

# Resident Core Curriculum

## Pediatric Radiology

**General Goals:** The specific goals include objectives required for every level of training with graduated levels of supervision and responsibility. All aspects of pediatric radiology are incorporated into the residency. During every training rotation, the resident will read the required literature and study the teaching file in pediatric radiology. Over time, the resident will become progressively more knowledgeable about normal radiographic anatomy, physiology of organs, and the radiological appearances of diseases. In addition, the resident will demonstrate a progressively increasing understanding of disease entities, their clinical presentations, and current modes of treatment. Prior to the start of the rotation, the resident will have learned, at a minimum, the GI, GU, and MSK chapters of “The Fundamentals of Pediatric Radiology” by Lane Donnelly. By the end of the second week, the resident will have learned the chest and airway chapters as well.

### Resident Daily Work Responsibilities (OVERALL BENCHMARKS/OBJECTIVES for Self-Evaluation)

1. Residents assigned to pediatric radiology will be available for consultations by technologists, clinicians, and other health care providers, except during conference times, when the attending faculty will cover.
2. Resident questions will be referred to the supervising faculty covering pediatric radiology.
3. Resident review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient workflow.
4. All resident examinations will be dictated by the end of every working day.
5. Residents will check and sign his/her reports prior to final verification by supervising faculty.
6. Residents must be familiar with the operation of all imaging equipment.
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 will learn the techniques for performing high quality, state-of-the art diagnostic examinations throughout the body. Examinations will be checked before the patient leaves the department if requested to do so by the supervising faculty.
9. Residents must become proficient at detecting abnormalities demonstrated by plain films and contrast examinations and be able to generate meaningful differential diagnosis.
10. Residents will become knowledgeable about the use of different radiographic contrast agents (including their indications, contraindications, dosages, and side effects).
11. Residents will acquire an understanding of the proper preparation of patients for examinations and appropriate follow-up afterward. At the start of every working day, the resident will be familiar with the patient schedule and anticipate need for any procedures. The resident will check requisitions for the next working day to evaluate for appropriateness of the requested procedure or if additional exams/protocols need to be performed. Absent clinical indication or seemingly inappropriate requests will be clarified and discussed with the referring physician.
12. Residents will do in-depth reading and study, along with a review and creating of teaching file cases, to become knowledgeable about the normal anatomy and physiology of organs and the radiologic appearances of diseases, and gain a general understanding of the disease entities, their clinical presentations, and certain modes of treatment.

13. Residents will serve as a secondary consultant to referring physicians regarding pediatric radiology. This will strengthen the confidence of the resident in the very important role every radiologist must perform throughout his/her career as a consultant to clinicians.
14. Residents will become prepared to pass the certifying examination of the American Board of Radiology.
15. Residents will teach and share knowledge to medical students, radiologic technologist students, and junior residents.
16. Residents will participate in the preparation and presentation of imaging studies at the monthly Interesting Case Conference.

### **Supervising Faculty Responsibilities:**

1. Supervising faculty will be available at all times for any questions or consultations needed by the resident.
2. Supervising faculty will review all cases with the residents before the end of the day.
3. Supervising faculty will provide the resident with constructive feedback in any problem areas encountered during the rotation.
4. Supervising faculty will verify resident-generated reports in a timely manner and inform the resident of any major changes made.

### **Educational Goals and Objectives (First Year Residents):**

#### **Patient Care:**

- 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
- Familiarity with the operation of imaging equipment
- Aware of the 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
- Understand the indications for and contraindications to use of intravenous radiographic contrast, and be able to monitor its administration
- Recognize and treat reactions to intravenous contrast
- Understand the indications and contraindications to the different types of contrast, dosages, side effects, and the differences and relative merits of single and double contrast studies.
- Develop a knowledge of the preparation and aftercare required for the common examinations
- Use the PACS, voice recognition systems, and hospital information systems to become proficient in dictating reports of significant findings in a concise and clear manner
- Demonstrate the ability to recommend additional imaging studies as appropriate to better assess findings on pediatric imaging studies

#### **Medical Knowledge:**

- Become knowledgeable about the different contrast agents available and begin to recognize abnormalities that are demonstrated on plain radiographs and other imaging modalities
- List the risk factors for allergic reaction to intravenous contrast media
- State the proper assessment and treatment for allergic reactions to contrast media
- 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
- Review plain films, fluoroscopy images, and assist with ultrasound, CT, and MRI imaging studies

**Practice-Based Learning and Improvement:**

- Show evidence of independent study using textbooks from reading list
- Demonstrate appropriate follow up of interesting cases
- Research interesting cases as directed by faculty
- Identify, rectify, and learn from personal errors
- Incorporate feedback into improved performance
- Efficiently use electronic and print sources to access information

**Interpersonal and Communication Skills:**

- Communicate with the patient at all times during the examination to ensure that patient remains comfortable
- Communicate effectively with all members of the health care team (technologists, medical students, fellows, residents, allied health providers, support staff, and attending physicians/radiologists)
- Call results to the referring physicians and show ability to interact with referring physicians
- Interact with clinicians when reviewing cases involving radiographs and imaging studies and show ability to provide preliminary readings, follow up with attending radiologists, formulate a plan of complex cases, and communicate any changes to referring clinicians
- Assist with supervision and teaching of medical students as well as creating one medical student lecture and put on I:Drive, Shared Peds Radiology Folder
- Make five teaching file cases and put on I:Drive, Shared Peds Radiology Folder

**Professionalism:**

- Demonstrate respect for patients, families, and all members of the healthcare team and be able to discuss significant radiology findings
- Explain the impact of the radiology findings on patient care, including what imaging studies may/may not be appropriate
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic with regard to work assignments

**System-Based Practice:**

- Able and willing to participate in clinical conferences in which imaging studies are used to guide patient care/evaluations and be able to demonstrate understanding of how imaging relates to the clinical care of the patient
- Demonstrate knowledge of the ACR practice guidelines and technical standards for pediatric radiology
- Demonstrate knowledge of ACR appropriateness criteria and cost effective imaging evaluation of common disorders

- Show ability to interact with clinicians regarding cost effective and streamlined evaluation for differing clinical entities

## **Monitoring and Assessment of Resident Performance**

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined.

## **Educational Goals and Objectives (Second Year Residents):**

The objectives above as well as the following:

### **Patient Care:**

- Understand the physics of radiation protection and how to apply it to routine studies
- Obtain consent for more complex procedures and answer all questions the patient may have
- Develop a knowledge of the preparation and aftercare required for more complex procedures
- Continue to improve skills for performing radiographic examinations, and tailor examinations to answer all questions being asked by the clinician; anticipate those questions that should have been asked but were not
- Demonstrate knowledge of indications for the examinations requested (when the reason for the examination is not clear, the resident will effectively communicate with the patient and referring physician until clarified)
- Familiarity with available medical records and how to access them for the purposes of patient care
- Protocol cases, in consultation with the attending, to assure that the examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician
- Review all studies with the supervisor faculty attending
- Provide preliminary reports to all referring clinicians if needed before the final review of cases (when there is a significant discrepancy between the preliminary reading and final reading, the resident will notify the referring clinician immediately)

### **Medical Knowledge:**

- Recommend the appropriate study based on the clinical scenario and understand the relative strengths of each modality
- Familiarity with the anatomy of the organs examined in every case
- Familiarity with imaging findings of common acute and chronic pediatric diseases
- Identify pathology in order to interpret routine imaging studies with accuracy appropriateness to the level of training when presenting to the attending
- Distinguish between normal and abnormal anatomy to level of training when presenting to the attending

- Detect abnormalities while the imaging procedures are in progress, such as 1) disease recognition skills will continue to increase on plain radiographs and contrast studies, and 2) begin to develop meaningful differential diagnoses for the pathology that is found

### **Practice-Based Learning and Improvement:**

- Identify, rectify and learn from personal errors
- Incorporate feedback into improved performance
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources
- Follow up on abnormal or interesting cases through personal communication with the referring physician or patient medical records
- Competent in using PACS, voice recognition systems, and the patient information systems in the daily accomplishment of the workload and instruct others in their use

### **Interpersonal and Communication Skills:**

- Appropriately obtain informed consent
- Produce concise reports that include all relevant information
- Communicate effectively with all members of the healthcare team
- Communicate effectively the results of studies to referring clinicians whenever needed (for emergent studies, this will be accomplished in a timely manner)
- Effectively convey the findings of examinations through accurate dictation of reports
- Teach junior resident and medical students

### **Professionalism:**

- Demonstrate respect for patients and all members of the healthcare team (technologists, nurses, and other healthcare workers)
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic in regard to work assignments
- Explain the nature of the examination or findings in an examination to patients and their families when needed
- Observe ethical principles when recommending further work-up
- Promptness and availability at work are required of every resident
- Dress appropriately for work

### **Systems-Based Practice:**

- Demonstrate knowledge of ACR practice guidelines and technical standards for pediatric radiology
- Demonstrate knowledge of ACR appropriateness criteria and cost-effective imaging evaluation of pediatric radiology imaging studies
- Familiarity with departmental procedures, contrast safety, fluoroscopy safety, and sedation required in the performance of examinations
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Thorough dictations will be made with indications, techniques, findings, and conclusions
- Dictate and correct reports in a timely fashion to avoid delay in patient disposition

- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

## **Monitoring and Assessment of Resident Performance**

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined.

## **Educational Goals and Objectives (Third Year Residents):**

The above objectives as well as the following:

### **Patient Care:**

- Perfect diagnostic examination techniques and be very skilled and efficient in performing and interpreting all diagnostic procedures performed
- Demonstrate knowledge of indications for the examinations requested (when the reason for the examination is not clear, the resident will effectively communicate with the patient or referring physician until clarified)
- Familiarity with available medical records and how to access them for the purposes of patient care
- Protocol cases, in consultation with the attending, to assure that the examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician
- Review all studies with the supervising faculty attending
- Provide preliminary reports to all referring clinicians if needed before the final review of cases (when there is a significant discrepancy between the preliminary reading and final reading, the resident will notify the referring clinician immediately)

### **Medical Knowledge:**

- Relate the imaging findings to the clinical condition and its pathology
- Understand the clinical management of the conditions encountered
- Familiarity with the anatomy of the organs examined in every case
- Familiarity with imaging findings of common acute and chronic pediatric diseases
- Identify pathology in order to interpret imaging studies with accuracy appropriateness to the level of training when presenting to the attending
- Distinguish between normal and abnormal anatomy with excellent accuracy according to the level of training when presenting to the attending and demonstrate improvement compared to the prior rotation
- Proficient in detecting abnormalities on plain radiographs, fluoroscopic studies, and other imaging modalities while in progress
- Development of appropriate differential diagnostic lists will be well advanced

- Know the proper preparation of patients for diagnostic procedures and the appropriate follow-up afterwards
- Act as a consultant in pediatric radiology to the clinical services
- Obtain a broad understanding of pediatric diseases, their clinical features, radiographic manifestations, and current modes of treatment
- Review plain films, scan ultrasound patients, read and protocol CT, and assist with protocoling and reading of MRI

### **Practice-Based Learning and Improvement:**

- Identify, rectify, and learn from personal errors
- Incorporate feedback into improve performance
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources
- Follow up on abnormal or interesting cases through personal communication with the referring physician or patient medical records
- Competent in using PACS, voice recognition systems, and the patient information systems in the daily accomplishment of the workload and instruct others in their use

### **Interpersonal Skills:**

- Appropriately communicate results to patients and clinicians whenever needed (for emergent studies, this will be done in a timely manner)
- Produce concise reports that include all relevant information and be able to effectively convey the findings of examinations through accurate dictation of reports
- Communicate effectively with all members of the healthcare team
- Assist with supervision and teaching of medical students
- Make five teaching file cases and put on I:Drive, Shared Peds Radiology Folder

### **Professionalism:**

- Demonstrate respect for patients and all members of the healthcare team (technologists, nurses, and other healthcare workers)
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic in regard to work assignments
- Explain the nature of the examination of findings in an examination to patients and their families when needed
- Observe ethical principles when recommending further work-up for cases
- Promptness and availability at work are required of every resident
- Dress appropriately when reporting to work

### **Systems-Based Practice:**

- Demonstrate knowledge of ACR practice guidelines and technical standards for pediatric radiology
- Demonstrate knowledge of ACR appropriateness criteria and cost effective imaging practices
- Complete final preparations to pass the certifying examination of the American Board of Radiology

- Familiarity with departmental procedures, contrast safety, fluoroscopy safety, and sedation required in the performance of examinations
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Produce thorough dictations with indications, techniques, findings, and conclusions
- Dictate and correct reports in a timely fashion to avoid delay in patient disposition
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

## **Monitoring and Assessment of Resident Performance**

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined.

## **Reading List for Each Year**

### **First Year**

1. Lane F. Donnelly. *The Fundamentals of Pediatric Radiology*. Saunders, 1<sup>st</sup> Edition, 2001. (Note: Read before starting Pediatric Radiology)
2. Ralph Weissleder, Jack Wittenburg, Mukesh MGH Harisinghani, John W. Chen, Stephen E. Jones, Jay W. Patti. *Primer of Diagnostic Imaging*. Mosby, 4<sup>th</sup> Edition, 2006 (Know the pediatric differentials)
3. Johan G. Blickman. *Pediatric Radiology: The Requisites*. Mosby, 3<sup>rd</sup> Edition, 2009.

### **Second Year**

1. Lane F. Donnelly. *The Fundamentals of Pediatric Radiology*. Saunders, 1<sup>st</sup> Edition, 2001.
2. Ralph Weissleder, Jack Wittenburg, Mukesh MGH Harisinghani, John W. Chen, Stephen E. Jones, Jay W. Patti. *Primer of Diagnostic Imaging*. Mosby, 4<sup>th</sup> Edition, 2006 (Know the pediatric differentials)
3. Lane Donnelly, Blaise Jones, Sara O'Hara, Christopher Anton, Corning Benton, Sjirk Westra, Steven Kraus, Janet Strife, Bernadette Koch, Karin Hoeg. *Diagnostic Imaging: Pediatrics*. AMIRSYS, 1<sup>st</sup> Edition, 2005.

### **Third Year**

1. Lane F. Donnelly. *The Fundamentals of Pediatric Radiology*. Saunders, 1<sup>st</sup> Edition, 2001.

2. Ralph Weissleder, Jack Wittenburg, Mukesh MGH Harisinghani, John W. Chen, Stephen E. Jones, Jay W. Patti. *Primer of Diagnostic Imaging*. Mosby, 4<sup>th</sup> Edition, 2006 (Know the pediatric differentials)
3. Lane Donnelly, Blaise Jones, Sara O'Hara, Christopher Anton, Corning Benton, Sjirk Westra, Steven Kraus, Janet Strife, Bernadette Koch, Karin Hoeg. *Diagnostic Imaging: Pediatrics*. AMIRSYS, 1<sup>st</sup> Edition, 2005.

## **Other Requirements/Expectations**

### **Conferences**

- Wednesday at 8:30am in new conference room and West Pediatric Ward rounds
- Thursday at 9:00am in Moss Amphitheater Conference Room with Neuro attending and KCRC rounds
- Friday at 3:00pm in new conference room and Hem-Oncology rounds

**Updated 6/25/2009; Revised 2/10/2010**

## **PEDIATRIC RADIOLOGY: Summary of Expectations**

Welcome to pediatric radiology. Our primary goal is to provide excellent clinical service to our patients, their families and our referring clinicians, and our secondary goal is to provide a good learning environment. You are integral to the success of both goals. Below please find a brief summary of our expectations for you while on peds. Please remember you may only have two rotations in peds during your residency so it will be important for you to be an aggressive learner throughout both of your rotations. When there are two residents, one resident will assume the responsibilities of the junior resident and the other the responsibilities of the senior resident. When there is only one resident, you will assume the responsibilities of both the junior and senior residents. If it is your first rotation on peds, **we expect that at a minimum you will have learned the GI, GU, and MSK chapters of “The Fundamentals of Pediatric Radiology” by Lane Donnelly before starting on service.** By the end of your second week we expect you to know the chest and airway chapters as well. It is not possible to see all of the pediatric disorders in two short months so we feel self directed learning is essential. **Also please carefully proofread your dictations.**

The nominal hours of the rotation are 8am to 5pm M-F. During these hours (except when performing fluoroscopy cases, checking US's or CT's, or attending or giving conferences), you are expected to be in the Pediatric Reading Room to be available for prompt reading of ED and other early reading studies, and for consultation with clinicians who frequently call the reading room. Perhaps more than other services, we expect you to be familiar with the patient's prior studies and electronic medical record, and have a complete understanding of how the study you are reading relates to that patient's clinical care. If you are reading a study on a patient who has a disorder or syndrome with which you are not familiar, please take the time to look it up.

<b>Junior Resident</b>	<b>Senior Resident</b>
<p><b>Clinical Service</b></p> <p style="padding-left: 40px;">Plain films Fluoroscopy: please review all fluoro cases first thing in the morning Assist with US, CT, and MRI</p>	<p><b>Clinical Service</b></p> <p style="padding-left: 40px;">Plain films Ultrasound; Scan as much as possible to familiarize yourself with pediatric US CT: protocol and read. First thing in the morning, please review the prior studies of all patients scheduled for a CT and recheck to ensure they have been protocolled properly. MRI: Assist with protocoling, and reading</p>
<p><b>Conferences</b></p>	<p><b>Conferences</b></p> <p style="padding-left: 40px;">830 am W pediatric ward rounds in new conf room 9 am Th KCRC rounds in Moss with Neuro attending 3 pm F Hem-Onc rounds in new</p>

			conf room (Case lists for wards and Hem-Onc round should be provided by the clinical teams.)
<b>Teaching</b>	8-830 am M, T, W, F, teach medical students in new conf room Teach medical students on radiology	<b>Teaching</b>	Teach junior resident  Teach medical students on radiology
<b>Legacy</b>	Make 2 multiple choice teaching file cases per week-format is in the pediatric radiology shared folder on I drive Create one medical student lecture and put on I: drive, shared pediatric radiology folder	<b>Legacy</b>	Make 2 multiple choice teaching file cases per week-format is in the pediatric radiology shared folder on I drive
<b>Learning: Minimum</b>	Know the contents of “The Fundamentals of Pediatric Radiology” by Lane Donnelly Know the pediatric differentials from “Primer of Diagnostic Imaging” by Ralph Weissleder	<b>Learning: Minimum</b>	Know the contents of “The Fundamentals of Pediatric Radiology” by Lane Donnelly Know the pediatric differentials from “Primer of Diagnostic Imaging” by Ralph Weissleder
<b>Additional Learning Resources</b>	Online Learning Resources on I: drive shared pediatric radiology “The Requisites: Pediatric Radiology” Johan Blickman, et al “Diagnostic Imaging: Pediatrics” By Lane Donnelly	<b>Additional Learning Resources</b>	“Diagnostic Imaging: Pediatrics” By Lane Donnelly  Online Learning Resources on I: drive shared pediatric radiology