PEDIATRIC RADIOLOGY

FELLOWSHIP TRAINING
GOALS AND OBJECTIVES
OVERALL GOALS

These goals and objectives are provided to each CMC pediatric radiology fellow as a reference to be used throughout the pediatric fellowship year. These guidelines establish objectives for fellows who would like to pursue a career in pediatric radiology.

The overall goal of the fellowship is to provide a one-year, supervised experience in the pediatric applications and interpretation of radiography, computed tomography, ultrasonography, angiography, interventional techniques, nuclear radiology, magnetic resonance, and any other imaging modality customarily included within the specialty of diagnostic radiology.

The fellowship is structured to enhance substantially the fellow's knowledge of the applications of all forms of diagnostic imaging to the unique clinical/pathophysiological problems of the newborn, infant, child, and adolescent. The fundamentals of radiobiology, radiological physics, and radiation protection as they relate to the infant, child, and adolescent are be reviewed during the pediatric radiology training experience. The recognition of normal imaging findings and variants will be stressed. The fellowship provides direct and progressively responsible experience in pediatric imaging as they advance through training. This training must culminate in sufficiently independent responsibility for clinical decision making such that the program is assured that the graduating fellow has achieved the ability to execute sound clinical judgment, and practice competently and independently.

The goals and objectives of each rotation are intended to ensure that the fellow achieves the six core competencies established by the ACGME: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, Practice-Based Learning and Improvement, and Systems-Based Practice.
Description of Educational Experience

The clinical and academic educational experience incorporated into the Pediatric Radiology fellowship program at Children’s Medical Center/UT Southwestern includes formal clinical rotation on pediatric radiology services, formal faculty directed and self directed didactic, individual study and participation in multidisciplinary conferences. The pediatric radiology fellow will rotate through the diagnostic radiology services at Children’s Medical Center of Dallas (CMC) to include plain films, fluoroscopy, sonography, nuclear medicine, CT and MR, and interventional radiology. Most training will be spent at CMC and 3 month elective which may be taken at CMC, Parkland, or at another children’s hospital. The purpose of these elective rotations will be to provide additional sub-specialized experience in the specialty of Pediatric Radiology. Fellows will learn to perform and interpret radiographs as well as CT and MRI examinations of the body, heart, brain, spine, and head and neck performed on pediatric patients with faculty supervision. They will have an opportunity to participate in diagnostic angiographic and basic interventional procedures and they will have didactic presentations on radiation, contrast and MR safety, performance and interpretation of fluoroscopy and sonography, and optimization and interpretation of pediatric CT and MRI. Specific ongoing instruction will include differences in image protocol for pediatric CT and MR studies, anatomic development at different ages, and appearances of pathology specific to children. Additionally, the fellows are required to attend rounds as well as the various clinical and didactic conferences at Children’s Medical Center of Dallas. The fellow will also be required to participate in a research project and encouraged to publish a paper in a peer reviewed journal or present at a national meeting during their fellowship. In addition, the fellow will be involved in a performance quality improvement project.
Patient Care

Goals
Pediatric radiology fellows must be able to provide patient care related to evaluation and treatment of diseases of the fetus, neonate, infant and child that is compassionate, appropriate, and effective for the diagnosis and treatment of these conditions and the promotion of health. Fellows are expected to:

Competencies
Clinical competency goals for this curriculum include:
1. Knowledge of the indications and contraindications for contrast administration (MR and CT) in the pediatric patient.
2. Knowledge of appropriate indications for imaging studies in a pediatric patient.
3. Knowledge of departmental standard procedures and policies.
4. Ability to perform preliminary evaluation of pediatric patients requiring imaging evaluation and protocol imaging studies in order to maximize diagnostic potential.
5. Ability to perform a targeted and procedure appropriate history.
6. Ability to render appropriate management of certain physiological considerations including drug/contrast reactions/premedication.
7. Ability to identify emergent cases requiring urgent intervention and provide immediate notification to referring faculty (critical results).
8. Ability to modify an exam to reduce radiation exposure.
9. Ability to relay information to parents and patients, when appropriate.
10. Ability to understand the concepts of magnetic resonance safety.

Objectives
The fellow will complete the following during the rotations to effect attainment of the above competencies, all under direct supervision of pediatric radiology faculty:
1. Involvement in patient care is in both outpatient and inpatient settings.
2. Provide a safe environment by following standard procedures and policies.
3. Follow recommendations for safe contact with patients by sanitizing hands before and after each procedure.
4. Performing time out procedure before all relevant cases.
5. Review pertinent patient history, physical findings and any antecedent imaging studies to determine that the requested examination/procedure is appropriate, and if not, take appropriate steps to contact the ordering physician.
6. Protocol studies to ensure a diagnosis with specific attention to potential radiation exposure, MR sequence and overall time.
7. Obtain procedural informed consent where appropriate.
8. Provide appropriate post procedure counseling regarding follow-up with referring physician.
9. Dictate exams in an appropriate timely manner with the use of appropriate language.
10. Communicate critical findings to appropriate referring physicians in a timely manner.
11. Will meet with clinicians as well as potentially parents/patients to discuss results of sensitive procedures.
12. Successfully complete a contrast safety lecture and MR safety course and attend training in radiation dose limitation.

Assessment Methods:
1. Global evaluations (faculty, technologist, and patient).
2. Case/procedure logs (fellow learning portfolio)
3. Direct observation of procedures, clinical processes (such as obtaining informed consent), and dictated reports.
4. Attendance documented for orientation and safety courses.
Medical Knowledge

Goals
Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences as they pertain to pediatric imaging, as well as the application of this knowledge to patient care. In pediatric imaging, this competency has technical and cognitive components. Fellows are expected to:

Competencies
Technical and cognitive competency goals for this curriculum include:

Technical Knowledge:
1. Understanding the hazards of radiation exposure in the child and how to reduce that risk for all techniques utilizing ionizing radiation.
2. Ability to recognize pertinent normal anatomy, standard views, and safety issues encountered with all pediatric imaging modalities.
3. Understand the limitations and advantages of each pediatric imaging modality.
4. Ability to perform procedures and obtain diagnostic images while minimizing radiation exposure and patient discomfort.
5. Ability to protocol imaging studies to maximize diagnostic potential and minimize time and
6. Ability to determine the type of contrast, need for contrast, and know the contraindications for contrast administration (fluoroscopy, CT, and MR).
7. Ability to apply basic principles of image acquisition and reconstruction for multi-planar CT and CT angiography, as well as save those reconstructions in the PACs archive.
8. Ability to independently perform image reconstructions, editing, and saving of images to archive for MR angiography acquisitions.
9. Ability to assist in the performance of pediatric interventional procedures.
10. Ability to determine if a child potentially needs sedation and if contraindications to anesthesia exist.

Cognitive Knowledge:
1. Know the indications for performing different diagnostic procedures and contraindications for those procedures.
2. Be familiar with the anatomy and pathology for the various diagnostic modalities.
3. Using all modalities, know how to diagnose common congenital, traumatic, iatrogenic, and neoplastic conditions.
4. Know age related changes on radiographs, sonography, CT, and MRI including maturational changes and normal variations.
5. Recognize time limits when scanning a sedated pediatric patient and be able to optimize protocols accordingly.
6. Recognize when additional projections, imaging planes, sequences or studies are needed.
7. Recognize and relate to a referring physician findings seen in common pediatric conditions including; new or progressive tumor, stroke, intracranial hemorrhage, and unstable spine injury.
8. Know the lists of critical results and how to communicate and document critical results.
9. Recognize and relate to a referring physician any critical test or finding and document that discussion properly in the radiology report.
10. Understand artifacts and other factors that alter image quality and accuracy.
11. Learn the approach to imaging a pediatric patient and relevant differential diagnoses.
Objectives
The fellow will complete the following during the rotations to effect attainment of the above competencies, all under direct supervision of pediatric radiology faculty:

1. Review a sufficient number of pediatric imaging studies under faculty supervision.
2. Interpret a sufficient number of pediatric ultrasound, CT, MR, MR angiographic studies and CT angiographic studies to attain technical and cognitive competency, including 3-D volume rendered analysis on the PACS workstation in pediatric patients.
3. Perform preliminary review of all exams to determine clinical and technical adequacy.
4. Monitor and participate in pediatric interventional procedures.
5. Attend pediatric multidisciplinary conferences with radiology participation including hematology-oncology, trauma, pediatric surgery, urology, GI, neuro-oncology tumor board, pediatric epilepsy clinical conference, and pediatric neurology conference.
6. Attend didactic lectures (core curriculum) on pediatric radiology given by the pediatric radiology attendings.
7. Attend pediatric radiology lectures at UT southwestern as well as pertinent lectures including; MR safety and issues relating to fatigue.
8. Attend daily interpretation sessions with pediatric radiology faculty involving review of the appropriate findings.
9. Prepare radiologic reports on all studies performed on the service.
10. Complete self directed study of recommended references.
11. Complete the Cleveland Clinic Review course.

Assessment Methods.
1. Direct observation
2. Global evaluations.
3. Resident learning portfolio (including documentation of conferences and courses attended, self-assessments modules completed, etc.)
4. Documentation of Journal Club attendance, including performing literature review to evaluate skills in accessing, interpreting and applying best evidence in the radiology literature to patient care.
5. Conference attendance documentation.
Practice-Based Learning and Improvement

Goals
Fellows must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and lifelong learning. Fellows are expected to develop skills and habits to be able to achieve competencies to:

- Incorporate formative evaluation feedback into daily practice.
- Use information technology to optimize learning.
- Applies principles of evidence based learning.
- Participation in quality control and peer review.
- Promotes learning with students, residents and other health care professionals.

Objectives
- The fellow will undergo quarterly reviews and feedback will be sought.
- The fellow will have access to the UT Southwestern library electronically.
- The fellow will attend and present at a monthly Journal Club.
- The fellow will attend and participate in monthly peer review and quarterly departmental morbidity and mortality conferences.
- The fellow will mentor residents rotating through the department and develop cases conferences to teach the residents.
- The fellow will give 2 didactic lectures to the UT residents.

ASSESSMENT METHODS:
2. Fellow learning portfolio (including presentations, teaching files and case conferences).
3. Direct observation of clinical research and literature evaluation.
4. Program director quarterly evaluation.
6. Documented attendance at peer review, morbidity and mortality and journal club conferences.
Professionalism

Goal
The fellow must remember that they represent the University of Texas Southwestern Medical Center, Department of Radiology with all of their actions and communications while on this rotation. The highest standards of professionalism must be maintained at all times, especially in interactions with patients or with other physicians. The fellow will be responsible for tracking duty hours and reporting them to the supervisory attending. Competence in professionalism will be assessed by supervisory attending, as well as by the global evaluation. Fellows must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

Competencies

- Responsiveness to patient needs that supersedes self-interest.
- Accountability to patients, society, and the profession.
- Demonstrates sensitivity to age, culture gender and potential disability of the patient.
- Demonstrates acceptable personal demeanor and hygiene.
- Demonstrates responsible work ethic and attendance.

These are considered essential to the professional practice of radiology.

Objectives

1. The fellow will be responsive to patient needs and will be assessed by evaluations given to parents.
2. Accountability will be assessed by evaluations of resident performance by the radiologic technologists.

ASSESSMENT METHODS:

1. Global evaluation (faculty, technologist and patient).
2. Verify status of medical license, if appropriate.
3. Documentation of compliance with institutional and departmental policies (e.g., conference attendance, HIPPA, JCAHO, dress code)
4. Direct observation.
Interpersonal and Communication Skills

Goal
Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families, and professional associates. Fellows are expected to:

Competencies
1. The ability to present findings, differential diagnosis, most likely diagnosis, and clinical significance of findings succinctly and completely, and communicating clearly with other fellows, staff, and affiliated colleagues is necessary.
2. The ability to work professionally and effectively with technologists and ancillary staff.
3. The ability to demonstrate respect and compassion in interactions with patients, parents and staff.
4. The ability to determine the needs of a patient dependent on age and disability.
5. The ability to avoid negative comments concerning other healthcare providers.
6. Observe HIPAA regulations.
7. The ability to instruct residents and medical students in small and large group settings.

Objectives
1. The fellow will work closely with clinicians, radiologists, technologists and additional trainees.
2. The fellow will teach residents in small and large group settings.
3. The fellow will be aware of patient developmental milestones as they pertain to patient cooperation.
4. The fellow will complete orientation with discussion of HIPAA guidelines.
5. The fellow will progressively gain confidence and knowledge to act as a consultant to clinical services.
6. The fellow will attend and then progress to presenting cases at multi-disciplinary conferences.
7. The fellow will interact with clinicians in a knowledgeable and professional manner.

ASSESSMENT METHODS:
2. Direct observation of selected procedures and other critical processes (such as obtaining informed consent and consultation will other professionals).
3. 360 degree evaluations.
4. Resident lecture evaluations.
5. Completion of orientation.
**Systems Based Practice**

**Goal**
Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Fellows are expected to:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialty
- Work in inter-professional teams to enhance patient safety and improve patient care quality

**Objectives**
1. Understand appropriateness of imaging guidelines (ACR guidelines as well as institution).
2. The fellow will create a safe environment (JCAHO)
3. The fellow will learn how radiology relates to other health care professionals.
4. The fellow will be empathetic to the obstacles and shortcomings of the health care system.
5. The fellow will participate in a quality improvement project.
6. The fellow will actively participate in the peer review process both departmental and at the hospital level.

**ASSESSMENT METHODS:**
2. Documentation of fellow participation in peer review meetings.
3. Documentation of active participation in multi-disciplinary conferences.
4. Attendance at multi-disciplinary conferences.
5. Direct observation.

Fellowship program and faculty evaluations are submitted electronically with anonymity.

The pediatric radiology program will be evaluated annually. A committee consisting of the Program Director, at least 3 faculty members, and the fellow will review the program goals and objectives and their effectiveness. The committee will utilize written comments of faculty, the Internal Review report, and the fellow/residents confidential written evaluation. Fellow performance and outcome assessment will help in the evaluation of the program effectiveness.
Teaching Methods

Fellows will learn through active participation under the direct supervision of faculty members and through electronic on-line resources accessed to further understanding and knowledge base. Didactic conferences/teaching are also given cover the multiple subspecialty areas of pediatric radiology (core curriculum).

Assessment Method

The fellow's performance on this rotation or educational experience will be measured by:

1. Faculty, technologist, and patient evaluations of residents professionalism as well as perceptive, deductive, and diagnostic skills
2. The fellow will meet with the program director quarterly to evaluate progress. A written summation will be generated and kept in the fellows records.

Assessment Method (Program Evaluation)

The effectiveness of this educational experience is measured by the residents evaluate the rotation on a competency based evaluation. The rotation as well as individual faculty is evaluated and feedback provided to the program director and faculty.

Level of Supervision

All formal interpretations of non-invasive studies and the performance of all invasive studies are done under direct supervision of a faculty member.

Educational Resources

1. Caffey’s Pediatric Diagnostic Imaging, 2008
6. Cleveland clinic online tutorial (www.pediatricradiology.ccf.org)
7. Pediatric radiology journal – free 6 month subscription to fellows.
DEFINITIONS

Interpersonal and Communication Skills
Results in the effective exchange of information and collaboration with patients, their families, and other health professionals;

Patient Care
Provide patient care through safe, efficient, appropriately utilized, quality-controlled diagnostic and/or interventional radiology techniques and effectively communicate results to the referring physician and/or other appropriate individuals in a timely manner.

Medical Knowledge
Engage in continuous learning using up to date evidence and apply appropriate state of the art diagnostic and/or interventional radiology techniques to meet the imaging needs of patients, referring physicians and the health care system.

Practice-Based Learning and Improvement
This involves the investigation and evaluation of care for their patients, the appraisal and assimilation of scientific evidence, and improvements in patient care.

Professionalism
Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team

System-Based Practice
Understand how the components of the local and national healthcare system function interdependently and how changes to improve the system involve group and individual efforts. Optimize coordination of patient care both within one's own practice and within the healthcare system. Consult with other healthcare professionals, and educate healthcare consumers, regarding the most appropriate utilization of imaging resources
1. Orientation (4 weeks)

A. Goals.
The fellow will rotate one week on rotations (Neuroradiology, Ultrasound, Body imaging, Fluoroscopy, and ER radiography). The fellow will learn how to access and use imaging workstations, electronic medical records, voice recognition dictation stations, pagers (paging directory), and e-mail. The fellow will become comfortable with the infrastructure of the hospital as well as supervision requirements. A superficial understanding of pediatric radiology will be achieved.

B. Competencies.
1. The fellow will know how to access and use imaging workstations, electronic medical records (Epic), voice recognition system, pagers (paging directory), and e-mail.
2. Have knowledge of appropriate radiation doses and dose limiting strategies in Pediatric Radiology.
3. Know normal findings on Head CT in the pediatric patient including the neonate.
4. Know appropriate protocols for Pediatric Neuroradiology and Body CT studies, as well as Fluoroscopy.
5. Become familiar with CT in the evaluation of pediatric trauma, infection, infarction, and hydrocephalus.
6. Understand the indications for MR, especially in the emergency setting.
7. Know the indications and use for ultrasound in the pediatric patient.
8. Have knowledge of using ultrasound in evaluation of appendicitis, hypertrophic pyloric stenosis and intracranial hemorrhage.
9. Know how to perform common Fluoroscopic procedures including; UGI and VCUG.
10. Know how to evaluate radiographs of the pediatric chest and abdomen.
11. Become familiar with common pediatric fractures, including those associated with abuse.
12. Begin the process of choosing a mentor and reasonable research project.

C. Objectives.
1. Completion of the fellow orientation for Pediatric Radiology, which includes PACS and Epic training as well as introductory lectures in Neuroradiology and Pediatric Radiology.
2. The fellow will complete the Cleveland Clinic Pediatric Radiology review course in the first orientation month.
3. The fellow will rotate on Neuroradiology CT, Body CT, Fluoroscopy, Ultrasound, and ER radiography during the orientation month.
4. The fellow will be observe and be observed performing fluoroscopic procedures.
5. The fellows will attend lectures covering contrast reactions, limiting radiation dose and MR safety.
6. Choose a faculty mentor and a research topic.
7. The fellow will begin reading “Donnelly and O’Hara, Diagnostic Imaging: Pediatrics, 2012”.

D. Assessment methods.
   2. Lecture attendance documentation.
   3. Completion certificate from the Cleveland Clinic review course submitted to Program Director.
   4. Submit mentor selection form to the Program Director.
   5. Direct observation.

2. Body Imaging – CT, MR and Cardiac (8 weeks)

A. Goals.
The fellow will rotate on the inpatient body imaging service with an assigned attending. The fellow will protocol, review and dictate these studies. Imaging studies will be performed on a variety of patients, which include; ICU, transplant, oncology, surgery and medicine. An outpatient experience is also present on this rotation. Additional outpatient experience is available as elective time at our outpatient clinics and Scottish rite. The fellow will gain confidence in MRI and CT evaluation of the chest abdomen, and extremities. At the end of the 2 rotations, the fellow will be able to protocol body studies, check images before the patient leaves the department, and provide the attending with a concise description of the imaging findings as well as a complete differential diagnosis and any suggested additional imaging or follow up.

B. Competencies.
1. The fellow will know dose limiting strategies as relates to the modality (CT).
2. The fellow will be familiar with MR safety and will take the MR safety course (MR safety officer Craig Morriss).
3. Know the indications, dose and potential complications for intravenous contrast administration (allergic, anaphylactic, nephrogenic systemic fibrosis).
4. Know the dose and indications for oral contrast as relates to body imaging.
5. Be able to determine the need for sedation and general contraindications in pediatric patients.
6. Be able to perform a targeted history and review of the electronic medical record, so as to accurately protocol an imaging study.
7. Know the role of imaging in the evaluation of the pediatric patient which includes but is not limited to; the acute abdomen, initial and follow up oncologic diagnosis, transplant evaluation, the intensive care unit, inflammation/infection, and trauma.
8. The fellow will become progressively adept at interpreting body imaging studies in the pediatric patient and will develop a systematic approach to interpreting these studies.
9. Knowledge of the use and interpretation of CTA and MRA in body imaging.
10. Know how to perform 3D and multiplanar reconstructions on the PACs.
11. Know the anatomy of congenital heart disease as well as gain knowledge and experience in interpreting and post-processing of cardiac studies (CT,MR).

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. Review daily schedule on epic and protocol all body MR exams, check in with CT technologist to see if any cases are in need of further evaluation (epic research or contact referring physician). Any questions should be addressed to the body attending.
3. Emergency/overnight studies will be evaluated prior to reviewing with the attending.
4. The fellow will actively participate and maintain professional behavior as a consultant for all pediatric services in need of body imaging studies.
5. If needed, the fellow will review studies before the patient leaves the department with specific attention to the need for additional imaging planes, sequences, and contrast. The attending will be available for questions at all times.
6. The fellows thoroughly review all studies, obtain appropriate history and compare with prior studies and then present the case the attending.
7. The fellow will actively participate in any interventional procedure performed in CT, including informed consent.
8. The fellow will be sensitive and professional when answering patient questions.
9. The fellow will be involved in cardiac studies on Tuesday and will learn how to post-process these studies.
10. The fellow will attend and be advised how present at multiple interdisciplinary conferences including; Trauma conference, Hematology conference, Surgery conference, Echocardiography conference, Transplant conference and Cardiothoracic surgery conference. An attending will accompany the fellow at all conferences.
11. The fellow will receive multiple didactic lectures throughout the year that emphasize techniques and imaging findings.

D. Assessment methods.
2. Didactic lecture attendance documentation.
3. Interdisciplinary conference attendance documentation, at least 2/week.
4. Completion certificate from the MR safety course.
5. Fellows learning portfolio to include procedure log.
6. Biannual tabulation of dictated body imaging cases.
7. Direct observation.

3. Fluoroscopy (8 weeks)

A. Goals.
The fellow will gradually become adept at routine pediatric fluoroscopy. The attending will first perform and then observe the fellow performing cases, with the goal by the end of the 8 week rotation will be for the fellow to function as a junior attending and mentoring other learners on the rotation. The fellow will be exposed to more challenging cases as well including; imperforate anus evaluation, cloacal malformations, enterostomy evaluation, as well as evaluating the augmented bladder. Professionalism will be stressed with direct observation of the fellow patient/parent interaction.

B. Competencies.
1. Be able to interact in a sensitive and professional manner with the patient, parent, and technologist.
2. Know the time-out protocol and always sanitize hands prior to beginning procedure.
3. Be able to obtain a concise history from the patient/parent and appropriately tailor the study to answer the clinical questions.
4. Knowledge of age differences and appropriate expectations of the patient.
5. Knowledge of radiation reduction techniques including; image intensifier position, collimation, last image hold, and pulsed fluoroscopy.
6. Knowledge of the genitourinary and gastrointestinal contrast agent, both use and dose given age.
7. Be able to independently perform UGI, contrast (air) enema, VCUG, and fistulagram.
8. Be able to perform UGI studies for evaluation of GE reflux, vascular ring, pre and post operative evaluation of esophageal atresia, malrotation/volvulus, and evaluate a neonate for bowel obstruction.
9. Be able to perform VCUG studies for evaluation of GU reflux, GU anomalies, as well as evaluation of the augmented bladder.
10. Understand imaging findings related to renal duplication and ectopic ureteral orifices.
11. Be able to perform a contrast enema in evaluation of neonatal obstruction, Hirschsprung disease, inflammatory bowel disease, GU and GI fistula, and polyps.
12. Know contraindication of and how to perform a diagnostic lumbar puncture in the pediatric patient.
13. Know the workup, complications and how to perform an air reduction enema in a patient with suspected intussusception.

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. Review daily schedule for non-routine cases and obtain the appropriate clinical information from the medical chart, patient/parent, and/or referring physician, then review with attending.
3. Observe and perform cases with an attending present with progression toward autonomy by rotation end.
4. The fellow will be sensitive and interact professionally with the technologist, parent, and patient.
5. The fellow will observe time out procedure as well as sanitary guidelines.
6. The fellow will minimize radiation dose to the child.
7. The fellow will be knowledgeable about the uses of various genitourinary and gastrointestinal contrast agents.
8. The fellow will be observed and evaluated by the attending (using a distributed checklist) on performance of an UGI, VCUG and contrast enema. This evaluation will be turned into the Program Director.
9. The fellow will complete 3 studies of the following procedures; UGI for malrotation, air enema for intussusception reduction, Contrast enema and/or UGI for neonatal obstruction, and diagnostic lumbar puncture. These studies will be signed off by the observing attending and the final list will be submitted to the Program Director for review.

D. Assessment methods
2. Didactic lecture attendance documentation.
3. Interdisciplinary conference attendance documentation, at least 2/week.
4. Fellows learning portfolio to include procedure log.
5. Biannual tabulation of dictated fluoroscopic cases.
6. Faculty evaluation of UGI, VCUG, contrast enema.
7. Direct observation.

4. Neuroradiology (4 weeks)

A. Goals.
The fellow will be confident in the protocoling, review and interpretation of studies relating to the brain, spine, and head/neck. Involvement in neuro-interventional cases will be encouraged. The fellow will know the indications and advantages of different modalities including; CT, MR, and US (see ultrasound section). The fellow will gain knowledge of advanced imaging techniques such as diffusion tensor imaging, MR spectroscopy, and other functional MR techniques.
B. Competencies.
1. Be able to interact in a professional manner with the imaging technologists.
2. Know the appropriate imaging workup of common neurologic and head/neck conditions.
3. The fellow will be able to protocol studies for common indications (Epic).
4. The fellow will be able to modify a CT exam to maximize diagnostic yield and minimize radiation dose.
5. The fellow will review studies prior to the patient leaving the department, to assess images for quality and completeness.
6. Appropriate indications for CT and MR contrast administration will be known by the fellow.
7. The fellow will be knowledgeable of common neurologic diseases including; congenital, metabolic, traumatic, neoplastic, and infectious etiologies.
8. The fellow will be knowledgeable of common diseases involving the spine including; congenital, traumatic, neoplastic and infectious etiologies.
9. The fellow will be knowledgeable of routine pathologies referred by the pediatric otolaryngologist including; infection, congenital, and neoplastic etiologies.
11. Knowledge of the indications for conventional spinal and cerebral angiography.
12. Ability to perform 2D and 3D reconstruction using advanced imaging software (PACs).
13. The fellow will be able to provide consultation to Neurologists, Neurosurgeons and other physician in a professional manner. The fellow should know the limitations of his or her knowledge and seek advice from the assigned attending when needed.
14. The fellow will become comfortable presenting in a group setting to a multidisciplinary team.

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. Exposure to neuroimaging studies of patients in the inpatient and outpatient settings.
3. The fellow will be involved in protocoling (Epic), reviewing and dictating studies with progression toward autonomy by rotation end.
4. Neuro-interventional studies will be observed by the fellow. The fellow will check schedule (Virginia) the day before for pertinent IR cases.
5. Involvement in neuro-interventional cases with the fellow obtaining informed consent.
6. The fellow will be sensitive and interact professionally with the technologist, parent, and patient.
7. The fellow will observe time out procedure as well as sanitary guidelines.
8. The fellow will attend and present at Neurology and Neuro-oncology conferences (interdisciplinary and multidisciplinary respectively).
9. The fellow will act as a consultant to clinical services desiring additional information and review of neuroimaging studies.
10. The fellow will be exposed to multiple modalities and learn how to apply them to neurologic and head and neck pathologies.
11. The fellow will be actively involved in using advanced imaging software.
12. The fellow will be involved in advanced functional MR cases and develop an understanding of indications as well as basic interpretation and limitations.
13. Critical and urgent findings will be communicated to the referring clinician clearly, concisely, and in a professional manner.
14. The fellow will read chapters on congenital brain malformation, toxic ischemic insults, tumors, and infections in Pediatric Neuroimaging by Barkovich.
D. Assessment methods.
2. Didactic lecture attendance documentation.
4. Fellows learning portfolio to include procedure log.
5. Biannual tabulation of neuroradiology studies dictated.
6. Direct observation.

5. Ultrasound, Emergency radiology (5 weeks)

Ultrasound
A. Goals.
The fellow will become more confident in the performance of ultrasonography in the pediatric patient though direct scanning and observation. The fellow by the end of the rotation will know the uses and advantages of ultrasound evaluation of the pediatric extremities, head, spine, abdomen, and chest.

B. Competencies.
1. Ability to demonstrate professional behavior when interacting with the patient/parent and sonographer.
2. Knowledge of basic ultrasound techniques as well as appropriate transducer selection.
3. Ability to overscan after the technologist in order to answer specific questions.
4. Ability to review ultrasound exams for completeness prior to patient departure.
5. Knowledge of ultrasound protocols and necessary images for ultrasound diagnosis.
6. Involvement in ultrasound biopsy and drainage procedures including obtaining informed consent.
7. Ability to use ultrasound to guide other clinicians in biopsy and drainage procedures.
8. Knowledge of the sonographic normal appearance of the pediatric head, abdomen and extremities.
9. Knowledge of scanning and diagnosis of common pediatric diseases using ultrasound including; developmental hip dysplasia, cord tethering, hydronephrosis, GU anomalies, intussusception, ovarian/testicular torsion, and abdominal masses.
10. Knowledge of ultrasound scanning and findings in renal and liver transplant patients.
11. Knowledge of head ultrasound scanning techniques, imaging findings, and limitations in the neonatal and pediatric patient.

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. Observe and scan on as many patients as possible.
3. The fellow will become comfortable in scanning to evaluate for hip effusion, hip dysplasia, hypertrophic pyloric stenosis, and appendicitis.
4. The fellow will be able to perform a head ultrasound with appropriate imaging planes.
5. The fellow will review all ultrasound studies with the technologist for completeness and quality, review with attending assigned to ultrasound and then dictate.
6. If needed, the fellow will obtain additional clinical information from the medical record or by directly contacting the referring clinician.
7. The fellow will be involved in all ultrasound directed biopsies and drainages including informed consent.
8. The fellow will attend at least 2 inter/multidisciplinary conferences per week including; pediatric surgery, liver transplant, echocardiography, and GI conference.
9. Critical and urgent findings will be communicated to the referring clinician clearly, concisely, and in a professional manner.

D. Assessment methods.
1. Global evaluation
2. Didactic lecture attendance documentation.
3. Inter - multidisciplinary conference attendance documentation (see above).
4. Fellows learning portfolio to include procedure log.
5. Biannual tabulation of ultrasound studies dictated.
7. Direct observation

Emergency Radiology

A. Goals.
The fellow will be exposed and have knowledge of the use and limitations of radiographs in the pediatric emergency patient. At the end of the rotation, the fellow will be able to diagnose using radiography of the skull, spine, chest, abdomen and extremities.

B. Competencies.
1. Ability to interact in a professional manner with the emergency room personnel.
2. Knowledge of critical results and the ability to document such results in the radiology report.
3. Knowledge of radiation reduction techniques including appropriate shielding and collimation.
4. Knowledge of appropriate radiographic views that should be obtained in the emergency room setting.
5. Knowledge of classic pediatric fractures and the ability to determine if additional imaging is required (CT/MR).
6. Knowledge of imaging findings concerning for osteomyelitis.
7. Knowledge of radiographic interpretation of the pediatric chest including normal thymus, infections, congenital abnormalities.
8. Know the findings suggestive a mediastinal mass and be aware of potential dangers in sedating such a patient.
9. Know the radiographic appearance of abdominal pathologies presenting though the emergency department including appendicitis, intussusception, masses, and obstruction.
10. Knowledge of the common causes of gastrointestinal bleeding and obstruction with the ability to suggest further imaging evaluation.

C. Objectives.
1. Positive interaction with emergency department personnel including; attending physicians, physicians in training, nurse practitioners, nurses, as well as ancillary staff.
2. Direct the appropriate imaging evaluation of the emergency room patient.
3. The fellow will consult with physicians from the emergency room with attending supervision.
4. The fellow will preview, offer preliminary findings, review with staff, and dictate radiographs from the emergency room.
5. The fellow will attend at least 2 inter/multidisciplinary conferences per week including; trauma conference and morning report.
6. The fellow will concentrate on emergency cases when on call.
7. Critical and urgent findings will be communicated to the referring clinician clearly, concisely, and in a professional manner.
D. Assessment methods.
2. Didactic lecture attendance documentation.
3. Inter-multidisciplinary conference attendance documentation (see above).
4. Biannual tabulation of the number of radiographs dictated.
5. Direct observation.

6. Nuclear Medicine and NICU/ICU (4 weeks)

Nuclear Medicine
A. Goals
The fellow will become confident in the evaluation and interpretation of Nuclear imaging studies in the pediatric population. Dose considerations unique to the pediatric population will be learned.

B. Competencies.
1. Ability to interact in a professional manner when interacting with the Nuclear Medicine technologists.
2. The ability to provide quality Nuclear Medicine exams to the pediatric population.
3. The ability to tailor an examination to minimize dose and maximize clinical utility.
4. Knowledge of Nuclear Medicine studies used in the evaluation of tumors, infection, urinary tract abnormalities, neonatal and childhood jaundice and traumatic lesions in the pediatric population with specific reference to the utility of Nuclear Medicine.
5. Understand the indications for Nuclear Medicine studies in pediatric patients.
6. Knowledge of advanced PET-CT techniques and use in tumor diagnosis and monitoring.
7. Knowledge of normal distribution of Nuclear Medicine radioisotopes including; bone scan, MIBG exam, Neuro and body PET-CT.
8. Knowledge of causes and grading of urinary obstruction, abnormal gastric emptying, and biliary obstruction, GI bleeding, fever, bone pain and seizures in the child.

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. Positive and knowledgeable interaction with the attending radiologist, other trainees, technologist, and patient.
3. If needed, the fellow will protocol studies to answer pertinent clinical concerns.
4. The fellow will be able to manipulate images to improve diagnostic quality, both on the PACS and in the Nuclear Medicine suite.
5. The fellow will review and dictate all Nuclear Medicine studies.
6. The fellow will consult with pertinent services concerning suggestions for potential studies and reviewing results.
7. The fellow will attend at least 2 inter-multidisciplinary conferences per week including; hematology oncology and surgery.

D. Assessment methods.
2. Interdisciplinary conference attendance documentation (see above).
3. Biannual tabulation of the number of Nuclear Medicine studies dictated.
4. Direct observation.
NICU/ICU

A. Goals (NICU/ICU).
The fellow will become proficient in evaluation of radiographs of newborns and ICU patients. In addition, the fellow will gain knowledge of normal and abnormal neonatal ultrasound exams.

B. Competencies.
1. Ability to interact in a professional manner when interacting with ultrasound/radiographers, ICU staff, and attending physicians.
2. Knowledge of appropriate shielding and collimation for ICU radiographs.
3. Knowledge of the normal appearance of supportive lines and tubes.
4. The ability to recognize emergent condition including; pneumothorax, pneumomediastinum and pneumoperitonium.
5. Knowledge of the normal appearance of the chest and abdomen at different ages.
6. Knowledge of common disease processes and their radiographic appearance that involve the chest including; neonatal pneumonia, surfactant deficiency, congenital pulmonary malformations, and diaphragmatic hernia.
7. Knowledge of common disease processes and their radiographic appearance that involve the abdomen including; bowel obstruction in the newborn and child, necrotizing enterocolitis, anterior abdominal wall defects, malrotation, and masses.
8. Ability to independently scan as well as over-scan ultrasounds performed in the NICU.
9. Knowledge of normal appearance of the developing brain on ultrasound.
10. Knowledge of the appearance of intracranial hemorrhage, ischemia, thalamic vasculopathy, vascular anomalies, and cerebral dysgenesis on ultrasound.
11. The ability to provide consultation to the intensive care team in small and large group settings.

C. Objectives.
1. The fellow will actively seek ICU radiographs to preview, review with staff and dictate.
2. The fellow will go the NICU at Parkland to preview, review with staff and dictated all radiographs and neonatal ultrasounds.
3. The fellow will act as a consultant to the ICU staff.
4. The fellow will progress from observing NICU rounds to running rounds with all questions directed toward the fellow.
5. The fellow will have the opportunity to over-scan NICU patients receiving ultrasound studies.
6. The fellow will attend at least 2 inter/multidisciplinary conferences per week.
7. The fellow will communicate all critical results to the ICU team.

D. Assessment methods.
2. Interdisciplinary conference attendance documentation (see above).
3. Biannual tabulation of the number radiographs dictated.
4. Direct observation of supervision of clinical rounds.
7. Fetal MR (2 weeks, 1 day per week for 2 months)

A. Goals.
The fellow will learn how to protocol and actively monitor fetal MR studies. Knowledge of normal anatomy, common indications and pathology will be gained during the rotation.

B. Competencies.
1. Knowledge of indications for performing a fetal MR study.
2. Knowledge of appropriate sequences to be obtained during the procedure.
3. The ability to interact with the MR technologist in a professional manner and to communicate to the technologist necessary imaging planes and sequences required.
4. The ability to interact with the patient and family to explain imaging results.
5. The ability to consult with Maternal Fetal Medicine physicians in both small groups and large multidisciplinary settings.
6. Knowledge of normal anatomy and appearance of the fetus at different stages of maturation.
7. Knowledge of common neurologic abnormalities encountered in the fetus and fetal MR appearance including; Chiari II malformations, fetal ventriculomegaly, cerebral dysgenesis, vascular anomalies, as well as congenital spinal disorders.
8. Knowledge of common abnormalities of the neck, abdomen, and chest encountered in the fetus and fetal MR appearance including; congenital pulmonary malformations, diaphragmatic hernia, GI atresias, anterior abdominal wall defects as well as the maternal placenta.
9. Knowledge of potential surgical implications and need for tertiary care referral in select patients.

C. Objectives.
1. The fellow will arrive at no later than 8:30 am to the Meadows MR suite and check in with the attending radiologist. The fellow will be free to return to Children’s once studies are complete.
2. Positive and knowledgeable interaction with the attending radiologist, other trainees, technologist, and patient.
3. The fellow will review the relevant clinical information prior to the fetal MR being performed.
4. The fellow will be actively involved in protociling and reviewing the study with the attending physician.
5. The fellow will be involved in interacting with the patient after completion of the fetal MR study.
6. The fellow will be involved in consultation with referring physicians (Maternal Fetal Medicine).
7. The fellow will attend a monthly multidisciplinary meeting on the 2nd Wednesday of the month from 4-5pm (D3 at Children’s).
8. While on the rotation, the fellow will keep a procedure log of the cases observed and/or dictated (HIPAA compliant).

D. Assessment methods.
2. Interdisciplinary conference attendance documentation (see above).
3. Fellows learning portfolio to include procedure log.
4. Direct observation.
8. Interventional Radiology (throughout year and elective)

A. Goals.
The fellow will become proficient performing basic pediatric interventional procedures.

B. Competencies.
1. The ability to obtain informed consent.
2. Ability to behave in a professional manner when interacting with the patient, parent and technologists.
5. The ability to determine the need for anesthesia in pediatric patients.
6. The ability to perform pediatric interventional procedures including; soft tissue biopsy, organ biopsy, aspiration/drainage, paracentesis, and PIC line placement.
7. Knowledge and ability to use ultrasound and CT as a guidance modality.

C. Objectives.
1. Check in with the assigned attending to review expectations and necessary supervision.
2. The fellow will be actively involved in all interventional cases, obtaining informed consent and assisting in the procedure (Virginia Shaw contact).
3. Positive and knowledgeable interaction with the attending radiologist, interventional technologist, and patient/parent.
4. The fellow will be involved as a consultant to assess requests for interventional procedures.
5. The fellow will attend inter-multidisciplinary conferences including; liver transplant, urology and surgery.
6. The fellow will follow patients in the post-procedure period for potential complications.

D. Assessment methods.
1. Rotation evaluation by attending physician.
2. Interdisciplinary conference attendance documentation (see above).
3. Fellows learning portfolio to include procedure log.
4. Direct observation.
ACKNOWLEDGEMENT:

I have read and understand the goals and objectives of the UT Southwestern / Children’s Medical Center Dallas Pediatric Radiology Fellowship Program.

I have / have not (circle) had an opportunity to discuss issues and concerns with the appropriate faculty or staff.

_____________________________________   _________________
Signature        Date

_____________________________________
Printed Name