AUTOMATED PATIENT TRACKING IN THE ED

CHRISTIANA HOSPITAL

- Newark, DE
- 860 beds
- www.christianacare.org

Christiana Hospital is a regional, independent, academic medical center within the Christiana Care Health System. Located in a suburb of Wilmington, the Delaware ED is a Level I trauma center with more than 100,000 visits a year.

S T E E E P

Safe

Location of patient can be determined at any point in real time.

Efficient

Lean techniques removed wasteful steps.

Patient-centered

All changes added value for the patient.

THE PROBLEM

At any one time, more than 100 patients are in this busy and complex ED. Historically, staff actively tracked patients with manual entry of a patient's location into a computer system. Keeping track of such a high number of patients in real time was clearly a challenge given the ongoing movement of patients in and out of bays and off for tests. Some of those patients could not be located without multiple phone calls and walking tours. Clerical staff often spent a great deal of time locating charts to place lab and diagnostic reports. This information was critical for infectious disease management and staff prophylaxis. Christiana Hospital's aim was to develop a tracking program that would be 100 percent effective in real time and would be accepted by all levels of personnel.

THE SOLUTION

Christiana Care chose to implement an automatic tracking solution—a "passive" system that does not require staff to input information manually. The ED selected an automatic patient and asset tracking software system in conjunction with an infrared sensory network and locating hardware. Infrared badges for patients, staff, and assets and in-room sensors "passively" collect real-time locations. Significantly, the system interfaces with the hospital's information systems. For example, it interfaces with the hospital's bed management system to streamline patient admissions from the ED, which account for approximately 60 percent of all hospital admissions.

RESULTS

- 100 percent of patients can be immediately located at any given time
- Average length of stay (LOS) decreased by 45 minutes for patients treated and released
- Average LOS decreased by 35 minutes for admitted patients
- Average LOS for low acuity patients reduced from more than 2 hours to less than 60 minutes
- Low acuity patients leaving without treatment decreased from 4.5 percent to 2.5 percent
- Patient satisfaction levels among low acuity patients rose from the 73rd percentile to the 99th percentile on the Press Ganey scale

BACKGROUND

With its new automatic patient tracking system, Christiana Care did more than install a new piece of technology. Work began with a multidisciplinary team involved in redesigning all the processes using Lean methodology around patient tracking—physicians, nurses, technicians, clerks, IT staff, quality assurance staff and executive sponsors. Wiping the slate clean eliminated dysfunctional processes, and the team was free to envision and define an ideal state to be integrated with the technology. Dubbed "business process planning," this approach is now the standard for any major IT implementation in the organization.

PRINCIPLES OF PERFORMANCE EXCELLENCE

Removing Waste

Staff no longer waste time chasing down patients in the large ED. Each new patient receives an infrared badge that is read by infrared sensors in the ceilings throughout the ED and radiology areas. Staff also wear badges, and whenever staff and patients come together under a sensor, the interaction is captured by the system. A map view of the department shows the status of every bed, helping triage nurses immediately place patients (see Figure 1). Status views of the areas throughout the ED provide detailed information on the patient, including the status of lab and radiology results. This information makes the day's work more efficient and helps staff manage fluctuations in patient volume. It also provides data for enhanced resource allocation and further optimization of patient flow processes.

Reducing Process Variation

A complete redesign of the patient tracking process and integration of the new technology has drastically reduced process variation and the data the system captures provide the means to spot and resolve any variances.

Over the course of five months, the team worked to document the current state of manual patient tracking and chart out the

TEAM MEMBERS

- **Vernon Alders**
  Director of Operational Excellence
- **Michelle Campbell**
  Corporate Director of Patient Safety and Accreditation
- **Nigel Hartell**
  Senior Systems Analyst
- **Linda Laskowski-Jones, RN**
  Vice President of Emergency Trauma and Aeromedical Services
- **Robert J. Laskowski, MD**
  President and CEO
- **Charles Reese, MD**
  Chairman of Emergency Medicine
- **Karen Toulson, RN**
  Emergency Department Nurse Manager
- **Kim Turner**
  Emergency Department Administrative Coordinator

future state of automatic patient tracking. Nurse participation was essential to identify all workarounds and informal, undocumented processes to be integrated, revised, or eliminated. High-level project decision makers helped to drive system change when necessary. Staff from admitting, the bed board and patient escort departments participated to ensure improved communication and interdepartmental work flow processes.

Involving nurses and other staff in the design, thorough staff training and an easy-to-use tracking system resulted in widespread staff acceptance. All hospital staff involved in the treatment and movement of patients in the ED have fully embraced the operational changes without backsliding into previous workflows that lead to project variability and inefficiencies.

The Patient Experience

Throughout the process redesign, the team sought to ensure that every step in the new process added value for the patient. The data that is now available through the system support ongoing process and staffing changes that enhance patient care and the patient experience. In turn, measurements of patient satisfaction, wait times and patient perception of how well informed they are kept have all improved.

This new ability to truly focus on the patient—knowing where a patient is at any given time, the status of test results and the overall status of the emergency department—has improved staff satisfaction and contributed to strong staff retention. And, with this information instantly at hand, nurses have more time to spend with patients.

CONTINUAL IMPROVEMENT

Christiana Care's investment in a robust technology solution has generated a rich set of data for continually improving the performance of the ED. Data is now supporting process improvements to reduce the length of stay for high acuity patients.

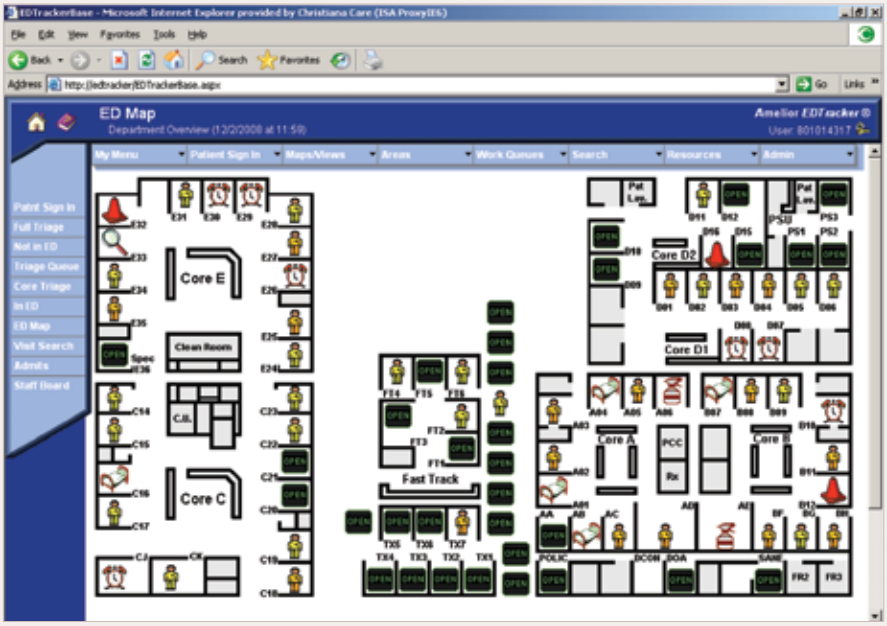

Figure 1. Map view of the ED

Note: Patient clothing color indicates acuity level. The bed indicates a patient to be admitted to the hospital. The magnifying glass indicates a patient currently in the ED who is posted for observation status in a hospital bed. The cone indicates a room assigned but not yet occupied by a patient. The alarm clock indicates a patient whose length of stay exceeds 4 hours. The spray bottle indicates a room to be cleaned.

The following key performance indicators on the department's home page are refreshed every 15 minutes and alert staff to issues that may affect patient throughput; over time, they indicate opportunities for improvement and support decision making for changes in staffing, capacity, and other resources:

- Hospital census;
- ED census;
- Patients at triage;
- Number of admitted patients in the department;
- ED arrivals in the past hour; and
- Patients leaving the ED in the past hour

As an example of how the data has supported staffing changes, Christiana Care turned to the system's database to help identify the cause of patient back-ups during the night. With no data, the answer might have been to add nursing staff to the night shift. With an analysis of the data from the system, it became apparent that the problem took seed during the day. The issue was resolved by reallocating staff to better cover the day and evening shifts. For Christiana Care, a rich set of data, the ability to analyze that data for meaningful information, and a culture that eagerly drives change have come together to pursue ongoing transformations for the ED.