

HIMSS Davies Enterprise Award Submission

Applicant Organization: St. Clair Hospital
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Menu Item: **Patient Flow/Throughput:** Improving Patient Flow in the Emergency Department through the use of electronic health record (EHR) tools.

National Patient Safety

Goal: Improve the effectiveness of communication among caregivers

Executive Summary: Emergency Department (ED) overcrowding is a major healthcare concern across the United States. Long wait times and delays in treatment can result in poor outcomes for patients. Additionally, there are implications for hospitals that can result from low patient satisfaction scores. Recognizing that throughput is not an ED problem alone, and that complex organizational issues require a multi-faceted solution, a four-pronged approach was used to address ED patient flow. This approach included facility improvements, process redesign and guest relations training, and significant upgrades to the electronic health record (EHR) and related systems. These efforts resulted in the organization in making significant improvements in wait times, turnaround times, and patient satisfaction. Through the successful completion of this multi-faceted project, the hospital received a ranking of the number one ED in the nation in patient satisfaction for large EDs. (See Figure 1)

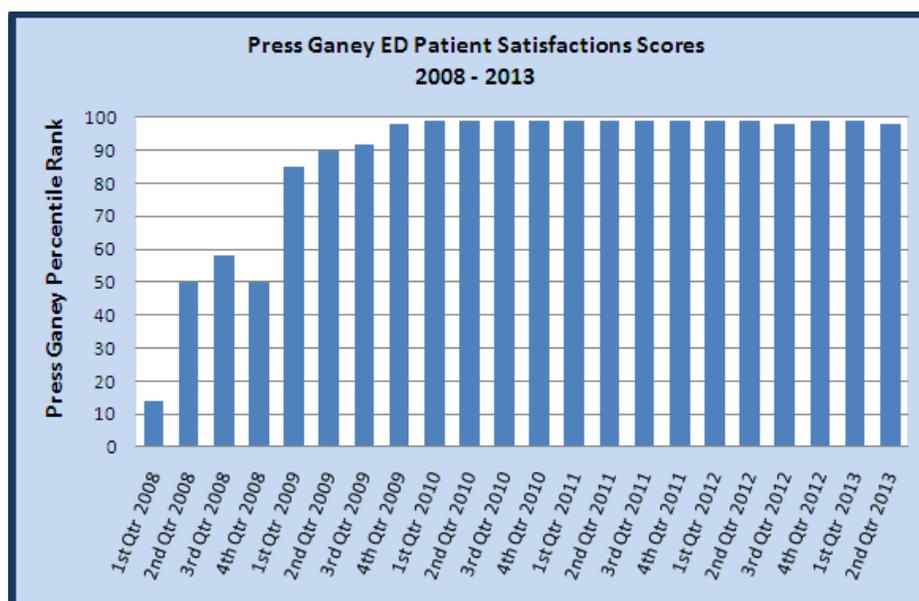


Figure 1. Press Ganey ranking of St. Clair Hospital Emergency Department

Background Knowledge:

St. Clair is a 328-bed independent, acute care facility that provides advanced, high quality health care to more than 480,000 residents in southwestern Pennsylvania. Our mission is to provide highly valued, service-oriented healthcare to our community across the hospital's main campus and five outpatient centers.

St. Clair's Emergency Department (ED) is the busiest in the region. In the years leading up to the ED transformation, it was broadly recognized that the ED was not performing at peak efficiency. Patients experienced long waits, delays in receiving necessary treatments, delays in diagnostic workups and potential delays in antibiotic therapy or other interventional procedures. Research studies have found that, while the overcrowding occurs in the ED, it is not an ED issue. Rather, it is a symptom of how the hospital manages its capacity, and how the hospital manages organizational throughput. These challenges require both systems and process change.

Patient flow requires the consideration of three functional processes: input, throughput, and output. The input function involves the processes and activities associated with the patient presenting to the ED for treatment. Throughput is comprised of activities involved in delivering care to the ED patient. Lastly, the output function occurs when the patient is transitioned to inpatient care. Patient flow can only be optimized when all three functions are addressed.

Local Problem and Intended Improvement:

Prior to fiscal year 2008, ED overcrowding presented a huge challenge. The hospital was experiencing an increase in the number of patients waiting for treatment in the ED. In addition, there were patients who were to be admitted, but there was no available inpatient bed. As these "boarders" remained in the ED while waiting for beds to become available, the waiting room became further crowded. Occasionally, the situation required the hospital to divert ambulances because the hospital had reached or exceeded capacity. Increasing numbers of patients, who when confronted with long wait times, were leaving the ED without being seen. By FY08, the average door to room time for a St. Clair ED patient was nearly 45 minutes, while the door to doctor average wait was over 75 minutes.

To reverse this trend, an organizational performance improvement initiative was established to improve patient flow.

Design and Implementation/How Health IT Was Utilized:

IT improvement efforts included support for patient registration process changes, the implementation of the ED Status Board and associated analytics, CPOE, electronic documentation, and an electronic bed management system.

The existing registration process contained significant waste and downtime for patients who were lead from the waiting room to an intake nurse, returned to the waiting room, then called back to the registration area, sent back to the waiting room, and finally moved to a treatment room. All of this movement occurred without the patient being on the EHR status board, and therefore didn't provide the opportunity for the status board to be useful in optimizing patient flow. (See Figure 2).

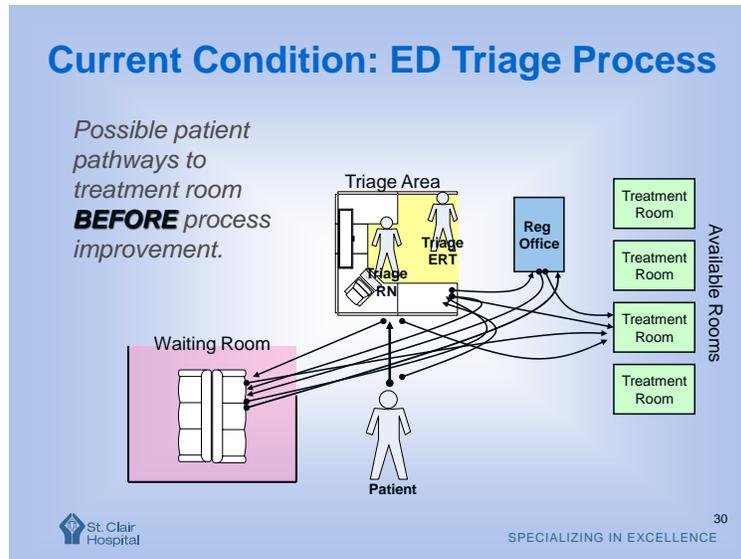


Figure 2. The ED Triage Process prior to system improvements

The redesigned process now includes bedside registration. When a patient arrives, the patient is taken directly back to a treatment room for triage and registration. A “quick registration” process is completed by either registrars or clinical staff. (See Figure 3)

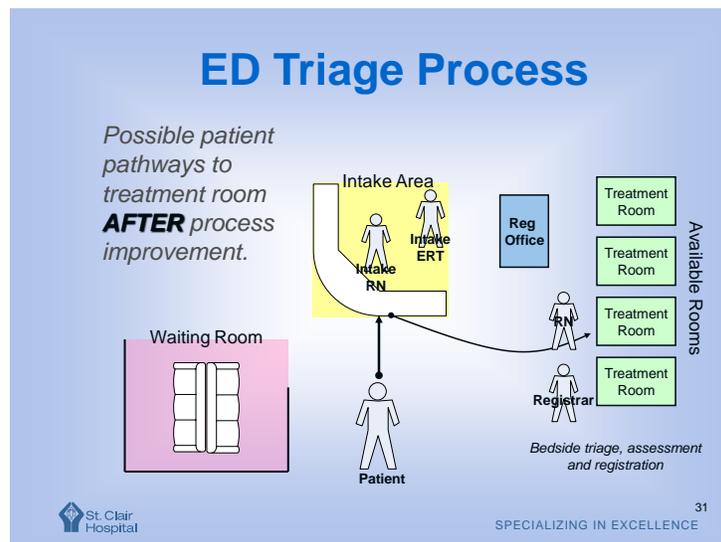


Figure 3. The ED Triage Process after implementing system improvements

Once the quick registration and triage process is completed, the patient appears on the EHR’s electronic status board. From that moment on, every process, step, task, and movement of the patient will be electronically tracked on the status board. Mounted in key ED areas and viewable by all ED staff members, the status board view is the default screen within the EHR.

Integrated into the patient’s treatment process, the EHR status board is continually updated by orders, tasks, procedures, and caregiver direct input of the patient’s current status and disposition. Some of the statuses that are used include Waiting To Be Seen, Triage Pending, Waiting for Exam Room, Provider to See, Treatment in Progress, Pending Discharge, To Be

Admitted, To Be Admitted Orders Written, Waiting for Transport, and so on. In this manner, all ED staff know what the patient status is and the potential steps to follow. Throughout all these stages, the EHR status board continually increments the length of stay timer so that there is always an awareness of how long the patient has been in the ED, and the associated progress being made. Additionally, the tracking mechanisms of the various aspects of treatment have trigger points that activate when the patient's treatment doesn't make the expected advancement.

The EHR status board also facilitates tracking the patient outside the emergency department, for example, when the patient is transported for an Endo procedure or Imaging procedure. The EHR tracks the length of time at those temporary locations and changes the color of the cell in the EHR as the time outside of the ED increases. Knowing where the patient is located, and how long the patient has been at that location, is essential to efficiently managing throughput.

The status of diagnostic orders is also clearly displayed on the status board. All ED staff know what tests have been ordered, and how they are progressing. For lab tests, the system displays a ratio of the total number of tests and those that have been resulted. Icons and colors are used to denote collection status. The status turns red if it is still pending collection at the 30 minute mark. For imaging exams, the same ratio indicator is used to show the number of total tests and those that have a result filed. The indicator turns blue once the imaging study has been performed, providing caregivers with an idea of when the patient will return to the ED and when the result can be expected.

To facilitate communication to departments outside of the ED, the EHR sends automatic referrals to diagnostic departments. For example, the EHR sends pager messages for respiratory therapy treatment at the time when the order is entered, reducing the need for traditional manual communication processes. Therapists now are alerted immediately when a treatment is required. Orders for radiology studies instantly flow to the Medical Imaging Department while a simultaneous pager message is sent to the escort who will transport the patient to diagnostic location.

As soon as the Physician determines that the patient needs to be admitted and enters the order, the Patient Placement Manager (PPM) automatically receives an electronic message indicating that a bed is needed. Likewise, the EHR status board also displays the Bed Request status. Once the PPM makes the arrangements for the bed through the bed tracking system, she completes the bed order in the EHR and the status board reflects the inpatient unit and room number.

The ED nursing staff completes all clinical documentation within the system, making it readily available for physicians and other members of the care team. Weights documented in the triage note appear within order sets, assisting the physician with drug calculations. CPOE protocols, groupings of commonly ordered medications and order sets based on chief complaints were developed to further enhance the ability of ED staff to move the patient through the system more efficiently. Likewise, the physicians do all of their work via CPOE, minimizing turn-around-times, including CPOE entry of the patient's admission orders. Most importantly, the inpatient units utilize the EHR which contains the patient's complete chart in the ED, to prepare for the patient. The systems and workflow change enabled St. Clair to

convert from a PUSH system to a PULL system, where ED patients that are to be admitted are pulled to the inpatient unit rather than pushed from the ED department.

Equally important to the success of the system transformation is post-process analytics. During the patient visit, the status board keeps the timers and statuses in front of the caregiver team, and this facilitates efficient throughput. However, with a process as multifaceted as an ED visit, there is plenty of opportunity to introduce waste into the process. It is only through analytics, and regular adjustments, that the gains in efficiency can be maintained.

The EHR, containing all the patient information and milestone time markers, acts as the source of analytics so that adherence to established metrics can be managed and maintained. On a routine basis, the team reviews and acts upon the following metrics: Door to Reg, Door to Admit, Door to Discharge, Reg to Treatment, Treatment to Admission Orders, Admission Orders to Floor, Treatment to Discharge, Reg to Discharge (by physician, by PA, by NP, by Nurse), Reg to Admission Orders (by physician, by PA, by NP, by Nurse), Admission Orders to Floor (by physician, by PA, by NP, by Nurse), Treatment to Floor (by physician, by PA, by NP, by Nurse), Treatment to Discharge (by physician, by PA, by NP, by Nurse). Through the use of analytic review sessions, adjustments are made when needed, and gains are maintained.

Value/Derived Outcomes:

St. Clair Hospital was successful in achieving the following improvements:

- In the first year after the system changes were implemented, a reduction of waiting room times from 49 minutes to 4 minutes was achieved. (See Figure 4)
- In the first year after the system changes were implemented, a reduction in the time to see a physician from 76 minutes to 28 minutes was achieved. (See Figure 5)

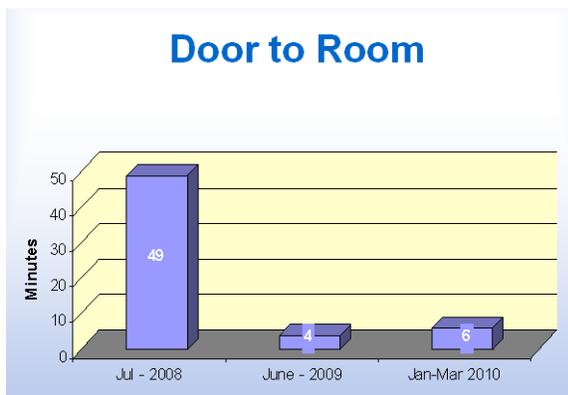


Figure 4. Decrease in Door to Room time

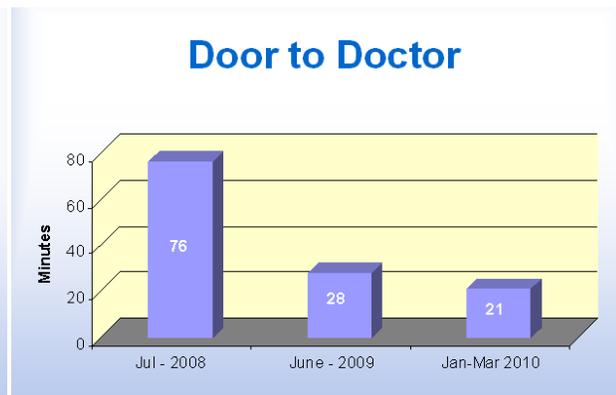
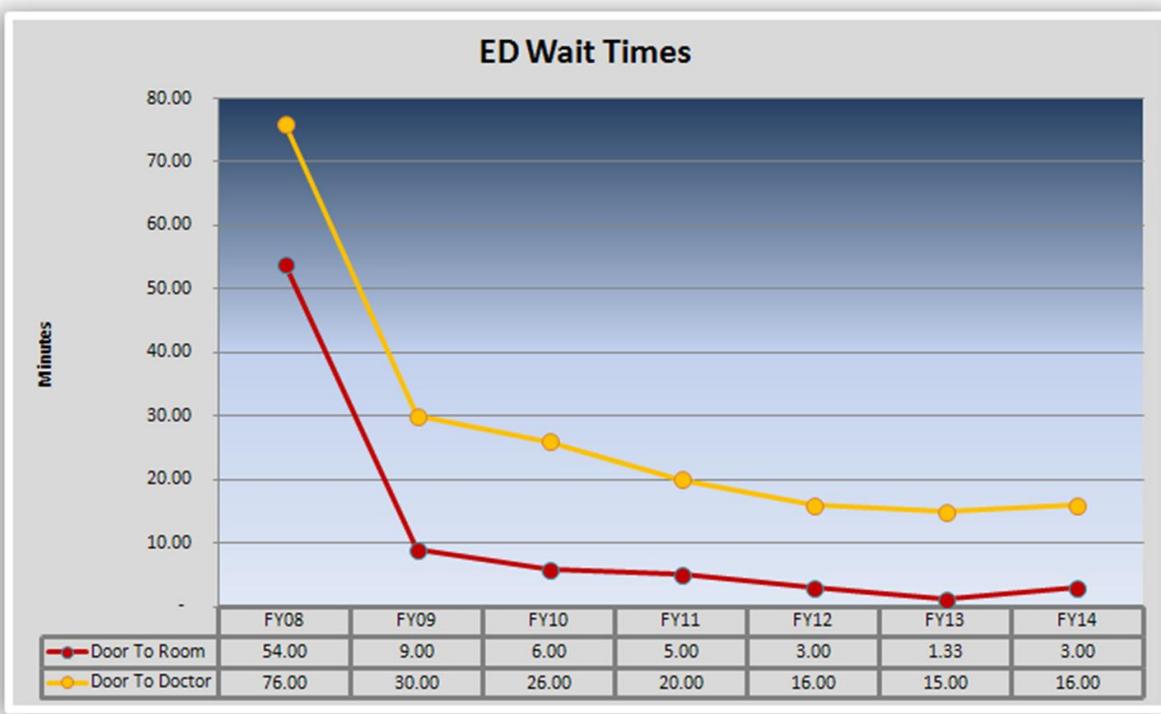


Figure 5. Decrease in Door to Doctor time

- Even after the large decrease in Door-to-Room and Door-to-Doctor were achieved in the first year, additional reductions, although much smaller, were achieved for the next several years, before the trend began to level out.



- A one-hour reduction was achieved in the time from entry into the system to discharge from the ED.
- Increase in patient satisfaction scores from 14% to 99%, distinguishing St. Clair as the top ranking ED in the nation among Press Ganey’s database of large EDs for several survey periods. Patients need fast, high quality, safe care in the ED and the ratings indicate that those patient needs are being met.
- Top rankings in Press Ganey (see Figure 6) have been sustained over a multi-year period.

St. Clair Hospital

10/1/2010 - 12/31/2010

EMERGENCY DEPARTMENT REPORT

7.1 Large PG Database Percentile Rank by Question

This section lists each question’s percentile rank in the Large PG Database peer group in descending order. The order of questions is listed in parentheses after the percentile ranks. To ensure reliability, only the order of questions answered by at least 40% of your respondents is presented. On the right your facility’s overall percentile rank is graphed as a vertical line in the bar chart of your percentile ranks. Questions appearing in **bold italics** are among your facility’s top ten priorities (based on your Internal Priority Index); superscripts indicate the priority number.

Question	Rank	Your Overall Percentile Rank
Waiting time to treatment area	99 (1)	

Figure 6. Report from Press Ganey showing ranking in 99 percentile.

Lessons Learned:

- When introducing a significant level of change in an area that is as busy as the ED, unless each change is communicated multiple times, stakeholders will not be on the same page.
- Without leadership present during implementation of major changes in workflow, the project is less likely to succeed.
- With any significant change in a workflow/protocol, staff buy-in can be a huge challenge. It is essential to involve skeptics on the planning team.
- Once the initial concept of the planned changes to the systems and workflow are introduced, some portion of the staff will begin to express their reasons for being skeptical. The reluctance expressed ranged from staff not believing any change can make a difference, to objections to the use of the EHR and Registration systems at different stages of the patient visit, to use of systems in different locations, to managing tasks and workflow through a status board. It is essential to provide a forum where all of these ideas can be freely expressed. To address each obstacle that is voiced, it is helpful to create a process map for both the current state and future state, and annotate it with the issues that are identified. As the plan develops and matures, proposed solutions to the obstacles are documented on the future state process map, and skeptics are transitioned to believers.
- Unless the off-shifts receive equal attention on process changes and system usage, staff will revert to “old” habits.
- The adage “out of sight, out of mind” is very applicable to ED patients that leave the unit for testing or procedures. Timers must be utilized to track the time in the alternate location, and to trigger intervention when time parameters are exceeded.
- Having milestones and progress information residing in the EHR is not enough to drive throughput improvement. The data must be displayed on large screens in the ED so that ED staff always has awareness around length of stay and treatment progress. The value of the visual cues cannot be underestimated.
- Unless there is a module within the EHR that is specifically geared towards mining all of the critical turnaround time metrics within an ED, outcomes and goal achievement will be difficult to measure.
- Without analytics, and continuous review of metrics, gains are difficult to maintain.

Financial Considerations:

The I.T. related expenses needed to complete the project are described in the table. The expenses included both capital and operating costs. I.T. capital costs were funded through the hospital’s routine capital, including the enhanced ED status board module of the EHR, the large display monitors, and workstations for the treatment rooms.

Type of Expense	Amount
Vendor enhancements to ED Status Board module of EHR	\$131,000
Initial I. T. analyst wage & benefit expense for 2,700 hours of project work	\$96,849
Annual ongoing cost of analyst time spent on maintenance and enhancements	\$9,995
Annual training costs	\$7,030
Hardware - Large screen monitors, workstations, access points, etc.	\$124,680
Vendor consulting hours (250)	\$43,750
Vendor annual maintenance fees	\$18,578
Total:	\$431,882

Using FY08 volume as a baseline, increased cases due to all improvement initiatives in the ED, generates a contribution margin of greater than \$40M from FY09-FY14. Conservatively, attributing only 10% of the increased case volume to improved Patient Throughput enabled by the EHR, provides a hard ROI of \$4M

