

Communication of Radiograph Discrepancies between Radiology and Emergency Departments

ABSTRACT

A radiograph ordered in the emergency department (ED) may not be reviewed immediately by a radiologist for a number of reasons, including limited availability of radiology services after hours and the increasing demand on radiology services due to growing ED volume. In 2008, facilities submitted 195 reports to the Pennsylvania Patient Safety Authority identifying a discrepancy between an ED physician's preliminary radiograph finding and the results of a radiologist's final reading. Processes for communicating radiograph readings from the radiology department to the ED vary among facilities due to factors including the availability of radiology services during off hours and availability of technologic services such as picture archiving and communication systems. When discrepant interpretations occur between the preliminary reading by an ED physician and the final reading by a radiologist, communicating the radiologist's findings to the ED and patient for follow-up is essential to ensure that the patient has received appropriate care. This article examines risk reduction strategies, including standardization of systems for communicating and reconciling radiograph discrepancies between the radiology department and ED that will promote optimal patient care. (Pa Patient Saf Advis 2010 Mar;7[1]:18-22.)

Introduction

The number of emergency department (ED) visits in the United States increased substantially between 1995 and 2005, from 96.5 million to 115.3 million. Along with an increase in ED volume is an increase in radiologic examinations performed on ED patients.¹ According to the National Center for Health Statistics, in 2005, radiographic imaging was ordered in 43.7% of ED visits, representing at least 50.3 million radiographs performed that year.¹ A radiograph ordered in the ED may not be reviewed immediately by a radiologist for reasons including limited availability of radiology services after hours and the high demand on radiology services due to growing ED volume. Typically, unless an immediate consult is required, the radiologist reviews the radiograph and generates a final report within 24 hours.² A process must be in place so that, if there is a discrepancy between the ED physician's preliminary interpretation and the radiologist's subsequent interpretation, it is communicated to ED providers so that the patient will receive appropriate follow-up care. Processes for communicating the radiograph readings from the radiology department to the ED vary among facilities because of factors such as the availability of radiology services during off hours and availability

of technologic services (e.g., picture archiving and communication systems [PACS], electronic medical records [EMRs]). Accordingly, discrepancies may be handled by means such as electronic- and paper-tracking systems. Regardless of the method, consistent and reliable communication between the ED and the radiology department is essential to ensure timely and adequate follow-up of any discrepancy.

Clinical Literature

A review of the literature found that discordance between ED physician and radiologist interpretations of radiographs has been reported in a number of studies as ranging from 0.3% to 17%.³⁻⁶ The majority of studies focus on rates of discrepancies; however, few studies evaluate the clinical impact of discrepancies on patient care. Not all discrepancies have the same degree of clinical significance. A 2003 study comparing ED physician and senior radiologist interpretations of 509 chest radiographs investigated the effects of misinterpretation of chest radiographs on discharge recommendations.⁷ The study showed that, when classified by level of clinical significance (i.e., mild, moderate, high), the highest sensitivity of the ED physicians' interpretation (60%) was found in the group with highly significant clinical findings (e.g., consolidation, congestion, pleural effusion, mediastinal widening). While this study found that the missed findings were of a minor nature, another study found that follow up of ED radiographs detects clinically important abnormalities that may have been overlooked. During a six-month study period, 19,468 ED visits generated 11,749 radiographic examinations. Discrepancies were detected in 175 patients (1.5%). Of these 175 patients, 136 (78%) were subsequently shown to have been incorrectly interpreted in the ED (i.e., false negatives), with 40 patients (23%) undergoing a change in management as a result. In the remaining 39 discrepancies, the ED interpretation was evaluated to be correct, with 16 patients requiring additional investigations or visits to the ED to confirm the radiographic finding.⁸

While the literature is inconclusive about the impact of discrepancies on patient management, reports submitted to the Pennsylvania Patient Safety Authority show that discrepancies occur often and may have an impact on patient safety if not communicated by the radiology department to the ED.

Authority Reports

The Authority received 3,173 reports from June 2004 to December 2008 related to discrepancies between the ED physician interpretation of a radiograph and the final reading by a radiologist. The Authority received 2,699 of these reports over a two-year period

from the same facility, possibly reflecting a targeted quality-improvement project. In 2008, facilities submitted 195 reports of this event type, which Authority analysts reviewed individually. None of these reports were submitted as a Serious Event. However, 68 (35%) of the reports indicated that the discrepancy involved a potentially significant clinical finding, as follows:

- Fracture: 50
- Pneumonia: 14
- Appendicitis: 4

The information in the reports does not convey how or when the discrepancies in the radiology findings were communicated between the radiology department and ED, although 55 (28%) of the reports indicate that communication was a factor contributing to the event. Also, the reports do not indicate that an error occurred in every case in which a discrepancy occurred. The reports do reflect the potential for patient harm if a discrepancy is not communicated between the radiology department and ED in a timely manner.

Examples of Authority reports related to such communication issues follow.

Communication of Radiology Discrepancies to the ED

A patient presented to the ED with the complaint of a seizure. The patient had a seizure and fell. A preliminary reading of a CT [computed tomography] scan was reported as negative, and the patient was discharged from the ED. A review of the radiographs the next day showed the patient had compression of the spine. The results were not conveyed to the ED physicians. The patient returned to the ED several days later and was admitted for neurosurgical intervention.

[A radiology staff member left a voice-mail message] regarding x-ray discrepancy for ED support staff. The voice mail was listened to later the next day. The support staff discussed [the discrepancy] with the physician. The physician stated the patient must return to the ED. Voice mails should not be left on ED support staff phone. If [there is] no answer, [the caller] MUST [sic] notify charge nurse.

Communication of Radiology Reports to the ED

An x-ray was done and the report was signed 45 minutes later. The ED physician/department was not notified of a result of subdural hematoma.

A patient was admitted from the ED. The physician reported several hours later that the patient had a dissecting aneurysm. A review of the chart showed patient had a CT done in the ED. The overnight radiology service report of CT showed dissection of aneurysm. [The aneurysm was] not documented in ED notes and was not treated.

A patient was diagnosed with a sprain. The patient was discharged and instructed to follow up with orthopedics. The patient returned later that day with pain. Radiology report was reviewed and was negative. A quality review of radiology report two

days later found a radiology report addendum from the previous day showing a dislocation that was not reported to ED.

Practice Guidelines

The Joint Commission National Patient Safety Goal for improving communication among caregivers addresses critical test results by requiring that facilities have a process in place for verbal and telephone communication of such results. The 2009 communication goal requires that facilities “measure, assess, and, if appropriate, take action to improve the timeliness of reporting, and the timeliness of receipt by the responsible licensed caregiver, of critical test results and values.” Accredited facilities are expected to apply this goal not only to laboratory tests, but also to all diagnostic tests (e.g., imaging studies, arterial blood gas assessments, electrocardiograms).⁹ The Joint Commission requires organizations to define an acceptable length of time between when critical tests are first ordered and when critical results are reported.⁹

The American College of Radiology (ACR) guideline on communication maintains that the radiologist is to provide imaging services to patients seen in the ED, including interpretation and appropriate communication.¹⁰ The guideline emphasizes that interpretation should be timely to facilitate decisions regarding treatment, although it does not specify a time frame in which radiology results should be communicated. The ACR guideline also addresses discrepancies in interpretation between a preliminary and final radiology interpretation. Changes between preliminary and final interpretation should be reported in a manner that reasonably ensures timely receipt by the referring or treating physician when such changes could impact patient care.

The American College of Emergency Physicians (ACEP) endorses that the interpretation of diagnostic studies ordered for the immediate evaluation of and management of ED patients should be done contemporaneously with the ED visit.¹¹ If the ED physician believes that urgent consultation is needed for the interpretation of a diagnostic study, the radiologist must be immediately available. The interpretation of the diagnostic study, both preliminary and final, must be documented in writing and entered into the patient’s medical record.

Risk Reduction Strategies

Although Joint Commission, ACR, and ACEP do not provide specific guidelines related to how a facility should communicate discrepancies, a number of methods for following up on ED/radiology discrepancies have been suggested. The process has been referred to as an “information chain,” starting with image generation, proceeding with image interpretation, and ending with communication of the interpretation.¹² The goal of the entire process is to follow up on any clinically significant discrepancies with the patient. The way the process operates

will depend on the availability of technology such as PACS, voice-recognition dictation systems, and EMRs. However, with any system, it is important to do the following:

- Develop a system for interpreting radiographs and communicating the interpretations that can be implemented regardless of the time of day or day of the week.^{13,14} A hospital may have separate processes for each shift for handling radiograph interpretation, depending on availability of radiology services. In the case of plain radiographs, a common scenario is interpretation of ED radiographs by the radiologist during normal business hours and interpretation by the ED physician during after-hours shifts, with a radiologist overreading the radiograph the next day. Although rates of discrepancies between ED physician and radiologist interpretations vary in the literature, standardizing the method of identifying discrepancies and the action plan for responding to them—for all shifts—will avoid confusion related to the use of multiple systems.¹³
- Implement a standardized method for informing the radiologist of the ED physician's interpretation.^{13,14} If the hospital uses a paper-based system, the ED physician can document his or her interpretation for requisition by the radiologist.¹⁵ Another paper-based approach involves the radiology department maintaining a log in the ED to document all radiographs. Radiology staff are responsible for logging the patient's name and views taken. The ED physician can make a notation of his/her reading in the log. The log can then be taken to the radiologist for review.¹⁵ If PACS technology is available, methods for integrating notations into the system from the ED physician and the radiologist have been described in the literature.¹⁶⁻¹⁸ For example, one facility successfully implemented a PACS that includes a preliminary note window. The window contains two text boxes—one for the ED physician's preliminary interpretation and the other for the radiologist's interpretation.¹⁶
- Implement a standardized system for communication of the radiologist's interpretation of the ED radiograph to the ED in a timely manner.^{13,14} If a discrepancy occurs between the ED physician's and radiologist's interpretations, it is important that the ED receives this information. A 2008 survey of current ED imaging practices showed that the most commonly used method of communicating urgent findings or a discrepancy is verbal communication between practitioners.¹⁹ Documentation of any verbal communication in the patient's record is essential. Voice-recognition dictation systems can expedite the availability of a radiologist's final report, but they do not eliminate the need for a consistent method to transmit the report to the ED in a timely manner.¹⁶⁻¹⁸

- Develop a consistent method to reconcile the radiographic interpretation with the actual care provided.^{13,14} A consistent system for identifying the clinical significance of the finding is essential. The ED physician may find that (1) the discrepancy has no clinical importance, (2) the patient has already been admitted and the subsequent treating physician needs to be notified of the finding, (3) the patient has been transferred to another facility and the subsequent treating physician needs to be notified of the finding, (4) the patient has received appropriate treatment in the ED and requires no follow-up, (5) the finding was missed and the patient requires a follow-up contact, or (6) follow-up studies are required for equivocal findings.¹⁵
- Develop a consistent method for timely communication of radiographic readings to the referring or subsequent treating physician and the patient as appropriate. One approach described in the literature for ensuring that radiologic findings are communicated in a timely manner is direct communication of the findings by the radiologist or radiology facility to the patient.²⁰

Conclusion

As Authority reports indicate, discrepancies may occur between the ED physician's interpretation of a radiograph and the final interpretation of the radiologist. A discrepancy may be clinically significant, and a system must be in place to communicate the discrepancy to the ED. Every ED needs a system to ensure that once a discrepancy is communicated to the ED, the discrepancy is correlated with the patient record to determine whether follow-up is necessary. Although systems may vary depending on factors such as availability of an electronic record, the system of communicating discrepancies should be simple and broadly applicable across all hours and days of the week. Finally, open communication among ED and radiology providers will help promote patient safety by ensuring that the patient will receive timely and appropriate follow-up care should a discrepancy occur.

Notes

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Self-Assessment Questions

The following questions about this article may be useful for internal education and assessment. You may use the following examples or come up with your own.

1. Risk reduction strategies to ensure timely and adequate communication and reconciliation of radiograph discrepancies between the radiology department and the emergency department (ED) include all of the following EXCEPT:
 - a. Eliminate the need for a consistent method to transmit a report from the radiology department and the ED by the implementation of a voice-recognition dictation system.
 - b. Develop a consistent method to reconcile the radiographic interpretation with the actual care provided.
 - c. Implement a standardized method for informing the radiologist of the ED physician's interpretation.
 - d. Standardize the method of identifying discrepancies and the action plan for responding to them—for all shifts—to avoid confusion related to the use of multiple systems during different shifts.
2. Which of the following statements about the potential impact of radiographic discrepancies between the radiology department and the ED on patient management is INACCURATE?
 - a. Discordance between ED physician and radiologist interpretations of radiographs has been reported in a number of studies as up to 20%; however, not all discrepancies have the same degree of clinical significance.
 - b. The majority of studies regarding discordance between ED physician and radiologist interpretations of radiographs focus on rates of discrepancies; however, few studies evaluate the clinical impact of discrepancies on patient care.
 - c. A 2003 study comparing ED physician and senior radiologist interpretations chest radiographs showed that, when classified by level of clinical significance, the highest sensitivity of the ED physicians' interpretation was found in the group of chest radiographs with highly significant clinical findings.
 - d. Studies about the effects of misinterpretation of chest radiographs in the ED on discharge recommendations have consistently shown that discrepancies are of a minor nature and subsequently have little to no effect on patient management.

3. All of the following are potential barriers to the communication of radiograph readings from the radiology department to the ED EXCEPT:
 - a. Limited availability of radiology services after hours
 - b. Different communication processes according to the shift or day of the week
 - c. Reliance on paper-based communication systems
 - d. Lack of documentation of any verbal communication between the ED and the radiology department in the patient record
4. Which of the following statements is INACCURATE according to accrediting bodies and organizational guidance about communication of radiographic results between the ED and radiology department?
 - a. The Joint Commission requires organizations to define an acceptable length of time between when critical tests, which include all diagnostic studies, are first ordered and when critical results are reported.
 - b. The American College of Radiology guideline on communication maintains that the radiologist is to provide imaging services to patients seen in the ED, including interpretation and appropriate communication within a time frame defined by the facility.
 - c. The American College of Emergency Physicians (ACEP) endorses that the interpretation of diagnostic studies ordered for the immediate evaluation and management of ED patients should be done contemporaneously with the ED visit.
 - d. ACEP endorses that if the ED physician believes that urgent consultation is needed for the interpretation of a diagnostic study, the radiologist must be immediately available.
5. A 56-year-old patient presented at 11 p.m. to the ED with the complaint of a seizure. The patient had a seizure in the ED and fell off the stretcher, striking his head on the floor. A preliminary reading of a computed tomography (CT) scan of the patient's head was reported as negative, and the patient was discharged from the ED. An overread of the CT scan the next day showed the patient had a subdural hematoma. The results were not conveyed to the ED physicians. The patient returned to the ED several days later with a severe headache and was admitted for neurosurgical intervention.

Predict which of the following risk reduction strategies would NOT help prevent the recurrence of this type of event.

 - a. Communicate findings by means of a telephone conversation between the radiologist reviewing the preliminary reading the next morning and the ED physician who was on duty.
 - b. Report changes between preliminary and final interpretation in a manner that reasonably ensures timely receipt by the referring or treating physician when such changes could impact patient care.
 - c. Expedite the availability of the radiologist's final report by using a voice-recognition dictation system (recalling that there needs to be a consistent method to transmit the report to the ED).
 - d. Ensure that the hospital has consistent processes for each shift for handling radiograph interpretation.

PENNSYLVANIA PATIENT SAFETY ADVISORY

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