and how to reduce radiation dose.

E: PRACTICE BASED AND LIFELONG LEARNING
Our students will demonstrate competency as below:
1. To use information technology to access and manage clinical information and perform on-line searches to support ongoing self-directed learning.
2. To search, evaluate, and critically review scientific literature to solve a clinical problem.