NEW JERSEY DEPARTMENT of HEALTH and SENIOR SERVICES

PATIENT SAFETY INITIATIVE:
Updates - June 2006

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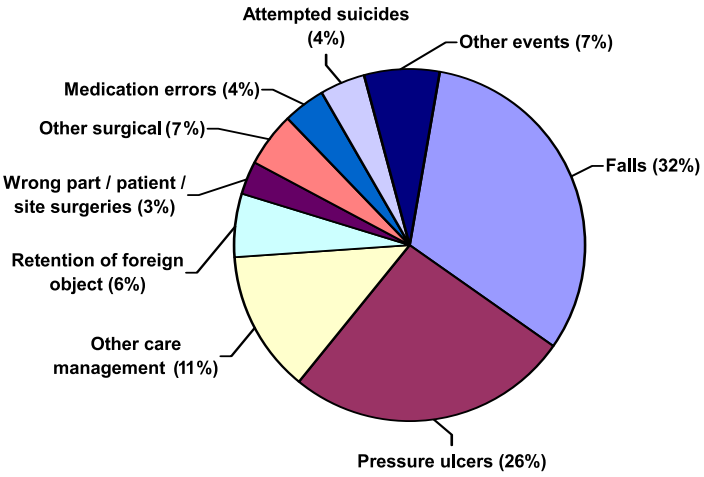
Hospital Reporting Update

The New Jersey Department of Health and Senior Services (Department) received 528 serious preventable adverse event reports from hospitals between February 1, 2005 and March 31, 2006. Of these reported events, 503 met the statutory criteria for an event subject to mandatory reporting. The frequency of event reports by event category is illustrated in Figure 1. Falls and pressure ulcers are the most commonly reported events, accounting for 58% of all submitted event reports. This has been a consistent pattern since the start-up of the Patient Safety Initiative.

Figure 1: Frequency of Reported Events



Current Activities

The Department has planned several ongoing or new projects:

- The second cycle of the *Falls Prevention Collaborative Workshops* ended in May and the third cycle will begin in June. The two-session workshop builds on New Jersey's experience with falls and the national perspective on falls reduction. Based on concepts presented in the first session, hospitals work on quality initiatives related to falls, and report on their progress in a second follow-up session. More information on the project was presented in the February 2006 *Patient Safety Initiative Updates.*

- The Department is in the early stages of developing a web-based Patient Safety Event Reporting System. The system will collect more specific information on each event, thereby enabling more comprehensive tracking and analysis by both the reporting facility and the Department. This web-based system will include the voluntary anonymous reporting system required under the Patient Safety Act (P.L. 2004, C.9) for less serious adverse events and near misses. At this stage of the process, a firm timetable for start-up of the web-based system is not possible.

Overview: Imaging Errors

Imaging studies are frequently an essential component of the diagnostic process. This issue of the *Patient Safety Initiative Updates* focuses on diagnostic imaging.

New imaging modalities, lab tests and testing recommendations have allowed for speedier and more accurate evaluation of a patient's clinical presentation. Such improvements in diagnostic testing, however, are not without their pitfalls.

Of the 55 serious preventable adverse events reported under the category of "other care

Continued on Page 2

Also in this issue:

management event," seven events involved diagnostic imaging. While this represents only a small percent of the total events reported to the Department, these errors often have very serious consequences for the patient.

The imaging studies process can be broken down into: ordering of studies, performance of studies, reading/interpretation of studies, and communicating the results of studies. These areas overlap but the categories allow us to examine the process.

Ordering

Despite technological advances in imaging studies, they remain highly vulnerable to ordering errors that affect the diagnostic process.[1,2] Problems fall into several categories: tests that were ordered but not performed; and tests ordered that did not include scans of critical diagnostic areas. These issues led to delayed or incorrect diagnoses, resulting in injury or death of patients.

Patient sustained a fall and complained of hip pain. The physician ordered an x-ray and the clerk transcribed left lower extremity. The error was discovered and the patient's left hip fracture was diagnosed 12 hours after the initial x-ray.

Performing

Delays in performing diagnostic tests due to the failure to note or communicate the necessity for immediate testing were responsible for significant patient harm. In other cases, poor or incorrect patient positioning resulted in a need to redo tests, delaying diagnosis. In one case the level of noise generated by an MR imager led to miscommunication between the patient and the technician, resulting in patient injury. A study by Moelker, Mass and Pattynama describes specific interventions that may be implemented by hospitals to improve verbal communication between technicians or between patient and technician in areas of high acoustic noise.[3]

Reading/Interpreting

Many imaging errors reported to the Department occurred during the reading/interpreting phase. In several cases the diagnostic image was misread when the clinician identified the primary condition and missed the secondary and life-threatening condition. The clinician reading the image was generally not a radiologist or senior radiology resident.

Patient was admitted after falling off his roof onto a ladder. On the second hospital day, he was noted to be tachycardic and tachypnic. The work-up included a chest x-ray that was read by the surgery resident as positive for a left pleural effusion. Later that day, the CT of the pelvis revealed free intra-peritoneal air and the patient was taken to the OR for chest tube placement and small bowel resection secondary to perforation. A second reading of the chest x-ray noted a subphrenic lucency, "rule out free air."

To address these problems, some hospitals have developed a list of critical or "don't miss" diagnoses and have had senior radiologists conduct training for residents, ED staff, and other critical care staff who read imaging studies. Such lists have included, at a minimum, aortic rupture, ectopic pregnancy, hemopericardium with cardiac tamponade, simple pneumothorax, tension pneumothorax, hemothorax, spinal epidural abscess, and thoracic spine fracture.[1,4]

Disagreements between clinicians, technical limitations (e.g., the inability of some patients to be positioned for optimal contrast) and the lack of patient history resulted in several incorrect diagnoses. In one case, a radiograph was ordered to rule out the presence of a specific retained object. Although the radiologist noted that the specific object was not present, he failed to communicate to the OR the presence of a different type of object.

The introduction of digital radiology and teleradiology that have enabled smaller facilities to have 24/7 coverage has introduced new challenges to the reading/interpretive process. Hospitals may find that off-site radiologists have difficulty in contacting the treating physicians and receiving critical patient information, leading to missed or incorrect results. Facilities should implement procedures to ensure that off-site radiologists have access to the same level of information and clinical specialists available to those in the hospital. Note that Department Licensure Standards (NJAC 8:43G-28.8) require that a radiologist must arrive at the hospital within 30 minutes upon being summoned.

Communicating

Radiologists are frequently at the center of the information exchange among clinicians. Therefore, the ability to clearly and consistently communicate the results of tests is critical to ensuring optimal patient care. In several cases reported to the Department, patient harm occurred due to incomplete communication of the results. This includes

Continued on Page 3

the imaging studies being read but the results not communicated, a delay in the communication of the results, or the results were communicated indirectly or to the wrong person.

An 18-year-old patient was admitted for pyelonephritis. She slowly responded to treatment and by the fifth hospital day was preparing for discharge when she complained of dyspnea. A CT scan was ordered to rule out a pulmonary embolus. This was performed and read by the radiologist at noon. The reading "Negative for PE, apparent CHF with bilateral pleural effusions" was faxed to the floor and not noticed until 11 PM that night. In the interim, the patient arrested and resuscitation was unsuccessful.

To minimize communication errors, the American College of Radiology in its practice guidelines encourages direct communication between clinicians utilizing methods to assure the receipt of the diagnostic report.[5] Some hospitals have initiated systems that require confirmation of receipt of the report by the treating physician. If confirmation is not received within a given time frame appropriate for the diagnosis, radiologists, or their designated representatives, notify the clinician again and document follow-up.

In exploring the causes of imaging errors drawn from RCAs submitted to the Department, staff communication, staff orientation and training, and the physical assessment process were the most frequently identified root causes. Team factors and hospital procedures were the most frequently identified contributing factors.

This emphasis on communication and practitioner skill is not unique to imaging errors. Staff communication and staff orientation/training are also the most frequently cited root causes of all adverse events reported to the Department. Poor communication, however, is not simply the result of inadequate transmission or exchange of information. The complex dynamics of health care delivery in a hospital setting, including multiple diagnostic tests/procedures and hierarchical differences among staff, inhibit clear communication and can lead to patient disability or death. Exploration of these issues, along with re-engineering information technology to address system weaknesses, may promote optimal treatment.

Imaging Resources

Several free resources are available for improving quality and safety in diagnostic imaging:

The American College of Radiology provides a number of materials, including appropriateness criteria, standards, and news bulletins. Available at **www.acr.org**

The Agency for Healthcare Research & Quality Morbidity and Mortality Rounds on the Web is an online journal and forum for patient safety and health care quality that has addressed several radiology-specific issues. Available at **www.webmm.ahrq.gov/**

An internet-based search engine for radiology and other medical specialties covering over 4500 PubMed journals and 864 HighWire-hosted journals is available at **http://highwire.stanford.edu/cgi/search**

Second Looks: Imaging

In this issue, we look at serious preventable adverse events related to imaging that, while not common, resulted in poor outcomes for the patient. In the interest of sharing this information and decreasing the probability of a similar event happening at your facility, we invite you to take a "Second Look" at your facility with these types of events in mind.

Ordering

1. *The infectious disease consulting physician ordered an echocardiogram to rule out vegetation in a septic patient. The patient improved clinically until 2 weeks later when he had sudden onset of shortness of breath and arrested. The autopsy showed fulminant endocarditis, vegetation of the valves, and valve rupture. The echo had never been performed.*

Comment: During the RCA process, the hospital discovered that the order for the echo had been entered into the computer for another patient,

Continued on Page 4

for whom, coincidentally, an echo had also been ordered. The hospital worked with its IT staff to redesign the order screen to require a yes/no second verifier for patient identification, and to reconcile the order number with the number on the test request. They also developed a method to verify that duplicate orders are valid.

The other striking finding of the hospital's investigation was that no one involved in the patient's care followed up on the echo: not the consulting physician who ordered the study, the attending physician, house staff physicians, nurses or case manager. Critically ill patients often have multiple specialists participating in their care and it is the role of the primary attending physician to ensure that there is complete, continuous and timely communication among the health care team. It is also generally agreed that it is the responsibility of the practitioner who orders a study to follow-up on the results.

Performing

2. *A patient who received epidural anesthesia for surgery developed a pulmonary embolus post-operatively and received anti-coagulation therapy. Several days later she complained of leg weakness and the neurologist ordered an emergency, "STAT," MRI. The study was performed 16 hours later and read 40 hours after the original order. The radiologist noted a subacute epidural hematoma and despite immediate surgical intervention, after the results were communicated, the patient became paraplegic*

Comment: During its RCA investigation, the hospital found that the ordering physician had not been told that the imaging technician had left for the day; the covering physicians did not communicate with each other; and the "STAT" status of the order was not recognized in radiology. The hospital's senior medical leadership is now emphasizing communication among the health care team, as in the previous event, and monitoring the response to "STAT" requests across the system.

Reading/Interpreting

3. *A chest x-ray was read in the Emergency Department as "WNL"; the patient was discharged with a diagnosis of bronchitis and sent to the waiting room for her family to pick her up. Four hours later she was found unresponsive and resuscitation was unsuccessful. The radiologist's final reading noted free intra-peritoneal air.*

Comment: The Department has received several event reports involving misread imaging studies. These were usually read by an ED attending or non-radiology resident, and the most frequent missed finding was free intra-peritoneal air. As discussed in the previous section, there are some critical findings that must not be missed if the patient is to have the best chance of a good outcome. To decrease the probability of a wrong or missed diagnosis, this hospital's Radiology Department, in consultation with other disciplines, developed a list of critical findings and then developed learning sessions, with periodic competencies, for those practitioners most likely to be doing emergency readings.

Communicating

4. *A Foley catheter was inserted into the stoma to maintain patency after the patient pulled out the PEG tube and a gastrografin abdominal x-ray was done to confirm placement. The resident read the film as "normal," confirmed it with a junior radiology resident and reordered the tube feedings. Seven hours later the patient was noted to be unresponsive, was resuscitated, transported to the ICU and placed on a ventilator.*

Comment: Information from the RCA revealed that shortly after the resident read the film, the senior radiology resident began to do the assigned preliminary reading of x-rays, read the patient's abdominal x-ray and reviewed it with the attending radiologist. They noted contrast in the stomach but could not rule out intra-peritoneal contrast and faxed the report to the floor where its receipt was unrecognized.

The Department has had several event reports involving critical imaging findings that were not directly communicated to the practitioners caring for the patient. Faxing such reports presumes there is someone at the fax machine to receive the report, but the evidence suggests this presumption is often wrong. Communicating critical results to someone other than the primary practitioner, such as a nurse, may also result in a delay of receipt of the information. This time delay can result in a delay in the patient receiving lifesaving care. The hospitals involved in such events have examined their communication protocols and many have implemented a protocol requiring direct physician to physician communication of these critical results.

Conclusion

A key factor in all of these events was the communication failure uncovered during the RCA process. Medical technology and medical informatics are rapidly evolving in sophistication and capacity. However all the refined images and enhanced diagnostic capacity will be of little benefit to the patient unless there are reliable and timely means of communicating imaging results and incorporating them in the patient's care plan. The 3"x 5" index card used to be the "gold standard" for recording information, following up on tests and results, and signing off to colleagues. Newer tools such as the PDA, Blackberry, cell phone, and laptops with wireless internet connection have virtually replaced those cherished index cards but fancier gadgets don't, on their own, assure clear channels of communication. The February *Patient Safety Initiative Updates* noted this same caution for Computerized Physician Order Entry (CPOE), another technological advance.

References:

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[2] Thrall, JH. Quality and safety revolution in health care. Radiology 2004;233:3-6.

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[4] Groskin, SA. Selected topics in chest trauma. Radiology 1992;183:605-17.

[5] American College of Radiology. ACR practice guidelines for communication of diagnostic imaging findings. Reston, VA: Author, 2005. Available from **www.acr.org**.

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