MedStar Georgetown University Hospital

MGUH Radiology Resident Rotation in Pediatric Radiology

The overall goal of the residents' educational experience is to endow the trainee with the knowledge, skill, and toolset necessary to appropriately diagnose and manage the vast array of commonly encountered diseases and conditions in the pediatric population. This plethora of subject matter will be covered among several formats, including resident lectures, conferences, and case reviews, daily read-out sessions, and self-directed learning efforts (e.g. independent reading, completion of various online modules, and board exam preparation). The educational experience is also further enhanced by both on-site rotations at MGUH, along with away-rotations through our partnership with Children's National Medical Center. Our ultimate goal is to cultivate a competent general radiologist capable of handling the diagnostic challenge of performing & interpreting pediatric studies in the real world.

Rotation Structure

Each resident will have a total of 3 pediatric radiology rotations during their residency. The first rotation is held during 1st year and is on-site at MGUH. The 2nd and 3rd rotations are off-site at our affiliate institution, Children's National Medical Center, which will provide additional goals, objectives, and rotation materials separately for residents to review.

General Objectives

- Learn the fundamentals of normal anatomy, normal development, and recognize normal variation(s) to distinguish these from pathology
- Learn common and uncommon pediatric disorders/illnesses, and appreciate their imaging manifestations, clinical implications, and management
- Generate value-driven reports & provide appropriate differential diagnoses
- Develop competence in the performance of pediatric fluoroscopic studies
- Develop competence in the sonographic evaluation of children, including hands-on scanning for pediatric-specific exams
- Understand basic concepts of radiation safety and adhere to the concepts and principles of the Image Gently campaign and ALARA
- Apply evidence-based guidelines and appropriateness criteria (such as those outlined by the ACR) towards the optimal selection and execution of radiologic studies in children, adolescents, and young adults
- Gain proficiency in appropriate protocoling of pediatric radiologic studies
- Understand and select appropriate contrast media agents used in imaging studies
- Understand proper management of adverse events, contrast reactions & their prophylaxis
- Cultivate and promote a culture of tolerance with appreciation of diversity
- Develop communication skills to appropriately obtain informed consent or discuss studies and findings with patients and/or their families
- Promote the general well-being of pediatric patients
- Develop skills in professionalism and meet milestone career development goals
- Use EMR and other electronic resources (AMBRA, CRISP, etc.) to integrate patient data and enhance the diagnostic utility interpreted radiologic studies

The specific goals include objectives required for every level of training with graduated levels of supervision and responsibility. During each rotation, each resident is expected to read the required literature and to use self-directed learning tools such as StatDX and RadPrimer. Initially, the resident will be expected to develop a strong knowledge of normal radiographic anatomy and basic disease processes but is expected over time to become progressively more knowledgeable about the developmental and acquired disease processes of the newborn, infant, child, and adolescent. The resident will also become more adept at discerning abnormal findings and interpreting the abnormalities to generate a concise, logical report with a defined differential diagnosis. The resident will demonstrate increasing knowledge about disease entities, from clinical presentation, radiographic appearance, and treatment options. The progress of the resident will be evaluated at the end of each clinical rotation. The objectives and goals are intended to be accomplished across the entire residency experience, including CNMC rotations.

Resident Responsibilities & Expectations

1. Resident participation is mandatory in daily department didactics (7:30 am and 12:00 pm) and in certain other department-specific meetings.
2. Residents are expected to arrive to the reading room for clinical service by 8:30 am. The workday ends at 5:00 pm.
3. Residents should be aware of scheduled pediatric cases anticipated for the day, specifically for any fluoroscopic studies and cross-sectional imaging exams; the resident should be aware of the relevant clinical histories and prior studies as they pertain to those cases for the day. A general understanding of the fluoroscopic study and its performance/technique should also be appreciated prior to the procedure.
4. Residents are responsible for dictating reports on all studies and procedures with which they are involved.
5. When appropriate, residents are expected to convey preliminary reports and pertinent findings to the referring physician for stat and ED exams.
6. When reviewing cases, the resident should be aware of clinical history and prior studies, incorporating relevant information from the EMR
7. Residents must acquire knowledge of radiation protection and ways to reduce radiation exposure to both patients and hospital personnel. The resident will be supervised to assure that safe practices are followed.
8. Residents are expected to be available for consultation (either by phone or in person) from clinical services, except during resident conference, during which attendings will cover.
9. Resident review of cases with supervising faculty should occur as many times in the day (or at reasonable intervals) as fit to keep an efficient workflow.
10. Residents must become proficient at detecting abnormalities demonstrated by plain films and cross-sectional exams and be able to generate meaningful differential diagnoses.
11. Residents are expected to be proactive with protocols. Residents must be able to properly protocol studies depending on what was ordered. If clarification is needed on an order, then the resident will discuss and clarify the order with the referring physician.
12. Residents should assist in teaching medical students & will give medical student lecture(s).
13. Residents should field calls from technologists regarding QA of US, CT, and MRI studies.

Supervising Faculty Responsibilities:

1. Will be available at all times for any questions or consultations needed by the resident and will integrate relevant teaching points into case read-outs.
2. Will supervise pediatric fluoroscopic procedures.
3. Will make every effort to review all cases with the resident by the end of the day.
4. Will provide the resident with constructive feedback in any problem areas and provide recommendations for improvement, as appropriate, during the rotation.
5. Will verify and attest any drafted/preliminary resident reports signed to them within 24 hours and notify residents of any major changes.
6. Will ensure residents get their protected learning time allotted by resident conference.

Schedule Expectations

- All residents are expected to show up on time. If they foresee that they are going to be late or have an unforeseen reason that they cannot work for the day, for whatever reason, they must call *both* the reading room to inform an attending in the reading room (46440) and inform Charlene Nebel, residency program coordinator.
- All residents are expected to stay until day's end at 5 pm, unless granted permission from an attending on service to leave early.
- No greater than 5 days may be spent from the resident FLEX vacation to take time-off from service during the rotation.

Independent Learning

Residents will be expected to invest effort towards independent learning, including self-directed preparation for their ACR in-service examinations and ABR Core Exam. Recommended reading will be provided to the resident and online materials will be suggested (for specifics, please refer to the course website, web link provided below). As a general guideline, the resident should spend 1 to 2 hours reading each day during after-hours, outside the workday.

Web-based Resources

Residents will have access to a course website containing useful links, articles, and online educational content, along with suggested reading materials and general guidelines regarding the rotation. The website may be accessed via the following link:

http://pedrad.georgetown.domains

Online learning modules are incorporated on the website and should be completed by the resident. Protected resources are also available on the website including practice exams, a pre-call test, and mock board exam; individual login details will be provided for each resident.

Practical Examinations

Several formative quizzes and exams have been painstakingly created to test resident knowledge, specific to pediatric radiology. These include:

[1st year] Resident quiz (online platform 60 MCQ at the end of the 1st year rotation)
[1st year] Pediatric Radiology Call Quiz (online platform, 40 cases, freehand response)
[2nd year] Oral board exam (25 cases, ppt format)
[3rd year] Mock board exam (online platform, 185 MCQ, given prior to CORE exam)

Participation and completion of these quizzes is expected. Residents will receive a score report, detailed feedback, and will have individual versus group sessions to review answers/rationales.

Resident Passport

A passport has been devised (see below) with an inventory of pediatric-specific imaging studies and procedures with which residents should become familiar. Residents should try their best to at least observe each of these exams and garner an appreciation of proper technique for these studies. The passport is a general guideline for the entire rotational experience including time at CNMC. If not completed in its entirety from real-world clinical work, the resident should then seek an understanding of these procedures through reading materials (or articles) or by virtual means.

PEDIATRIC RADIOLOGY --- RESIDENT PASSPORT

Resident Name: _____

FLUOROSCOPY	SEE ONE	DO ONE
Modified Barium Swallow		
Tube Check study		
ND Placement		
Esophagram		
Upper GI series		
Contrast Enema		
Air-Reduction Enema		
Fistulogram		
Male VCUG		
Female VCUG		
Airway study		

ULTRASOUND	SEE ONE	DO ONE
Intussusception		
Pyloric stenosis		
Infant spine		
Hip DDH (infant)		
Hip Effusion (child)		
Appendicitis		
Head		
Pleural Effusion		
Diaphragm study		

Remediation

On occasion, residents may be required to spend extra time on rotation for remediation purposes when any deficiencies arise in their performance on rotation or from in-service exams. In addition to extra time on clinical service, supplemental reading assignments and additional testing material may be used to facilitate remediation.

Specific Pediatric Diagnoses and Conditions

The following outline incorporates some of the basic and advanced pediatric illnesses and conditions that residents must recognize and skillfully diagnose. This list does not cover the entire spectrum of disease processes that residents must understand.

Recognizing appearance and understanding normal positioning of basic support lines and tubes
Pneumothorax, pneumomediastinum, and pneumoperitoneum
Child abuse (skeletal manifestations, abdominal trauma, abusive head injuries)
Common pediatric accidental skeletal trauma
Salter Harris fractures
Avascular necrosis, including acquired and idiopathic forms/osteochondroses
Osteomyelitis
Scoliosis
Developmental dysplasia of the hip
Transient synovitis vs. septic arthritis
Langerhaan Cell Histiocytosis
Sarcomas of childhood and adolescence (rhabdomyosarcoma, Ewing, osteosarcoma)
Skeletal dysplasias, including achondroplasia, spondyloepiphyseal dysplasia, and lethal dysplasias
Rickets
Wilm's Tumor
Nephroblastomatosis
Hydronephrosis
Vesicoureteral reflux disease
Congenital renal anomalies including MCDK
Testicular torsion, epididymitis, and other acute scrotum
Ovarian torsion and other acute pelvis
Uterine anomalies
Neuroblastoma
Hepatoblastoma
Budd Chiari syndrome
Disorders of the biliary tree, including biliary atresia and choledochal cyst
Pancreatic disorders in children, including pancreatic divisum
Malrotation
Esophageal atresia
Intestinal atresias
Pyloric stenosis
Hirschsprung disease

Meconium plug syndrome
Meconium ileus
Intussusception
Appendicitis
Meckel's diverticulum
Inflammatory bowel disease
Respiratory distress syndrome
Meconium aspiration syndrome
Germinal matrix hemorrhage
Necrotizing enterocolitis
Foregut duplication cysts and bronchogenic cysts
Congenital pulmonary airway malformations
Sequestration
Congenital lobar emphysema
Pulmonary sling
Aberrant subclavian artery and other aortic arch variants
Round pneumonia
Atelectasis
Epiglottits
Croup
Bronchiolitis
Retropharyngeal abscess
Foreign body aspiration
Normal thymus vs. anterior mediastinal masses
Congenital heart disease, including cardiac shunts
Branchial cleft cyst
Thyroglossal duct cyst
Hydrocephalus
Disorders of the temporal bone and middle ear anomalies, including incomplete partition
Structural abnormalities of brain development
Normal brain myelination and distinction from dysmyelination syndromes
Chiari malformations
Work-up of pediatric seizure
Mastoiditis
Sinus disease
Pediatric brain tumors
ADEM and other polyneuropathies
Spinal disorders, including cord tethering syndrome
Lymphoma and post-transplant lymphoproliferative disorder
Congenital and infantile hemangioma
Arteriovenous malformations
Lymphatic / venolymphatic malformations
Neurophakamatoses (neurofibromatosis, tuberous sclerosis)

Educational Goals and Objectives – First Year Residents (First Rotation)

Patient Care:

- Uses established evidence-based imaging guidelines such as ACR Appropriateness Criteria.
- Appropriately uses EMR to obtain relevant clinical information (Amalga, Centricity, Aria)
- Adequately explain each examination to the patient in order to ensure that the patient feels comfortable and to provide patient care that is compassionate, appropriate, and effective.
- Aware of basic principles of radiation protection in order to reduce as much as possible the radiation dose to the patient and reduce exposure to healthcare providers.
- Familiar with Image Wisely, Image Gently and takes pledge.
- Demonstrate ability to recommend imaging studies as appropriate to better assess findings on pediatric imaging studies.
- Learns to obtain informed consent for pediatric studies.
- Observes and then performs, with assistance, pediatric fluoroscopic examinations.

Medical Knowledge:

- Understands normal/abnormal anatomy on imaging studies:
    - Normal/abnormal airways on chest x-ray
    - Normal/abnormal skeletal structures
    - Establish bone age on the basis of radiographic findings
    - Identify all support lines and correctly identify their positions
    - Identify abnormalities associated with congenital heart disease on chest x-ray
    - Understand and identify cranio-spinal trauma on x-ray.
    - Understand and explain the indications for both upper and lower GI studies.
    - Understand and explain the indications for various GI and GU procedures and when to recommend alternative procedures (i.e. nuclear medicine examinations)
- Recognize the more common abnormalities encountered in pediatric radiology.
- Develop a knowledge of the differential diagnoses of the more commonly encountered abnormalities.
- Demonstrate the ability to recognize and describe common medical conditions depicted on imaging studies
- Able to appropriately protocol studies with assistance from an attending or senior resident. If clarification is needed, the resident will discuss the order with the referring physician.

Professionalism:

- Demonstrate altruism (putting the interests of patients and others above own self-interest).
- Demonstrate compassion: be understanding and respectful of the patients, patient families, and staff and physicians caring for patients.
- Be honest with patients and all members of the health care team.
- Interact with others without discriminating on the basis of religious, ethnic, sexual or educational differences and without employing sexual or other types of harassment.
- Demonstrate positive work habits, including punctuality and professional appearance. Fulfills work-related responsibilities.

- Demonstrate principles of confidentiality with all information transmitted during a patient encounter.
- Presents oneself as a professional in appearance, conduct, and communication.

Systems-Based Practice:

- Demonstrate the appropriate use of recommendations and follow-up imaging.
- Demonstrate knowledge of ACR appropriate criteria and cost effective imaging evaluation of common disorders.

Practice-Based Learning and Improvement:

- Recognized and manages contrast reactions.
- Describes the mechanisms of radiation injury and the ALARA concept (as low as reasonably achievable).
- Show evidence of independent study by using RadPrimer, statdx, textbooks, journal articles.
- Read about interesting studies that are encountered during the working day.
- Follow-up on interesting cases.
- Identify and learn from personal errors.
- Incorporate feedback into improved performance.

Monitoring and Assessing Resident Performance:

1. **Direct observation** – the resident's progress will be monitored by the faculty on the service on a daily basis.
2. **Global faculty evaluations** – at the end of each rotation, the resident will be evaluated by all attendings on that service. Any deficiencies or substandard performance will discussed privately with the resident
3. **Procedure competency evaluation** – Evaluations for the ability to obtain informed consent will be submitted by the appropriate supervising attending
4. **360 evaluations** – Evaluations from x-ray technologists will be obtained.
5. **Radiology Report Evaluation** – formal report evaluation of reports by Program Director may occur during the pediatric rotation.
6. **RadPrimer** – Achieve a score of at least 75% in the Basic Pediatric post-test Assessment.
7. **Image Wisely** – Must read the section on Pediatric CT and Image Wisely:
   http://www.imagewisely.org/Imaging-Professionals/Imaging-Physicians
8. **Image Wisely** – Must take the pledge.
9. **Cleveland Clinic Pediatric Radiology Module** – Lines/catheters and Radiation Safety modules.

Educational Goals and Objectives – Second Rotation at MGUH (optional)

The second rotation through Pediatric Radiology at Georgetown is an optional rotation after the resident spends two additional one-month rotations at Children's National Medical Center. Thus, in reality, this optional "second" rotation at Georgetown will be the fourth month that the resident spends in pediatric radiology. The expectations of the resident will reflect this.

Patient Care:

- Able to independently recommend imaging of uncommon pediatric conditions.
- Able to independently obtain informed consent for pediatric studies.
- Able to perform pediatric fluoroscopic studies under direct supervision.
- Appropriately uses EMR to obtain relevant clinical information (Amalga, Centricity, Aria)
- Adequately explain each examination to the patient in order to ensure that the patient feels comfortable and to provide patient care that is compassionate, appropriate, and effective.
- Puts into practice basic principles of radiation protection in order to reduce as much as possible the radiation dose to the patient and reduce exposure to healthcare providers.

Medical Knowledge:

- Able to independently protocol pediatric studies.
- Strong knowledge base regarding acute and chronic pediatric diseases, both acute and chronic.
- Identify pathology in order to interpret imaging studies with meaningful differential diagnoses.
- Increased familiarity with the more uncommon pediatric conditions.

Professionalism:

- Demonstrate altruism (putting the interests of patients and others above own self-interest).
- Demonstrate compassion: be understanding and respectful of the patients, patient families, and staff and physicians caring for patients.
- Be honest with patients and all members of the health care team.
- Interact with others without discriminating on the basis of religious, ethnic, sexual or educational differences and without employing sexual or other types of harassment.
- Demonstrate positive work habits, including punctuality and professional appearance. Fulfills work-related responsibilities.
- Demonstrate principles of confidentiality with all information transmitted during a patient encounter.
- Presents oneself as a professional in appearance, conduct, and communication.

Systems-Based Practice:

- Demonstrate the appropriate use of recommendations and follow-up imaging.
- Demonstrate knowledge of ACR appropriate criteria and cost effective imaging evaluation of common disorders.

Practice-Based Learning and Improvement:

- Recognized and manages contrast reactions.
- Describes the mechanisms of radiation injury and the ALARA concept (as low as reasonably achievable).
- Show evidence of independent study by using RadPrimer, statdx, textbooks, journal articles.
- Read about interesting studies that are encountered during the working day.
- Follow-up on interesting cases.
- Identify and learn from personal errors.
- Incorporate feedback into improved performance.

Monitoring and Assessing Resident Performance:

1. **Direct observation** – the resident's progress will be monitored by the faculty on the service on a daily basis.
2. **Global faculty evaluations** – at the end of each rotation, the resident will be evaluated by all attendings on that service. Any deficiencies or substandard performance will discussed privately with the resident.
3. **Procedure competency evaluation** – Evaluations for the ability to perform 3 pediatric fluoroscopic studies will be submitted by the appropriate supervising attending.
4. **360 evaluations** – Evaluations from x-ray technologists will be obtained.
5. **Radiology Report Evaluation** – formal report evaluation of reports by Program Director may occur during the pediatric rotation.
6. **RadPrimer** – Achieve a score of at least 75% in the Intermediate Pediatric post-test Assessment.