When every minute counts – Three Solutions to the Challenges of Meeting Emergency Imaging Needs
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Sophisticated imaging modalities are becoming standard diagnostic tools in emergency medicine. Ask a critical-care physician today if he or she needs a CT scanner situated in the emergency department (ED), for example, and the answer will be a resounding “Yes!” However, in many existing hospitals, the imaging department is rarely adjacent to the ED, much less within it. The process of transporting emergency patients to and from the imaging department inevitably increases emergency patient turnaround time; temporarily deprives the department of RN support or requires increased RN staff; ties up ED beds; and reduces patient satisfaction.

There are several approaches to meeting the imaging needs of the ED: situate the ED and imaging departments adjacent to each other, providing for efficient traffic flow to and from the ED; provide duplicate imaging equipment in the ED; provide basic X-ray equipment in the ED (i.e., in each trauma room), transporting emergency patients to the imaging department for other procedures; or provide portable imaging equipment to the ED.

To develop a cost-effective solution to the needs of emergency diagnostic imaging, planners need to analyze a number of economic factors: ED patient volume; imaging department patient volume; hospital layout; capital-equipment cost vs. operational costs; size of institution; and plans for digital equipment.

At three Missouri hospitals, planning for a new ED or the renovation/expansion of an existing ED provided opportunities to develop three distinct solutions.

Solution No. 1: Situate Imaging Adjacent to Emergency

In planning the new ED for Lincoln County Medical Center, Troy, Mo., the question of situating imaging equipment within the ED was analyzed on the basis of benefits to the patient and staff vs. cost. Time will always be saved when imaging can be done within the ED. But in this case, the imaging department would be directly adjacent to the ED, minimizing patient travel. And because emergency volume is relatively low — approximately 10,000 visits per year — the volume of emergency patients would not support dedicated imaging staff within the ED.

While the economics strongly suggested using the adjacent imaging facilities rather than providing imaging within the department, certain key issues needed to be addressed to ensure the success of this solution. Much of the imaging department’s volume would come from outpatients, and mixing emergency patients with outpatients must be handled carefully. At Lincoln County Medical Center, access from the ED to the radiographic and CT rooms was designed to minimize visual contact of outpatients and emergency patients. A separate entrance was provided to the imaging area that allows emergency patients to access imaging without being visible from the outpatient waiting area (Figure 1).

A common concern in using the imaging department for both emergency patients and outpatients is the disruption to schedule caused by the unpredictable ED activity. For emergency patients, a significant wait for imaging often is not medically possible, and even a modest wait is counter to the goal of minimizing emergency patient turnaround times. But constant disruption to the flow of outpatients by unscheduled emergency patients can increase outpatient waiting times, reducing patient satisfaction.

At Lincoln County Medical Center, guidelines were established to minimize potential scheduling problems.

A key to optimizing patient flow is good communication among imaging and emergency personnel. Patients are not transported to imaging until their room is available, minimizing RN transport time. If a non-emergency patient is occupying a room, the exam is completed before the emergency patient is moved to imaging. But emergency patients have priority, and every effort is made to make rooms available to them as quickly as possible.

Most emergency imaging exams are completed fairly quickly. Prompt reading of the films and communication of the results have the greatest impact on improving patient turnaround times. Again, emergency films have priority, and prompt communication from the radiologist is necessary for good patient flow.

Solution No. 2: Situate Imaging on the Perimeter of the Emergency Department

At SSM Cardinal Glennon Children’s Hospital, St. Louis, the ED receives approximately 40,000 visits per year. A major planning goal for the expansion and renovation was to improve patient turnaround times. Analysis of patient flow indicated that although the imaging department was adjacent to the ED, imaging was a significant factor in the total time per patient. The time from when the imaging order was placed to when the patient arrived at the imaging room averaged 18 minutes; the exam itself averaged 12 minutes. Typically, a patient who needed CT consumed more than six minutes of RN time simply being moved through the corridors (Figure 2). With more than 1,100 emergency imaging exams per year — more than 30 imaging exams a day — emergency patients account for 25 percent of the hospital’s total imaging volume. The transport time alone accounts for more than three hours a day of RN time. While the radiographic room was situated closer to the ED, the high volume of traffic added substantially to lost RN time.
In this case, it was clear that situating imaging within the ED would improve both patient turnaround time and nursing efficiency, but the volume of patients from the ED would not financially justify staffing a dedicated radiographic room and CT room. Even if a technician could be economically based in the ED, reading of the films by radiologists based in the imaging department would slow the process. Time from the completion of an emergency imaging exam to the reading of the film averaged 38 minutes. Transitioning to a digital system would significantly reduce this time. However, a transition to digital equipment was not envisioned in the near future.

A solution was found by situating radiographic, CT and MRI equipment within the ED, but on the perimeter, which would allow access for other patients. This arrangement enables the hospital to benefit from in-department emergency imaging, with the staffing economies achieved by making CT and MRI readily available for other patients. Care was taken to provide separate access to the CT for emergency patients, minimizing their exposure to other patients. If a digital system is implemented in the future, even greater improvement to turnaround times will result.

**Solution No. 3: Situating Imaging at the Hub of the Emergency Department**

When planning for the new ED at Barnes-Jewish Hospital, St. Louis, the goal was to transform the patient experience. After years of adapting to space designed for half the annual volume of 90,000 visits, patient wait times had become unacceptable, with patient visits often lasting more than eight hours. Ambitious targets were set, with a goal of completely eliminating waiting for 85 percent of the patients, and to keep overall turnaround times to two hours or less.

To accomplish this, every aspect of the patient visit process was analyzed, from triage to discharge, and many factors were found to contribute to slowing the patient flow. To improve patient turnaround, the hospital made a number of key procedural changes. Among these, triage was streamlined; bedside registration was instituted; protocols were established for 16 chief complaints; and the lab committed to 10-minute turnaround of results for the most common tests. Holding space for long-term observation was planned for the new ED.

Efficient emergency imaging was another major factor in improving patient flow. With the high volume of ED visits and the imaging department situated a quarter-mile and several elevator rides away, Barnes-Jewish Hospital’s new ED would require in-department imaging. Planners needed to determine the correct number of imaging modalities, effective organization and optimal staffing.

Representatives of the imaging department played an active role on the planning committee. Patient data were analyzed to determine the most efficient and cost-effective mix of equipment and how best to staff the imaging component of the ED both for cost and rapid response. In the overall organization of the new ED, separate modules were considered for various acuity levels: fast track, observation, emergent and critical trauma. These types of patients have differing imaging needs. Critical/trauma patients are difficult to move, need very rapid response and often need CT. Emergent patients make heavy use of CT and radiography. Fast-track patients seldom use CT, but make fairly heavy use of radiography. In diagramming patient flow in the ED, it soon became clear that imaging was the common destination point for all the modules and, therefore, needed to be the hub of the department (Figure 3).

Because of the high-volume of critical/trauma patients, each of the six critical/trauma rooms was equipped with fixed radiographic equipment. Two CT rooms were included near the critical/trauma area, and three radiographic rooms and one ultrasound room were provided. Sufficient support and reading spaces were provided in the ED to fully staff the imaging area as an independent imaging satellite (Figure 4).

The experiences of planners and administrators at Lincoln County Medical Center, Cardinal Glennon and Barnes-Jewish Hospital show that cost-effective solutions can be developed to meet the imaging needs of emergency care. But no single solution is right for all situations. Good solutions come from analysis of costs and benefits in the context of each unique facility, and finding answers that benefit patients, care-givers, and financial performance.

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