

2.03 DIAGNOSTIC IMAGING

Introduction

Radiographic studies have become fully integrated into the daily practice of Pediatric Hospital Medicine, as the interpretation of a given image often plays a pivotal role in the management of a hospitalized child. With the explosion of imaging technology in the past three decades, clinicians are now faced with a myriad of possible studies from which to choose. The choices vary by setting, as availability and expertise with different imaging modalities can differ by institution and practice setting. More recently, there has been a greater appreciation of the potential impact of ionizing radiation when applied to young children. Judicious use of radiographic studies requires a collaborative, team-based approach, working closely with radiology and subspecialty colleagues to best utilize these powerful clinical tools. Knowledge of the studies locally available, selection of the optimal imaging modality, and interpretation of the most common radiographic studies remain critically important for pediatric hospitalists in any setting.

Knowledge

Pediatric hospitalists should be able to:

- Describe relevant human anatomy and relate this to interpretation of common plain radiographs of areas such as the chest, abdomen, airway, and long bones.
- Describe the indications and limitations of different radiographic modalities, including plain radiography, fluoroscopy, ultrasound, computed tomography, magnetic resonance imaging, and nuclear medicine.
- List the risks of ionizing radiation in children and review the concept of ALARA (as low as reasonably achievable) in limiting radiation exposure.
- Review the indications for, and benefits and risks of, oral and intravenous contrast.
- Review the indications for anxiolytics, sedation, and anesthesia relevant to age, developmental stage, and the procedure being performed.
- List the appropriate imaging study for common clinical presentations, such as acute respiratory distress, altered mental status, stridor, abdominal pain, and others.
- Compare and contrast the utility, risks, and costs of different imaging modalities for presentations of complicated pneumonia and acute abdominal pain.
- Discuss the impact of practice setting on the availability of pediatric radiological services.

Skills

Pediatric hospitalists should be able to:

- Choose the optimal study to answer a specific clinical question in a safe, cost-effective manner.
- Order radiologic studies, noting indications for the study, the clinical question to answer, sedation/anesthesia need, and other relevant information within the order.

- Perform initial interpretation of the most common radiographic studies in daily practice, such as plain radiographs of the chest and abdomen for children 0-18 years of age.
- Interpret radiographic studies to diagnose time-sensitive conditions, such as a pneumothorax, prior to review and interpretation by a radiologist.
- Integrate the results of radiographic studies into ongoing clinical care plans.
- Engage the radiologist and subspecialists as consultants in imaging decisions.
- Communicate effectively with nurses, trainees, radiologists, and sedation experts, to ensure safe and effective performance of radiographic studies.
- Communicate effectively with patients and the family/caregivers in order to address concerns regarding radiation exposure and risk.
- Communicate effectively with patient and the family/caregivers in order to provide basic teaching and understanding of results of radiographic images and the impact on the overall care plan.

Attitudes

Pediatric hospitalists should be able to:

- Recognize the radiologist as a consultant with whom to collaborate in decision-making.
- Appreciate the importance of collaborating with hospital staff, radiologists, and sedation and anesthesia experts, to ensure coordinated timing, planning, and performance of radiologic studies.
- Realize the value of effective communication with patients and the family/caregivers regarding the indications for, risks, benefits, alternatives, and steps involved in the radiologic procedure.
- Recognize the importance of obtaining results of all studies and reviewing images in a timely manner.

Systems Organization and Improvement

In order to improve efficiency and quality within their organizations, pediatric hospitalists should:

- Lead, coordinate, or participate in the development and implementation of cost-effective, safe, evidence-based standards for radiology services for children, ensuring that standards and protocols for minimizing ionizing radiation to children are in place.
- Lead, coordinate, or participate in development and implementation of a system to review the accuracy of readings for pediatric patients.
- Work with hospital administration to ensure that clinicians have appropriate and necessary access to key imaging modalities to practice at the standard of care.
- Collaborate with hospital administration and community partners to develop and sustain referral networks between local facilities and tertiary referral centers, so as to allow review of pediatric images between centers to benefit patient care.

- Work with hospital administration, subspecialists, and others to review acquisition of new technologies which are cost effective and positively impact patient care.

References

1. The Image Gently Alliance. 2014. <https://www.imagegently.org/>. Accessed August 23, 2019.
2. Donnelly, LF. *Fundamentals of Pediatric Imaging*, 2nd ed. Philadelphia, PA: Elsevier;2017.