How three very different health care organizations are leveraging clinical and operational data from their emergency department electronic medical record systems to help clinicians increase efficiency, improve care, lower costs and make better long-term decisions.

Catalyst for growth

The emergency department (ED) plays a pivotal role in the modern health care system both clinically and financially. Not only does the ED treat seriously ill and injured patients — emergency physicians working in hospital emergency departments represent 4 percent of U.S. physicians but provide 28 percent of all acute care treatment in the U.S. — but it also plays an important role as the gateway to inpatient treatment. In effect, the ED is the front door of the hospital.

According to a recent study by the RAND Corporation, a nonprofit nongovernmental organization, “EDs are responsible for essentially all the recent growth of hospital admissions, and now account for approximately half of hospital inpatients in the United States, excluding live births. Since inpatient care accounts for more than 30 percent of aggregate U.S. health care spending — nearly a trillion dollars per year — this means that decisions made in EDs have a profound impact on the financial fortunes of hospitals on one hand, and the aggregate costs of health care on the other.”
Significant challenges facing emergency care

The emergency care network is being strained by a troubling dichotomy. On one hand, the ED is treating more complex patients as a result of an aging population. This requires more time and resources. Conversely, the ED is also treating a growing number of patients who use its services for minor care, which increases volume.

Between 1997 and 2007, the increase in total annual ED visits was almost double what would be expected from population growth. At the same time that the number of visits to EDs has increased, the number of EDs in the U.S. has declined. Exacerbating the situation further, the number of inpatient beds has declined as well. Between 2001 and 2008, hospitals closed about 198,000 beds. With more patients seeking care and fewer inpatient beds available for those who need them, EDs have grown crowded with admitted patients who can’t be efficiently transitioned to inpatient care.

The result: emergency departments are dealing with overcrowding, boarding (holding of patients in the ED until a hospital bed opens up) and ambulance diversions — all of which can adversely impact care, patient satisfaction, physician satisfaction, and the financial health of both the department and the hospital as a whole.

Improving performance through automation

The right ED EMR (emergency department electronic medical record) solution can deliver a complete set of operational and management tools that help optimize ED performance in the face of these challenges.

A high-performance ED EMR solution addresses the ED’s unique workflow with patient tracking, comprehensive clinical documentation, clinical decision support, ePrescribing, an operational dashboard, and information sharing and management reporting. By implementing an advanced ED EMR and using it to its full capacity, EDs are able to drive better performance, lower costs, improve processes, increase patient flow and improve the overall patient experience.

We will examine how three forward-thinking hospitals are leveraging the capabilities and data gathered from their ED EMRs to:

• Analyze and improve clinical and financial performance
• Effectively deal with immediate challenges
• Better plan and adapt for future needs

Although these three emergency departments are located in different regions of the country, serve different types of communities and offer different levels of emergency service, they have one thing in common: they have used the capabilities of their ED EMR to develop creative solutions that lower costs, increase quality, improve patient satisfaction, support administrative goals and promote overall hospital operational efficiency.
St. Joseph Health System: Performance improvement
Texas style

St. Joseph Health is an integrated local health care system whose services span 10 Central Texas counties known as the Brazos Valley. St. Joseph’s main campus, which includes a 210-bed hospital, is located in Bryan, Texas — not far from Texas A&M University — and is the only Level II trauma center in the region.

Beverly Welch, St. Joseph’s ER and trauma services line director, manages the Health System’s six EDs and five trauma programs. She is a big proponent of using data to guide and support daily and long-term management decisions. Since implementing the Optum™ ED PulseCheck EMR at St. Joseph in 2011, she has been able to do just that.

“You always have perceptions about what the issues are but unless you have the data to support it, you are not able to really make big changes,” says Welch. “Having accurate data at your disposal lets you manage for daily improvement as well as justify bigger decisions.”

Data from St. Joseph’s ED EMR has propelled three important initiatives that have optimized or soon will optimize emergency care performance at the hospital:

- Building a new Level II Trauma Center
- Implementing a creative new staffing plan
- Initiating a sepsis campaign

Data-driven emergency department planning

St. Joseph is building a new emergency department at their main campus. Nearly every key decision made about the facility — from the go/no-go decision to build a new ED to the ideal number of beds, even the configuration of ambulance bays — was based on data pulled directly from their ED EMR system.

To build or not to build: It started with the decision to build a new ED. According to Welch, “Our saturation rates on our ED PulseCheck tracking board were going to Code Red frequently during the peak hours. If you looked at the numbers at certain times of the day, it justified going to diversion. We don’t do diversion, period. We are the only Level II trauma center in the area so there is no place to divert to except for a lower level of care, and we just can’t do that.”

When Welch and her staff drilled down into the numbers, it became apparent that they had maxed out the improvements they could make without increasing the number of beds, which was not possible in their current facility. This analysis was instrumental in the decision to build a new ED.

Fact over feeling

At St. Joseph, data from the ED EMR even helped determine the number of ambulance bays needed for the new facility. The hospital has had an increase in the number of patients arriving via emergency medical services (EMS) and air medical because it was recently designated as a Level II trauma center. Based on this increase, EMS management thought that they needed 10 ambulance bays.

Instead of relying on anecdotal evidence, ER and Trauma Services Line Director Beverly Welch once again went to the data. After an analysis, it was determined that the actual number needed to satisfy demand was four. The result: ambulance access was right-sized and overall project cost was lowered.
How many rooms? What kind? After the decision to build was made, data from the ED PulseCheck system was instrumental in a number of design decisions beginning with the number of beds that were needed. Welch examined system data relating to:

- Acuity levels
- Lengths of stay
- Bed usage by time of day

“By looking at our data pulls and factoring in future growth requirements, we were able to determine the exact number of beds we would need,” says Welch. Data from the system also helped determine specialty areas to be added in the new facility. By pulling diagnosis and patient-specific population types reports from the system, Welch was able to determine that the new facility would be best served with a designated geriatric area and a mental health/behavior health unit.

“Every key decision we made came out of data from ED PulseCheck,” says Welch. “We were able to determine the number of psychiatric, geriatric and bariatric beds we needed and the number of resuscitation rooms; how we can roll up or decrease the number of beds we have is based on throughput broken down by the hour.”

Staffing to need

St. Joseph used data from its ED EMR to optimize ED staffing. Before implementing ED PulseCheck, the ED had three shifts: 7 a.m., 7 p.m., and a mid-shift. By leveraging system data — most notably a “moment in time” report, which provides a snapshot of volume of activity in the ED at any particular moment — management was able to see all the peaks and valleys by day, week and month. This allowed them to staff to true operations.

“Looking at the data, we were able to see an increase in nurse-to-patient ratios at certain times of the day,” says Welch. St. Joseph is now staggering shifts based on that data. There are now seven nursing shifts: 7, 8, 9 and 11 a.m. and 1, 3 and 7 p.m.

The system’s “activity by day” report also proved helpful and led to assigning extra staff on Sunday, Monday and Tuesday — the ED’s busiest days of the week. The system’s “activity by month” report is particularly useful given that St. Joseph is located in a large university town and its population shrinks by 45,000 in the summer.

Establishing a sepsis protocol

St. Joseph received a CMS grant to support research on sepsis, a condition marked by the presence of pathogenic organisms or toxins in the blood or tissues that is a leading cause of death in infants and the elderly. As part of this effort, the department was able to use ED PulseCheck’s Insight ED, an advanced decision support tool that includes a rules processor, to send clinical reminders to nurses and physicians about potential sepsis patients.

According to Welch, “We were able to write rules that help identify potential sepsis patients, and it has really made a difference in the care we provide. ED PulseCheck scrubs the whole record, and if certain values are present — such as tachycardia, elevated lactic acid, infection, etc. — a notice is triggered to warn clinicians that this patient meets sepsis criteria.” ED personnel then follow the hospital’s sepsis protocol, which includes blood culture, antibiotic administration, antibiotic urine culture and moving the patient to a higher level of care.

Early treatment of sepsis greatly improves chance of survival, and the facts bear this out at St. Joseph. Based on data from Premier, an alliance of leading health care organizations, the hospital has saved 37 lives in the last 12 months when comparing expected versus observed mortality rates.
Erlanger Health System: Improving capacity management

Erlanger Health System is a multi-hospital system with five campuses located in Chattanooga, Tennessee. Tucked in the scenic mountains of southeastern Tennessee, Erlanger provides services to a tri-state region that includes parts of Tennessee, Georgia and Alabama. The tenth-largest public hospital in the U.S., with 813 beds, Erlanger is the region’s only Level I trauma center.

Effectively managing capacity in a large ED like Erlanger is extremely challenging. That challenge led Dewayne Siddon, RN, Erlanger’s EDIS coordinator, to look for ways to apply technology to improve capacity management and increase patient flow through the ED.

“Our primary goal is to get the patients to the most appropriate place for care in the hospital,” says Siddon.

In addition to its importance in ensuring quality care, effective capacity management is just as vital to ensuring the financial health of the hospital. “The hospital can lose revenue if we don’t effectively manage patient flow,” said Siddon. “For example, we can lose revenue if we can’t get our ED patients to inpatient beds in a timely manner.”

Siddon also pointed out that backed-up waiting rooms discourage patients from waiting for services, and ambulance crews, when they realize that there are no beds available for their patients, often go to other facilities even when a hospital is not on diversion.

Applying new rules to solve an old problem

Siddon saw the potential of mining data from Erlanger’s Optum ED PulseCheck EMR system to address capacity management challenges. Using the system’s built-in Insight ED rules processor, Siddon created a solution to help improve the flow of patients through the ED.

He created rules to track activity within the ED and proactively notify key personnel when conditions exist that require immediate attention. “The rules processor is fairly easy to use,” says Siddon. “We use it, in combination with the system’s reporting capabilities, to address capacity management issues.” The ED has been using the solution that Siddon developed for more than four years.
Color brings ED status into focus

Erlanger’s capacity management program is focused on providing the best care possible by minimizing delays and getting patients to the right place at the right time. As part of this initiative, Erlanger has identified four ED capacity management levels, which Siddon characterized as follows:

- **Blue and Green:** “These equate to normal operation and, while displayed on the Optum ED PulseCheck tracking board, do not generate an email notification.”
- **Yellow:** “This is a heads-up and tells management and staff that they need to start working on the issue.”
- **Purple:** “Need to drop everything and figure out a way to fix the issue.”

The ED automated notification solution that Siddon developed identifies and notifies key personnel when yellow and purple conditions exist. The system tracks a host of different parameters and then assigns a score to each. For example, if there are more than four patients in Triage Level One, two points are added to the score. If the number of patients in ED overflow is more than six, add one point. Once the total score reaches 16, a yellow capacity management notification is sent. A score of 60 triggers a purple notification.

When yellow or purple scores are reached, the system automatically sends an email notification to these people:

- Director of emergency services
- ED nurse manager
- Relief person for nurse manager
- Logistics director (for inpatient admissions)
- EDIS coordinator

The system is programmed to limit notifications to once or twice per hour. This was done because the status changes rapidly in a large, fast-moving ED and multiple conflicting messages cause confusion.

Automation provides a more accurate picture

Before the automated notification system, the charge nurse in the ED had to decide when they needed to notify someone for extra help. The automated rules-based system offers accuracy not achievable with a manual or “seat of your pants” approach. First, it’s more consistent, since it runs off the same parameters every time. Next, it’s automated, which means the charge nurse doesn’t have to stop her important work to make phone calls. Finally, it’s quantitative, which eliminates subjectivity. “How loud the physician is yelling at the moment doesn’t play into this anymore,” says Siddon.
Improving performance and tackling difficult challenges

The automated notification solution has dramatically improved flow for patients treated and discharged from the ED. Until recently, Erlanger had significantly improved ED/inpatient admission times as well. “We were doing fine until the Affordable Care Act kicked in,” says Siddon. “Before that, we had our admission times comparable to or just a little longer than a normal ED stay.”

The hospital is now taking proactive steps to meet the recent ED/inpatient admission challenge. A new rule was created that sends out notifications four times per day that indicate the number of patients who are holding in the ED awaiting inpatient beds.

In addition, a set of reports was developed to track the steps required to admit a patient after the admit decision is made by the ED physician. These include:

• How long does it take for residents to write orders after the inpatient bed request?
• How much time elapses from the bed request until getting the inpatient bed?
• How much time does it takes to get the patient moved from the ED once the bed is assigned?

These reports are helping pinpoint the parts of the process that are causing delays. Once understood, capacity management rules will be developed to address those particular problems.

In parallel, the logistics director in charge of inpatient admissions is using data from the ED EMR to address the problem from the inpatient side. For example, at 5:30 a.m., a housewide capacity management notification is sent out that shows the status of every unit. This includes critical information from the ED such as capacity status (green, blue, yellow, purple) and number of patients waiting in the ED and the complaint (orthopedic, diabetic, etc.). In addition, notifications from the ED EMR help management determine when emergency bed meetings need to occur, which include representatives of inpatient units, to review what needs to be done to decompress the ED.

At Erlanger, capacity management is an iterative process. “Although we’ve been using the system for more than four years, it’s still a work in progress,” says Siddon. “We continue to mine data from our EMR and make adjustments to our rules in order to improve performance.”
Cape Cod Hospital: Meeting an ambitious mandate

Cape Cod Hospital is a 259-bed acute care hospital located in the seaside resort town of Hyannis, Massachusetts. Despite the hospital’s size, it boasts one of the busiest EDs in New England, providing emergency services to 90,000 patients annually.

In 2008, Cape Cod Healthcare System’s CEO issued the ED a challenge: “Get 90 percent of patients to an ED bed in 25 minutes or less.” At the time, the average wait time to see a doctor was 45 minutes — which is about standard for EDs nationally. In summer, wait times were much higher because of the huge influx of tourists on the Cape.

“Fortunately we went live with our Optum ED PulseCheck EMR at about this time,” says Liz Kelley, the Emergency Center nurse manager. “Without the system, we wouldn’t have been able to get a hold of the data needed to tackle such an imposing challenge.”

Addressing the challenge

Once the mandate was issued, Kelley started by using data from the system to understand what was truly going on in the ED. Using reports, including timeline reports, which showed what was happening every day and every hour, and turnaround time and occupancy reports, she was able to collect metrics that were key to making meaningful changes. According to Pamela Mason, senior EDIS analyst at Cape Cod Hospital, “Liz is a wizard at analyzing data. She helps bring issues into focus so we can consider how to improve the team.”

The data showed what times of day the goal was being met and when it was not. Also, tracking ED patient arrival times revealed some surprising trends. “We thought patients started flocking in about 11 a.m., but the data showed us that the flow really started more around 10 a.m.,” says Kelley. “This led us to bring in some nurses and physicians earlier.”

Transforming triage

Kelley was able to use the metrics to show her staff that if the waiting room started backing up in the morning, it never got unclogged. As she is fond of saying: “Nothing good happens in an ER waiting room.”

After a careful analysis, Cape Cod ED management decided to make a major change in the way they did triage. Previously, a nurse got a complete history before assigning a patient bed. While the triage nurse was spending 20 minutes with the patient, other patients began lining up. This meant that the fifth patient in line was automatically going to have a wait of over an hour.

Kelley and her staff decided it was time for a change and initiated what they’ve dubbed the “half-T” system. A triage nurse now does a quick check-in, logging key elements for triage like chief complaint, and then gets the patient to a bed as soon as possible. Once in a bed, the primary nurse gets the remainder of the history. As a result they went from having one triage nurse to having 10. According to Kelley, this broke the bottleneck. “Within six months we were able to cut our average door-to-doc time down to 23 minutes.”

Mandate met

The new triage system and the elimination of geographic nursing assignments have delivered impressive results:

- The ED was able to meet the CEO-issued mandate of getting 90 percent of patients to an ED bed in 25 minutes or less.
- Patients are happier. Press Ganey patient satisfaction scores have met the hospital’s aggressive goals of scoring over the 90th percentile; currently they are in the 99th percentile.
- Physicians and staff are happier as well, since they are no longer walking in on patients who are already upset because of the wait.
A geographic change that actually works

Another change that the ED EMR system helped foster was how nurses were assigned to patients. In the past, nurses were assigned to rooms geographically. For example, a single nurse was assigned rooms 1 through 4. If a high-acuity patient was in one of the rooms, the patients in the other three rooms would naturally receive less attention. “It was as if the other rooms were blocked off,” says Kelley. “Nurses just wouldn’t cross the line.”

With the help of the tracking board from Optum ED PulseCheck, Cape Cod was able to set up a team system with four nurses having 10 rooms assigned to them. Kelley is extremely pleased with the results. “Every patient still has a primary nurse, but the tracking board — which is user friendly and can be configured so that you see only your zone — lets nursing teammates know exactly what’s going on. If one has a really sick patient, the other nurses pick up the slack, which is the way it should happen.”

Overcoming skepticism and instilling confidence

Kelley has involved her staff in all the process and workflow changes the department has made and used data from the system to both encourage change and measure results. “When I first said that we were going to get 90 percent of our patients in beds in 25 minutes or less, the staff kind of laughed at me because wait times were two hours. When I was able to demonstrate, using data from the system, that we actually could do it, then the staff got excited. They felt that it was an attainable goal, and they were willing to make changes.”

Feedback helps as well. Having quantifiable goals, and the tools to measure them, not only drives change but also motivates the staff. “When you tell them what the goal is and how they are doing, they want to meet or surpass expectations,” says Kelley.

Tackling other problems

Based on the success of meeting the wait-time mandate, Kelley and her team have taken on several other initiatives/changes driven by data from their ED EMR:

**Chest-pain protocol:** They set and achieved a goal of getting EKGs done within five minutes for 90 percent of patients who present with chest pains. “The staff was willing to try it because I could tell them exactly how many patients were presenting with chest pains and how we were doing,” says Kelly. “There was not the overwhelming number of patients that we thought there was. It proved it was doable.”

**Inpatient admissions:** After consulting the data, Cape Cod ED management recently set the following goal: 90 percent of the time, hospital admissions should move out of the ED in 30 minutes or less once an inpatient bed is assigned. This is a shared goal with inpatient staff in the hospital. “We share data with inpatient nurses and let them know that they are doing a good job. Without their cooperation, we couldn’t get patients upstairs,” says Kelly. While they have not yet reached the 90 percent goal, they have reduced the wait time to move to an inpatient bed after bed assignment from an average of 90 minutes to less than 30 minutes.

**Callback program:** Cape Cod EDIS developed a custom report using system data that is used to call back patients two days after they are discharged home if the patient is either over 55 years old or under 17 years of age. The report provides a list of patients who meet the criteria, with their phone numbers and language to be used on the call. The nurses use the report to call, and they chart as they go.
Conclusion

Emergency departments play a vital role in the modern health care system. Annual visits doubled between 1997 and 2007, and EDs now account for approximately half of U.S. hospital inpatient admissions. Yet despite this growth, the number of EDs has actually declined. As a result, EDs are now trying to manage this explosive growth while faced with dwindling resources. This troubling dichotomy can adversely affect care, patient satisfaction, and ultimately the financial success of the department and the entire hospital.

As demonstrated in this paper, automation can play a pivotal role in optimizing performance and meeting the difficult challenges facing today’s EDs — regardless of the size of the facility, its location, its patient population or its service level. The success stories at St. Joseph, Erlanger and Cape Cod prove that mining data from a robust ED EMR system can optimize clinical performance in the ED, which can lead to improved efficiency, increased revenues and lower costs. The result: better patient satisfaction and a more positive bottom line for both the ED and the entire hospital.

Optum ED PulseCheck

Optum ED PulseCheck is the nation’s number one electronic medical record for emergency departments. Facilitating more than 42 million emergency care visits per year, ED PulseCheck streamlines every ED task to improve patient care, caregiver satisfaction and hospitalwide efficiency.

ED PulseCheck provides a complete set of operational and management tools including:

- Fully integrated tracking board
- Advanced clinical decision support and rules
- ePrescribing
- Integrated charge capture from documentation
- Customizable ED dashboard for key performance metrics
- Scribe workflow support
- Information sharing and management reports
- Seamless interoperability and bidirectional information flow

References