

## **Family Medicine Residency**

### **Radiology Rotation**

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#### **Rotation Goal**

The specialty of radiology encompasses diagnostic imaging as well as therapeutic intervention. There are numerous longitudinal experiences during the three year course of this residency program designed to teach residents fundamental radiologic concepts relevant to the practice of family medicine as well as a scheduled two week radiology rotation during the PGY-1 year. This two week radiology rotation serves as a jump-start for learning the capabilities of a hospital radiology department and learning to appropriately apply radiology to the primary care practice. During this rotation, the residents are paired with board certified radiologists at Jackson Madison County General Hospital to develop proficiency in interpreting routine x-rays and become familiar with the indications for various diagnostic modalities. In addition, residents are instructed to pick up a portable electronic storage device (jump-drive) with radiologist-prepared presentations and learning tools that review interpretation of multiple modalities, including xray, CT, and MRI. Residents are encouraged to work through the available electronic files during the two week radiology rotation, and to save the files to their own device for future access and review. Residents have access to our American College of Radiology teaching file, which is available for self study at all times for all residents in training. Residents will also spend time with the radiology technician at UT Family Practice to gain experience in the actual procedure of taking and processing plain x-rays and to explore options for office-based x-ray capabilities.

Longitudinally, the resident has immediate faculty involvement on the interpretation of all x-rays taken at the UTFP clinic at the point of care. Preceptors assist the residents in interpreting plain x-rays and give them immediate feedback while the patient is being evaluated in clinic. Radiologic topics are also covered in depth on numerous clinical rotations including OB1, OB2, GYN, Emergency Medicine, Inpatient Pediatrics, Outpatient Pediatrics, Inhouse 1, Inhouse 2, SS, orthopedics, NICU and ICU. Please see the curriculums for each of these rotations for further details. In addition, office-based radiology with an emphasis on safety, billing and various other business aspects are covered during the MFPU rotation. The cognitive and behavioral objectives for the radiology rotation, are comprehensive, and should thus be viewed as skills that develop throughout the residency experience. Further implementation of the goals beyond the two week radiology rotation will be achieved in the other rotational experiences, clinic experiences and in the scheduled conferences and seminars throughout the three year residency program.

#### **Goals**

- Review basic anatomy referable to all applications of diagnostic imaging such as plain films, CT, ultrasound, and MRI
- Understand the role of radiologists as specialists and consultants working with other medical staff as part of the healthcare team
- Identify applications of radiology as a screening modality of disease and for use in guiding medical and surgical interventions
- Use of evidence-based medicine in choice of radiological imaging, procedures, and appropriate interpretation
- Understand the basic concepts of risk management, malpractice, and confidentiality, as it applies to radiology and the legal obligations to protect patients' interests

- Formulation of appropriate differential diagnoses for common radiologic findings
- Prepare residents to order appropriate diagnostic imaging relevant to presentations in primary care
- Identify the sensitivity, specificity, indications and limitations of imaging studies
- Familiarize residents with diagnostic and therapeutic modalities provided by interventional radiology
- Familiarize residents with options for office-based x-ray capabilities

**Responsibilities**

- Review the residency teaching files at your scheduled time during the 2 wk rotation and then any other time during your training that you want extra practice reading plain x-rays
- Meet with radiology technician at UTFP clinic during radiology rotation
- Review radiographic studies with preceptors during other rotational experiences
- Complete the online radiology tutorial assignments for each day of the rotation as indicated on your schedule and work independently on this tutorial to cover the remaining concepts throughout the course of your residency training.

**Supervision**

Direct observation is provided by supervising physicians. Supervising physicians include Dr. James Ellis, Jr., Dr. Tim Crossett, Dr. Matt Graham, Dr. John Crocker, Dr. Gregory Bruno, Dr. Tony Ghodadra

**Rotation Objectives**

By the end of the Radiology rotation, PGY I residents are expected to expand and cultivate skills and knowledge learned during previous training and to achieve the following objectives based on the six general competencies. The resident should exhibit an increasing level of responsibility and independency as he or she progresses throughout the year.

Competency	Required Skill(s)	Teaching Method(s)	Formative Evaluation Method(s)	Frequency of Evaluation
Patient Care	<p><b>SPECIALTY SPECIFIC OBJECTIVES</b></p> <p>Identify what diagnostic imaging studies should be ordered to aid in making a clinical diagnosis</p> <ul style="list-style-type: none"> <li>• Fetal ultrasound</li> <li>• Pelvic and intra-vaginal ultrasound</li> <li>• Mammogram</li> <li>• Breast ultrasound</li> <li>• DEXA scan</li> <li>• Chest x-ray</li> <li>• Abdominal flat plate, upright and decubitus</li> <li>• Upper GI series</li> <li>• Barium Enema</li> </ul>	<p>Conferences/Didactics</p> <p>Daily Rounds</p> <p>Self Directed Learning</p> <p>Online tutorials</p> <p>Chart Review Project</p>	<p>Direct Feedback</p> <p>Global Evaluation</p> <p>Procedure Log Review</p> <p>Conference Attendance</p>	<p>Daily</p> <p>Monthly</p> <p>Monthly</p>

	<ul style="list-style-type: none"> <li>• Ultrasound abdomen, liver, GB, pancreas</li> <li>• Tagged red cell study</li> <li>• HIDA scan</li> <li>• IVP</li> <li>• Arteriogram</li> <li>• MRI brain</li> <li>• MRA brain</li> <li>• MRI c-spine, t-spine and LS spine</li> <li>• Echocardiogram</li> <li>• Venous dopplers</li> <li>• Carotid dopplers</li> <li>• C-spine in the Emergency Department (ED)</li> <li>• CT abdomen the in the ED</li> <li>• Spiral CT chest</li> <li>• Thyroid scan (RAIU scan)</li> <li>• Thyroid ablation</li> <li>• VCUG</li> <li>• Sinus CT</li> </ul>			
	Write orders for studies that help the radiologist in his/her interpretation	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Interpret findings of above studies in the context of the clinical presentation	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Order sedation when needed for MRI (claustrophobia) or other studies for which it is required	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Use evidence-based medicine principles to determine the appropriate radiographic work-up and sequencing of imaging modalities for the following presentations to	Conferences/Didactics Daily Rounds Self Directed Learning	Direct Feedback Global Evaluation Procedure Log Review	Daily Monthly Monthly

	<p>optimize the diagnosis in balance with cost-effectiveness and potential patient complications.</p> <ul style="list-style-type: none"> <li>• Cardiac ischemia</li> <li>• Pulmonary embolism</li> <li>• Acute abdomen</li> <li>• Neck and back pain</li> <li>• Neurological syndromes including spinal cord compression, seizures, cerebrovascular accident, headaches, focal neurological findings, mental status changes, and head trauma</li> <li>• Child abuse</li> <li>• Preventive medicine including spiral CT for pulmonary nodules, bone densitometry scans for osteoporosis, mammograms for breast cancer screening, and prostate ultrasound for cancer screening and nodule evaluation</li> <li>• Bone and joint pain</li> <li>• Normal and abnormal pregnancy</li> <li>• Staging of common cancers</li> <li>• Hematuria and flank pain</li> <li>• Gastrointestinal bleeding</li> <li>• Aortic aneurysms/dissections</li> <li>• Physical findings including ascites, abnormal heart sounds, prostate nodules, bruits, aneurysm, testicular masses, thyroid nodules, and breast lumps</li> <li>• Trauma</li> </ul>	<p>Online tutorials Chart Review Project</p>	<p>Conference Attendance</p>	
	<p>Interpret the following types of x-rays:</p> <ul style="list-style-type: none"> <li>• Plain chest x-rays (10)</li> <li>• Extremity x-rays (10)</li> <li>• Abdominal x-rays (5)</li> <li>• C-spine x-ray (5)</li> <li>• CT head (5)</li> <li>• CT chest (5)</li> <li>• CT abdomen (5)</li> <li>• Ultrasound-guided vascular access (5)</li> <li>• Paracentesis (3)</li> </ul>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>

	<ul style="list-style-type: none"> <li>• Thoracocentesis (3)</li> <li>• Chest tube insertion and management (3)</li> </ul>			
Medical Knowledge	<b>SPECIALTY SPECIFIC OBJECTIVES</b>			
	Know appropriate terminology used to describe various radiographic findings	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	<b>Plain Radiographs</b> <ol style="list-style-type: none"> <li>1. Identify normal anatomy on PA, AP, and lateral chest films</li> <li>2. Recognize abnormal chest films including pleural effusion, pneumothorax, pneumonia and lobe location, changes of congestive heart failure, changes of chronic obstructive pulmonary disease, atelectasis, pulmonary nodules and masses, and hyaline membrane disease of the newborn</li> <li>3. Identify normal anatomy on four views of the abdomen</li> <li>4. Recognize abnormal abdominal films including ileus, small bowel obstruction, large bowel obstruction, free air, and calcifications</li> <li>5. Identify normal anatomy of the spine and long bones in both adults and children</li> <li>6. Recognize abnormal bone radiographs including fractures, degenerative joint disease, osteoporosis (including vertebral collapse), and primary versus metastatic bone malignancy</li> <li>7. Identify normal anatomy on barium enema, and upper gastrointestinal series</li> </ol>	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	<b>Computed Tomography</b> <ol style="list-style-type: none"> <li>1. Recognize and treat contrast allergy, it's signs and symptoms, and implications to the patient</li> <li>2. Discuss principles of CT function and applications</li> <li>3. Discuss differences between CT, MRI, plain film, and US, including the comparative benefits/drawbacks and strengths/weaknesses of each modality</li> <li>4. Discuss general indications of when to use CT as the</li> </ol>	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly

	<p>imaging of choice</p> <ol style="list-style-type: none"> <li>5. Identify normal anatomy found on CT of the head, spine, chest, abdomen, and pelvis</li> <li>6. Recognize abnormal head CTs including acute hemorrhage (subarachnoid, subdural, and parenchymal), infarcts, edema, mass effect, and hydrocephalus in an infant and adult</li> <li>7. Recognize abnormal chest CTs including pulmonary nodules and masses</li> <li>8. Recognize abnormal abdominal/pelvis CTs including diverticular disease, appendicitis, bowel obstruction, abdominal aortic aneurysms, pancreatitis, abdominal abscesses, ascites, and hepatic, pancreatic and renal masses</li> <li>9. Recognize abnormal CTs of the spine, including metastatic disease, degenerative joint disease, and disc disease</li> </ol>			
	<p><b>Magnetic Resonance Imaging</b></p> <ol style="list-style-type: none"> <li>1. Discuss principles of magnetic resonance imaging, including differences in abilities and applications of MRI versus CT</li> <li>2. Identify normal anatomy on MRI of the head and spine</li> <li>3. Recognize abnormal head and spine MRIs including central nervous system infection, masses, stroke syndromes, multiple sclerosis, disc disease, metastatic vertebral column disease, and cord compression</li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>
	<p><b>Ultrasound</b></p> <ol style="list-style-type: none"> <li>1. Discuss general principles of ultrasound including the differences between 2D, Doppler, and M mode</li> <li>2. Discuss indications and limitations of <ol style="list-style-type: none"> <li>a. ultrasound for specific OB/Gyn situations (molar pregnancy, anencephalic pregnancy, placenta previa, fetal age using bi-parietal diameter and femur length, and ectopic pregnancy)</li> <li>b. vascular Doppler ultrasound (aneurysm, deep vein thrombosis, and carotid artery and peripheral</li> </ol> </li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>

	<ul style="list-style-type: none"> <li>vascular disease)</li> <li>c. ultrasound for gallbladder, bile ducts and liver</li> <li>d. echocardiogram (transthoracic versus trans-esophageal echocardiography, chamber size, valvular disease, and pericardial effusions)</li> <li>e. renal ultrasound for cysts and tumors</li> <li>f. prostate ultrasound (for evaluation of nodules and biopsy)</li> <li>g. FAST ultrasound for trauma</li> </ul>			
	<p><b>Mammography</b></p> <ol style="list-style-type: none"> <li>1. Discuss basics of normal and abnormal mammograms</li> <li>2. Discuss indications and utility of mammography, including usefulness as a screening method and as a surgical tool for resection and biopsy</li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>
	<p><b>Nuclear Medicine</b></p> <ol style="list-style-type: none"> <li>1. Discuss general principles and therapeutic uses of nuclear medicine</li> <li>2. Discuss mechanisms, indications, and limitations of HIDA scans, bone scans, tagged RBC scans, myocardial perfusion and function scans, bone densitometry scans, and ventilation/perfusion scans</li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>
	<p><b>Angiography</b></p> <ol style="list-style-type: none"> <li>1. Discuss diagnostic and therapeutic principles of angiography</li> <li>2. Discuss indications for obtaining angiograms</li> <li>3. Discuss applications and utility of MRA angiograms</li> <li>4. Recognize normal anatomy of the great vessels and other vasculature on angiograms</li> <li>5. Discuss indications for angiograms for abnormal processes including subarachnoid hemorrhage and berry aneurysms, vascular stenotic lesions, pulmonary angiogram for PE, aortic dissection, aortic trauma, and gastrointestinal bleeding</li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>
	<p>Become familiar with the various treatment modalities provided by interventional radiologists</p> <ol style="list-style-type: none"> <li>1. Ultrasound-guided vascular access</li> <li>2. Paracentesis</li> </ol>	<p>Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials</p>	<p>Direct Feedback Global Evaluation Procedure Log Review Conference Attendance</p>	<p>Daily Monthly Monthly</p>

	<ul style="list-style-type: none"> <li>3. Thoracocentesis, chest tube insertion and management</li> <li>4. Ultrasound-guided cyst aspirations and soft tissue biopsy</li> <li>5. Embolization procedures</li> <li>6. Vertebroplasty</li> <li>7. Vascular stenting</li> <li>8. Thyroid ablation therapy</li> <li>9. Thrombolytic therapy for PE/DVT</li> </ul>	Chart Review Project		
Practice Based Learning and Improvement	<b>SPECIALTY SPECIFIC OBJECTIVES</b>			
	See General Family Medicine Objectives for a comprehensive list.			
	Develop tools to help meet the needs of patients	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Facilitate learning of medical students, residents and other health care professionals to encourage quality improvement in patient care	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
Interpersonal and Communication Skills	<b>SPECIALTY SPECIFIC OBJECTIVES</b>			
	See General Family Medicine Objectives for a comprehensive list.			
	Communicate effectively with patients and their families while in the presence of their daily preceptor.	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Convey information in a clear and concise manner to patients, families, and other health professionals (i.e., use appropriate vocabulary choice, realistic outcomes, and working with difficult patients and family)	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
Professionalism	<b>SPECIALTY SPECIFIC OBJECTIVES</b>			
	See General Family Medicine Objectives for a comprehensive list.			

	Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Behave in a professional manner when interacting with patients or other health care providers (i.e., integrity, respect, accountability, punctuality)	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
Systems-Based Practice	<b>SPECIALTY SPECIFIC OBJECTIVES</b>			
	See General Family Medicine Objectives for a comprehensive list.			
	Incorporate considerations of cost awareness and risk-benefit analysis in patient care	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Advocate for quality patient care and optimal patient care systems	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Develop an understanding of the role of radiologic imaging and intervention in evaluation and treatment of disease	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly
	Develop an understanding of coding and billing relevant to radiologic imaging.	Conferences/Didactics Daily Rounds Self Directed Learning Online tutorials Chart Review Project	Direct Feedback Global Evaluation Procedure Log Review Conference Attendance	Daily Monthly Monthly

**Educational Resources**

1. Daffner, Richard H. Clinical Radiology The Essentials, 2<sup>nd</sup> Edition. Philadelphia, PA. Lippincott Williams & Wilkins, 1999

2. Mettler, Fred A. Primary Care Radiology. Baltimore, MA. Saunders, 2000.
3. Introduction to Radiology. An Online Interactive Tutorial. [www.med-ed.virginia.edu/courses/rad/](http://www.med-ed.virginia.edu/courses/rad/)
4. [www.uptodate.com](http://www.uptodate.com) (available free through [www.utdol.com](http://www.utdol.com) in Jackson General Hospital)
5. [www.epocrates.com](http://www.epocrates.com)
6. [www.emedicine.com](http://www.emedicine.com)
7. [www.aafp.org](http://www.aafp.org)