

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 and the pediatric cases in Rad Primer. 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 read, 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 read the chest and airway chapters, completing the text by the end of the third week of the first rotation

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 diagnoses.
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. 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 creation 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 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 core examination of the American Board of Radiology.
15. Residents will teach and share knowledge to medical students, radiologic technologist students, and junior residents.

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 and Technical Skills:

PCTS1: Consultant

- Demonstrate knowledge of the ACR practice guidelines and technical standards for pediatric radiology

PCTS2: Competence in Procedures

- Gain familiarity with the operation of imaging equipment
- Develop a knowledge of the preparation and aftercare required for the common examinations

Medical Knowledge:

MK1: Protocol Selection and Optimization of Images

- Demonstrate the ability to recommend additional imaging studies as appropriate to better assess findings on pediatric imaging studies
- Explain the impact of the radiology findings on patient care, including what imaging studies may/may not be appropriate

MK2: Interpretation of Examinations

- Become knowledgeable about the different contrast agents available and begin to recognize abnormalities that are demonstrated on plain radiographs and other imaging modalities
- 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

System-Based Practice:

SPB1: Quality Improvement (QI)

- Gain familiarity with departmental procedures, contrast safety, fluoroscopy safety, and sedation required in the performance of examinations
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

SPB2: Health Care Economics

- 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

Practice-Based Learning and Improvement:

PBLI1: Patient safety: contrast agents; radiation safety; MR safety; sedation

- Be 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
- List the risk factors for allergic reaction to intravenous contrast media
- State the proper assessment and treatment for allergic reactions to contrast media
- 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.

PBLI2: Self-Directed Learning

- Identify, rectify, and learn from personal errors
- Incorporate feedback into improved performance
- Show evidence of independent study using textbooks from reading list
- Demonstrate appropriate follow up of interesting cases
- Research interesting cases as directed by faculty
- Be 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
- Make five teaching file cases and put on I:Drive, Shared Peds Radiology Folder

Professionalism:

PROF1: Professional Values and Ethics

- Demonstrate respect for patients, families, and all members of the healthcare team and be able to discuss significant radiology findings

- 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

Interpersonal and Communication Skills:

ICS1: Effective Communication with Patients, Families, and Caregivers

- Communicate with the patient and families at all times during the examination to ensure that patient remains comfortable
- Adequately explain each examination to the patient and parents in order to ensure that the patient feels comfortable and to provide patient care that is compassionate, appropriate, and effective

ICS2: Effective Communication with Members of the Health Care Team

- 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
- 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
- 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
- Efficiently use electronic and print sources to access information
- 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

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. At the end of each rotation, the resident will receive a consensus evaluation of performance from faculty on service. 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. 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 for Year 1 above, as well as the following:

Patient Care and Technical Skills:

PCTS1: Consultants

- Gain familiarity with available medical records and how to access them for the purposes of patient care

- Demonstrate knowledge of ACR practice guidelines and technical standards for pediatric radiology

PCTS2: Competence in Procedures

- 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

Medical Knowledge:

MK1: Protocol Selection and Optimization of Images

- Recommend the appropriate study based on the clinical scenario and understand the relative strengths of each modality
- 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)
- 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

MK2: Interpretation of Examinations

- Gain familiarity with the anatomy of the organs examined in every case
- Gain familiarity with imaging findings of common acute and chronic pediatric diseases
- Identify pathology in order to interpret routine imaging studies with accuracy appropriate 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
- Review all studies with the supervising faculty attending

Systems-Based Practice:

SPB1: Quality Improvement (QI)

- Gain familiarity with departmental procedures, contrast safety, fluoroscopy safety, and sedation required in the performance of examinations
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

SPB2: Health Care Economics

- Demonstrate knowledge of ACR appropriateness criteria and cost-effective imaging evaluation of pediatric radiology imaging studies

Practice-Based Learning and Improvement:

PBLI1: Patient safety: contrast agents; radiation safety; MR safety; sedation

- Understand the physics of radiation protection and how to apply it to routine studies

PBLI2: Self-Directed Learning

- Identify, rectify and learn from readouts
- Incorporate feedback into improve performance
- Follow up on abnormal or interesting cases through personal communication with the referring physician and/or patient medical records
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources

Professionalism:

PROF1: Professional Values and Ethics

- 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
- Observe ethical principles when recommending further work-up
- Show promptness and availability at work are required of every resident
- Dress appropriately for work

Interpersonal and Communication Skills:

ICS1: Effective Communication with Patients, Families, and Caregivers

- Appropriately obtain informed consent
- Obtain consent for more complex procedures and answer all questions the patient may have
- Explain the nature of the examination or findings in an examination to patients and their families when needed

ICS2: Effective Communication with Members of the Health Care Team

- 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
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Be competent in using PACS, voice recognition systems, and the hospital patient information systems in the daily accomplishment of the workload and instruct others in their use
- 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
- 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)
- Teach junior resident and medical students

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. At the end of each rotation, the resident will receive a consensus evaluation of performance from faculty on service. 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. 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 from Years 1 and 2, as well as the following:

Patient Care and Technical Skills:

PCTS1: Consultant

- Demonstrate knowledge of ACR practice guidelines and technical standards for pediatric radiology
- Familiarity with available medical records and how to access them for the purposes of patient care
- Act as a consultant in pediatric radiology to the clinical services

PCTS2: Competence in Procedures

- Refine diagnostic examination techniques and be very skilled and efficient in performing and interpreting all diagnostic procedures performed
- Know the proper preparation of patients for diagnostic procedures and the appropriate follow-up afterwards

Medical Knowledge:

MK1: Protocol Selection and Optimization of Images

- Understand the clinical management of the conditions encountered
- 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)
- 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

MK2: Interpretation of Examinations

- Demonstrate familiarity with the anatomy of the organs examined in every case
- Demonstrate familiarity with imaging findings of common acute and chronic pediatric diseases
- Identify pathology in order to interpret imaging studies with accuracy appropriate 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
- Be proficient in detecting abnormalities on plain radiographs, fluoroscopic studies, and other imaging modalities while in progress
- Relate the imaging findings to the clinical condition and its pathology
- Development of appropriate differential diagnostic lists will be well advanced
- 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
- Review all studies with the supervising faculty attending

Systems-Based Practice:

SBP1: Quality Improvement (QI)

- Familiarity with departmental procedures, contrast safety, fluoroscopy safety, and sedation required in the performance of examinations
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

SBP2: Health Care Economics

- Demonstrate knowledge of ACR appropriateness criteria and cost effective imaging practices

Practice-Based Learning and Improvement:

PBLI2: Self-Directed Learning

- Identify, rectify, and learn from personal errors
- Incorporate feedback into improve performance
- Follow up on abnormal or interesting cases through personal communication with the referring physician or patient medical records
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources
- Complete final preparations to pass the core examination of the American Board of Radiology

Professionalism:

PROF1: Professional Values and Ethics

- 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
- 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

Interpersonal Skills:

ICS1: Effective Communication with Patients, Families, and Care Givers

- Explain the nature of the examination of findings in an examination to patients and their families when needed
- Appropriately communicate results to patients and clinicians whenever needed (for emergent studies, this will be done in a timely manner)

ICS2: Effective Communication with Members of the Health Care Team

- 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
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Produce thorough dictations with techniques, findings, and conclusions
- Dictate and correct reports in a timely fashion to avoid delay in patient disposition
- Be competent in using PACS, voice recognition systems, and the hospital patient information systems in the daily accomplishment of the workload and instruct others in their use
- 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)
- Assist with supervision and teaching of medical students and more junior residents

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. At the end of each rotation, the resident will receive a consensus evaluation of performance from faculty on service. 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. 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. *Fundamentals of Pediatric Imaging*. 2nd Edition, 2016.
2. Ralph Weissleder *Primer of Diagnostic Imaging*. 5th Edition, 2011 (Know the pediatric differentials)
3. Michele Walters. *Pediatric Radiology: The Requisites*. 4th Edition, 2009.
4. Rad Primer pediatric cases

Second Year

1. Lane F. Donnelly. *Fundamentals of Pediatric Radiology*. 2nd Edition, 2016.
2. Ralph Weissleder *Primer of Diagnostic Imaging*. 5th Edition, 2011 (Know the pediatric differentials)
3. Carlson Merrow. *Diagnostic Imaging: Pediatrics*. 2nd Edition, 2016.
4. Rad Primer pediatric cases

Third Year

1. Lane F. Donnelly. *Fundamentals of Pediatric Radiology*. 2nd Edition, 2016.
2. Ralph Weissleder *Primer of Diagnostic Imaging*. 5th Edition, 2011 (Know the pediatric differentials)
3. Carlson Merrow. *Diagnostic Imaging: Pediatrics*. 2nd Edition, 2016.
4. Rad Primer pediatric cases

Other Requirements/Expectations

Conferences

- Wednesday at 1:00pm General Pediatric Ward rounds, Blue Room
- Wednesday and Thursday 1:00pm Pediatric Medical Student rounds (they will join General Pediatric Ward rounds when held) Blue Room
- Friday at 3:00pm Hematology-Oncology rounds, Blue Room
- Thursday 4:00pm Pediatric Tumor Board (monthly), Cancer Center Conference Room
- Tuesday 4:00pm Pediatric Gastroenterology Conference (monthly), Blue Room
- Monday 4:00pm Pediatric Surgery Conference (monthly), Blue Room

Updated 6/25/2009; Revised 2/10/2010, Revised 3/12/2015, Revised 5/24/2017

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. By the end of the 3rd week, you should have completed this book. 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, CT, or MRI studies 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 high priority studies, and for consultation with clinicians who frequently call the reading room. You will also spend time in the Battle Building reading room, based on the structure of the day. 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.

Junior Resident	Senior Resident
<p>Clinical Service</p> <p style="text-align: center;">Plain films</p> <p style="text-align: center;">Fluoroscopy: please review all fluoro cases first thing in the morning</p> <p style="text-align: center;">Assist with US, CT, and MRI; Scan as much US as possible to familiarize yourself with pediatric US</p>	<p>Clinical Service</p> <p style="text-align: center;">Plain films</p> <p style="text-align: center;">Ultrasound; Scan as much as possible to familiarize yourself with pediatric US</p> <p style="text-align: center;">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.</p> <p style="text-align: center;">MRI: Assist with protocoling, and reading</p>

<p>Conferences</p> <p>1:00pm Wednesday and Thursday Medical Student rounds</p>	<p>Conferences</p> <p>1:00pm Wednesday pediatric ward rounds</p> <p>3:00 pm Friday Hem-Onc rounds</p> <p>(Case lists for wards and Hem-Onc round should be provided by the clinical teams.)</p> <p>3:00 pm Thursday Tumor Board (monthly)</p>
<p>Teaching</p> <p>Teach medical students and rotating residents on radiology</p>	<p>Teaching</p> <p>Teach junior resident</p> <p>Teach medical students and rotating residents on radiology</p>
<p>Learning: Minimum</p> <p>Know the contents of “Fundamentals of Pediatric Radiology” by Lane Donnelly</p> <p>Know the pediatric differentials from “Primer of Diagnostic Imaging” by Ralph Weissleder</p>	<p>Learning: Minimum</p> <p>Know the contents of “Fundamentals of Pediatric Radiology” by Lane Donnelly</p> <p>Know the pediatric differentials from “Primer of Diagnostic Imaging” by Ralph Weissleder</p>

<p>Additional Learning Resources</p> <p>Online Learning Resources on I: drive shared pediatric radiology</p> <p>“Diagnostic Imaging: Pediatrics” By Carlson Merrow</p> <p>Rad Primer peds cases</p>	<p>Additional Learning Resources</p> <p>“Diagnostic Imaging: Pediatrics” By Carlson Merrow</p> <p>Online Learning Resources on I: drive shared pediatric radiology</p> <p>Rad Primer peds cases</p>
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