

Radiology (Weiss Memorial Hospital, Chicago IL)

4 Week Virtual Elective

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Imaging plays a central role in the management of most patients. Unfortunately, most medical students receive minimal training in selecting the right diagnostic studies for their patients and in the interpretation of diagnostic studies.

The goal of this elective is to introduce students to diagnostic imaging in the work-up of common clinical complaints that most primary care providers will encounter. At the end of the rotation, students will be able to discuss the benefits and limitations of imaging modalities with their patients, select the most appropriate imaging test, decide if intravenous or oral contrast is necessary, and review the pertinent findings with their patients.

Key concepts will be discussed in a case based approach maximizing clinical relevance.

Assigned reading: Learning Radiology by William Herring, 2nd edition, will be provided to the students in pdf format. The reading material will correlate with online lectures.

There is a written test at the end of the rotation.

Module 1: Introduction to imaging modalities

- Introduction to the different imaging modalities available to the clinicians including plain films, fluoroscopy, CT, ultrasound, MRI, and nuclear medicine.
- Introduction to terminology and convention.
- Understanding basics of CT.
- What is contrast and how can you enhance contrast?
- Hounsfield units as a measure of density.
- Appropriate use of intravenous and oral contrast material.

Module 2: Chest module

- Review of gross and introduction to cross sectional anatomy of the chest.
- Students will identify normal structures as seen on chest x-ray and CT scan of the chest.
- Students will be able to view, scroll, and identify normal structures on a chest x-ray and CT scan of the chest on their own laptops.

Module 3: Work-up of chest pain

- Students will learn to differentiate cardiac from non-cardiogenic causes of chest pain.
- Students will learn how to diagnose various causes of chest pain including angina, pericarditis, acute aortic syndromes, pulmonary embolism, pneumothorax, pleural effusion, pneumonia, rib fracture/costochondritis, and upper abdominal abnormalities resulting in chest pain.
- Students will also learn the imaging modalities commonly used to make these diagnosis and imaging findings of these various abnormalities.

Module 4: Workup of Shortness of breath

- Students will learn about various causes of acute and chronic causes of shortness of breath, including pneumonia, pulmonary embolism, CHF/pulmonary edema, allergic drug reactions, and pneumothorax.
- Students will learn about restrictive and obstructive lung diseases with detailed discussion on emphysema/COPD, idiopathic pulmonary fibrosis, and sarcoidosis.
- Students will learn about the indications of interstitial lung disease CT scan of the chest.

Module 5: Lung Cancer

- Students will learn about the epidemiology, different histologic types, and presentation of lung cancers.
- Students will learn about the work up of pulmonary nodules.
- Students will learn about low dose chest CT scan as a screening tool for the detection of lung cancer in high risk patients.

After completion of the chest module, the students will complete unknown thoracic cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 6: Breast Imaging

- Review of gross and introduction to imaging anatomy of the breasts.
- Students will learn appropriate indications for screening and diagnostic mammography.
- Students will learn about additional imaging methods available for imaging of the breasts and when these additional modalities are used.
- Work-up of common breast complaints: Students will learn how to manage common breast complaints including a palpable concern, focal breast pain, and breast discharge.
- Students will learn about techniques available for breast biopsies including ultrasound,

stereotactic, and MRI guided biopsies.

- Students will learn the management of high risk breast lesions (atypical ductal hyperplasia, atypical lobular hyperplasia, papillary lesions, and radial scars), DCIS, and breast cancer.

After completion of the breast module, the students will complete unknown breast cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 7: Brain imaging

- Review of gross and cross sectional anatomy of the head.
- Students will identify normal structures as seen on CT and MRI of the brain.
- Students will be able to view, scroll, and identify normal structures on a CT scan and MRI of the brain on their own laptops.

Module 8: Head and facial trauma

- Students will learn the work up and management of patients with head trauma.
- Students will learn about skull fractures, subgaleal, epidural, subdural, subarachnoid, and intraparenchymal hemorrhage as a result of head trauma.

Module 9: Understanding headaches

- Students will learn the various causes of headaches.
- Students will learn about appropriate imaging in the work-up of headaches.

Module 10: Altered mental status and focal neurological deficits

- Students will learn the management of patients with altered mental status and focal neurological deficits.

After completion of the brain module, the students will complete unknown brain cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 11: Spine Imaging

- Review of gross and cross sectional anatomy of the spine.
- Students will identify normal structures as seen on CT and MRI of the spine.
- Students will be able to view, scroll, and identify normal structures on a CT scan and MRI of the spine on their own laptops.

Module 12: Spine Trauma

- Students will learn how to clear the cervical spine in trauma patients.
- Students will learn about the indications of imaging in trauma patients.
- Students will learn about common fractures-dislocations that occur in patients with spine trauma.

Module 13: Neck and back pain

- Students will learn various causes of neck and back pain including degenerative disk disease, spinal canal stenosis, fractures, discitis-osteomyelitis, and cord compression.
- Imaging and management of these diseases will be discussed.

After completion of the spine module, the students will complete unknown spine cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 14: Head and neck abnormalities for the primary care physician

- Students will learn differential diagnosis and management of patients with sore throat.
- Students will be introduced to common emergencies of the neck including dental abscess, sialolithiasis, and sinusitis.
- Students will be introduced to head and neck cancers.
- Students will be introduced to various thyroid abnormalities and their management.

After completion of the head and neck module, the students will complete unknown cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 15: Gastrointestinal system

- Students will identify normal structures as seen on CT and MRI of the abdomen and pelvis.
- Students will be able to view, scroll, and identify normal structures on a CT scan and MRI of the abdomen and pelvis on their own laptops.

Module 16: Introduction to barium studies

- Students will be introduced to barium studies including oropharyngeal motility examinations, esophagrams, and upper GI series, small bowel follow through, and barium enemas.
- Understanding dysphagia: Students will learn the various causes of dysphagia,

diagnosis, and management.

Module 17: Management of right upper quadrant pain

- Students will be introduced to various imaging modalities in the work-up of right upper quadrant pain including ultrasound, CT, MRI/MRCP, and nuclear medicine.
- Students will learn about diffuse and focal liver diseases.
- Abnormalities of the gallbladder, pancreas, and biliary tree will be discussed in detail.

Module 18: Management of right lower quadrant pain

- Students will learn about the various diseases that can cause right lower quadrant pain including acute appendicitis, right-sided diverticulitis, Crohn disease, infectious diseases of the colon/distal small bowel, pelvic inflammatory disease, and renal colic diseases.
- Students will learn about the management of these diseases including their complications.

Module 19: Diagnosis and management of small and large bowel obstruction

- Students will learn about the various causes of small and large bowel obstruction.
- Students will learn the management of the various causes of small and large bowel obstruction, including adhesive disease, hernias, local inflammatory processes, intussusception, malrotation, and malignancies.

After completion of the gastrointestinal module, the students will complete unknown cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 20: Genitourinary system

- Students will identify normal kidneys, ureters, and bladder as seen on ultrasound and CT scan of the abdomen and pelvis.
- Management of hematuria. Students will learn the differential diagnosis of various causes of hematuria, management, and the imaging work-up.
- Students will learn about stone disease of the urinary tract, infectious/inflammatory conditions leading to hematuria, and malignancies of the kidneys and bladder.

Module 21: Management of scrotal/testicular pain and mass.

- Students will learn the differential diagnosis of acute causes of scrotal pain.
- Students will learn the management of testicular and extra- testicular masses.

Module 22: Female pelvis

- Management of abnormal vaginal bleeding and pain.
- Students will learn the management of pre-menopausal and post-menopausal vaginal bleeding.
- Students will learn the management of acute pelvic pain in pre-menopausal women.
- Students will learn about pregnancy related complications in the first trimester.

After completion of the genitourinary module, the students will complete unknown cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Module 23: Vascular system

- Students will learn about a variety of vascular abnormalities including peripheral arterial disease, aneurysm, dissection, pseudoaneurysm.
- Students will also learn about acute and chronic mesenteric ischemia as a cause of abdominal pain.

Module 24: Interventional radiology for the primary care physician

- Students will learn about a variety of procedures performed by interventional radiologists.
- Lines and Tubes: Students will learn about the indications, proper placement, and complications of lines and tubes.

Module 25: Musculoskeletal system

- Students will learn the clinical manifestations of degenerative and inflammatory arthropathies.
- Students will learn how to differentiate degenerative from inflammatory arthropathies on imaging.
- Inflammatory arthropathies such as rheumatoid arthritis and seronegative spondyloarthropathies will be discussed in detail.
- Crystalline arthropathies such as gout and pseudogout will be discussed in detail.
- Students will learn the imaging and clinical findings of septic arthritis.

Module 26: Understanding osteomyelitis

- Students will learn the mechanisms of acute osteomyelitis.
- Students will learn the imaging findings of acute osteomyelitis as seen on radiographs, CT, MRI, and bone scan.

Module 27: Management of shoulder pain for primary care providers

- Anatomy of the shoulder girdle will be reviewed with emphasis on the rotator cuff and labrum.
- Students will learn about the various causes of shoulder pain.

Module 28: Management of elbow, wrist, and hand pain for primary care providers

- Anatomy of the elbow, wrist, and hand will be reviewed.
- Students will learn about the various causes of elbow, wrist, and hand pain.

Module 30: Management of hip pain for primary care providers

- Anatomy of the hip joint will be reviewed.
- Students will learn about the various causes of hip pain.

Module 31: Management of knee, ankle, and foot pain for primary care providers

- Anatomy of the knee, ankle, and foot will be reviewed.
- Students will learn about the various causes of knee, ankle, and foot pain.

After completion of the genitourinary module, the students will complete unknown cases. Students will review the imaging on their own laptops and decide proper workup and management of the diseases presented. Each case will be discussed in detail after the students review the cases.

Upon completion of the course material, students will take a final written examination.

Module 32: Review of final examination.