

## Menu Case Study: Sepsis

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**Menu Item:** Sepsis

### Executive Summary

In 2007 Lakeland started a sepsis initiative. The program began with the Intensive Care Unit and preventing catheter related infections. The initiative grew to be organizational wide with an aim of not only preventing but recognizing sepsis in the earlier stages with the intention of goal directive treatment. Lakeland struggled with producing top decile results. It wasn't until the implementation of the electronic health record (EHR), in 2012 was Lakeland able to reach the desired results. Lakeland was able dramatically decrease and sustain the mortality rate to surpass the top decile baseline and save 62 lives.

### Background Knowledge

"Sepsis, also known as blood poisoning, is a serious medical condition characterized by a whole-body inflammatory state caused by microbes in the blood. Estimates indicate that more than 200,000 patients die in the U.S. each year from severe sepsis and that the annual cost of caring for patients with severe sepsis and septic shock is nearly \$17 billion."<sup>1</sup> The incidence is increasing despite the major advances in the development of antimicrobial agents and other supportive treatments. Septic patients often succumb to systemic inflammatory response, of which multiple organ failure is a main complication.<sup>2</sup> However, over the past decade there has been a large push to affect the patient's clinical outcomes by treating in the first 6 hours with a sepsis bundle. Comparative studies have shown that implementation of a sepsis bundle activated within the first six hours lead to:

- 43% mortality rate before vs. 29% mortality rate after
- LOS was 5.1 days shorter
- 24-Hour APACHE-II and SOFA scores were significantly lower<sup>3</sup>

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<sup>1</sup> Michigan Health and Hospital Association (n.d.). *MHA Keystone Center /Emergency Room*. Retrieved May 12, 2014, from <http://www.mhakeystonecenter.org/collaboratives/sepsis.htm>

<sup>2</sup> Scott MJ, Godshall CJ, Cheadle WG. Jaks, STATs, Cytokines, and Sepsis. *Clin Diagn Lab Immunol*.2002;9:1153–1159

<sup>3</sup> Cannon CM et al. The GENESIS Project (GENeralized Early Sepsis Intervention Strategies): A multicenter quality improvement collaborative. *J Intensive Care Med* 2012 Aug 17

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According to the Society of Critical Care Medicine's "Surviving Sepsis Campaign," studies suggest a screening tool to improve early recognition of early sepsis and implementation of an order set to facilitate goal directed treatment of presumed sepsis.<sup>4</sup> We proposed that a Best Practice Advisory (BPA) would alert allied health care providers of patients meeting systemic inflammatory response syndrome (SIRS) criteria. This would assist in identifying potential septic patients and facilitate early intervention leading to better outcomes. SIRS criteria were set as follows:

- Temperature > 100.4 degrees Fahrenheit
- Heart Rate > 90 beats per minute
- Respiratory Rate > 20 breaths per minute
- White Blood Cell count > 12,000

### Local problem being addressed and Intended Improvement

With an electronic health record implementation, a hospital's ability to standardize elements of care through order sets or alerts greatly increases. Unfortunately, this sometimes leads to increases in the cost of care because tests (both laboratory and imaging) are pre-checked or are harder to not order than they are to let them be. With data from the electronic health record, Lakeland's Emergency Medical Staff are able to better identify sepsis patients and quickly intervene with proven targeted therapies and tests. These include: emergent lactates and blood cultures for identification, early crystalloid therapy and antibiotic intervention. The implementation of an active screening tool that incorporates the SIRS criteria and alerts the provider of potential early sepsis through a "pop up" BPA would assist in identifying potential septic patients and thus would initiate earlier recognition and treatment, leading to improved outcomes. This initiative was bundled with a sepsis order set as well as preferred antibiotic orders set for specific infections.

### Design and Implementation

After switching over to an electronic health record in February 2012, Lakeland formed a multi-disciplinary Sepsis Committee with representatives from the following departments:

- Emergency Department Nurses/Providers
- Intensive Care Nurses/Providers
- Pharmacy

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<sup>4</sup> Society of Critical Care Medicine (n.d.). *Surviving Sepsis Campaign | Protocols and Checklists*. Retrieved May 12, 2014, from <http://www.survivingsepsis.org/Resources/Pages/Protocols-and-Checklists.aspx>

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- Performance Support
- ConnectCare (Analysts/Trainers)

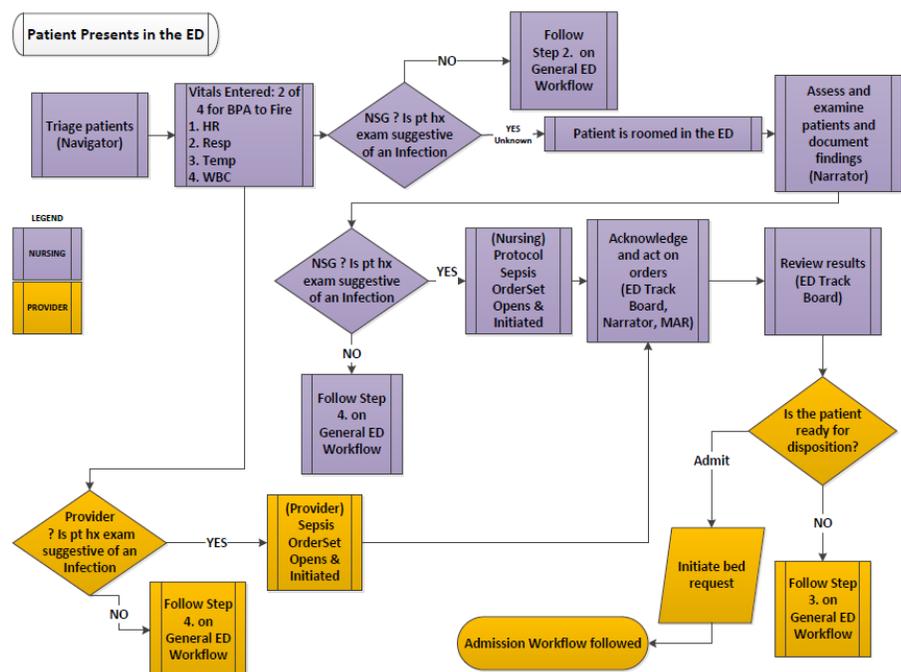
The group would focus on sepsis workflow within the emergency department. The committee set a goal to identify a workflow within the electronic health record system for standardization with recognizing and treating potential septic patients with early intervention within emergency department processes. In addition, it would be necessary to identify the education needed for the clinical staff when dealing with potentially septic patients by focusing on the key interventions that need to be completed in a time sensitive manner.

A process flow chart was designed and necessary steps were strategically placed within the emergency department patient's throughput process. The group identified that a clear sepsis protocol was missing. They designed and implemented one for nursing staff to follow for potentially septic patients. The goals of the sepsis protocol are early fluid resuscitation and diagnostics testing. A sub-committee was formed also using the multi-disciplinary approach when designing and validating a treatment order set for the emergency clinician. The order set sub-committee consisted of an Emergency Department Physician, Intensive Care Physician, Infectious Disease Physician, and a clinical pharmacist. Once complete, the order set was taken to the Sepsis Committee for approval.

The Sepsis Committee monitored and reviewed key time frames with a sepsis patient's process. The Laboratory department monitored and reported the volume and timeframes of lactic acid tests being performed in the emergency department. Also, key data was validated to report out of the electronic health record system to meet MHA Keystone Sepsis criteria.

### How was Health IT Utilized?

The electronic health record opened doors to tools Lakeland had never had at their fingers tips before. Switching from paper to an electronic health record prompted a CCU Sepsis order set

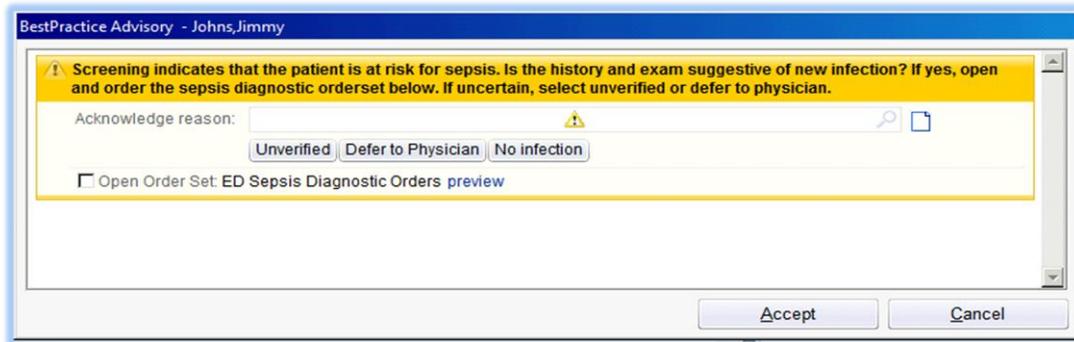


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to become electronically available and increased levels of transparency. Clinicians were able to see the hospital problem list without searching through a paper chart.

In the emergency department, the group deployed two BPA's (triggered every 4 hours with applicable criteria) and two order sets that standardized the clinical pathways. The BPA's in particular prompt clinical staff to be aware of sepsis. The first BPA notifies the nurse and the second BPA notifies the emergency department clinician. SIRS criteria were used as the basis of the BPA prompting the clinical staff to answer, "Is the history or exam suggestive of a new infection?" The nursing staff completes the sepsis BPA question with three options:

- Unverified – this will close the BPA but it will open again the next time the chart is opened.
- Defer to Physician – this will close the BPA and nursing must notify the physician.
- No infection – this simply closes the BPA and ceases it from opening again.

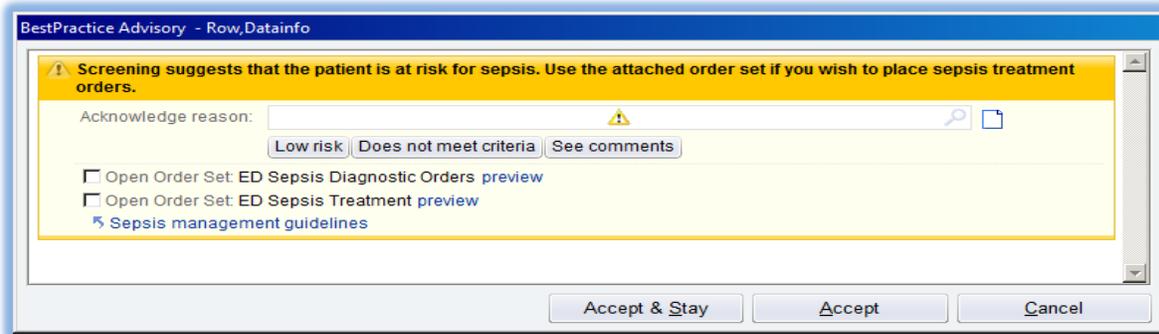


Within the BPA, the nurse is prompted to implement the Sepsis Diagnostic order set. She/he can order the protocol orders approved for potential septic patients and even begin acting on them. The protocol diagnostic order set includes the following labs and procedures needed for septic patients including but not limited to:

- Complete Blood Count (CBC)
- Comprehensive Blood Panel (CMP)
- Lactic Acid
- Urine Analysis (UA)
- Two sets of Blood Cultures
- Electrocardiogram (EKG)

At the same time, a BPA notifies the emergency department clinician. If not already done by the nurse, the clinicians are able to open a diagnostic order set and treatment order set for sepsis. The treatment order sets outline the specific antibiotics needed and replacement antibiotic in case of allergies.

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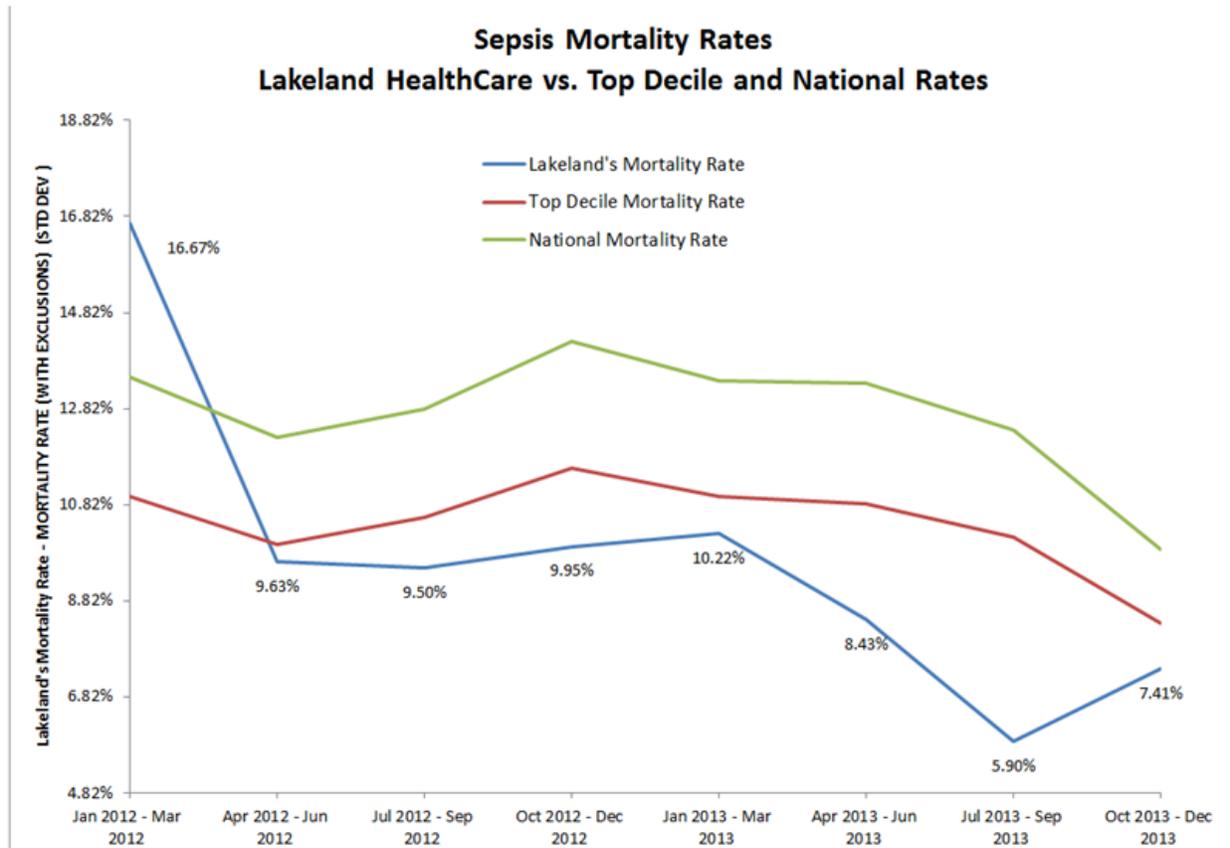


For reporting and monitoring purposes, a sepsis “button” was built into the emergency department’s disposition process which would essentially tag the patient’s chart. The group realized that there was benefit in being able to track and monitor patients free from coding, billing, diagnosis or other more traditional identifiers. For monitoring, we use a dashboard with various process goals that are reviewed on a monthly basis at each Sepsis committee meeting. These process goals include reviewing lactic acid lab orders for septic patients as well as the turn-around time to result the test. This helps to assure compliance with the implemented sepsis workflows. Along with sepsis, there was a button created for stroke and trauma patients as well. While the downsides are a possible misuse of the button and unwritten criteria for its use, the benefits have thus far outweighed those concerns.

### Value and Outcomes

The electronic health record (EHR) system was implemented in Feb-May 2012. Almost immediately, we were able to see an effect on the mortality rate of patients later coded with a DRG of Sepsis (870, 871 or 872). In the second quarter of 2012, Lakeland saw immediate effects of their Sepsis treatment changes. In the first quarter of 2012 the mortality rate was 16.67 % and in quarter two it decreased to 9.63 %. The initial three months of the implementation of the EHR the mortality rate drop 7%.

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The initial plunge was extraordinary, but perhaps more surprising was the sustainment of the progress. As the sepsis programs took hold and education increased, there were other EHR-based tools that were deployed. By utilizing “in the trenches” decision support as well as a uniform strategy, mortality rates fell further in 2013. While they did rise in the fourth quarter of 2013, seasonal fluctuations are expected and were still 2.5% lower than the same quarter in the previous year.

The comparison rates are based on data from The Advisory Board’s Crimson Clinical Advantage tool. The tool is able to compare the two different cohorts to Lakeland’s performance using 3M’s APR-DRG committee, which takes into account case characteristics like diagnosis related committee and severity/complications. There are myriad avenues of dissection with this data, but the bottom line is Lakeland’s mortality rate for sepsis patients is among the best in the nation and has been shown to be controlled to the point of statistical stability. Comparing national percentages and hospital percentages to our actual volumes and along with Top Decile, Lakeland saved 62 lives, where Top Decile saved 24 lives.

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We will continue to monitor and reevaluate the information. Though we are confident that a two year same is significant enough to celebrate some successes, a lack of pre-2012 data is seen as a shortcoming to our analysis.

### Lessons Learned

#### **Real-Time Automated Notifications Are Necessary**

In discussions within the sepsis committee meetings, agreeing on the right tool was a challenge. Members were hesitant to implement a BPA based on SIRS fearing that this would be a nuisance and would be ignored rather than used as a decision support tool. Having researched and reviewed documentation from hospitals that implemented similar programs made it clear that BPAs are the ideal solution. Real-time notification is imperative to start early fluid resuscitation and antibiotics when diagnosing and treating a septic patient within the first 6 hours. The BPA was vital to recognize patients that are potentially septic, and notifies staff. Without the BPA, the thought of sepsis may have never crossed their mind.

#### **Get Buy-In From Those Impacted**

An initial team was assembled consisting of clinical members from the emergency department and intensive care. Inpatient team members were added at a later date. This impacted the time-frame of the project by delaying implementation of the sepsis screening tool on the inpatient side. Duplication of effort was necessary to obtain buy-in from the inpatient key stakeholders. In hindsight, involving inpatient members at the beginning would have alleviated these setbacks.

#### **Understanding is Key to Success**

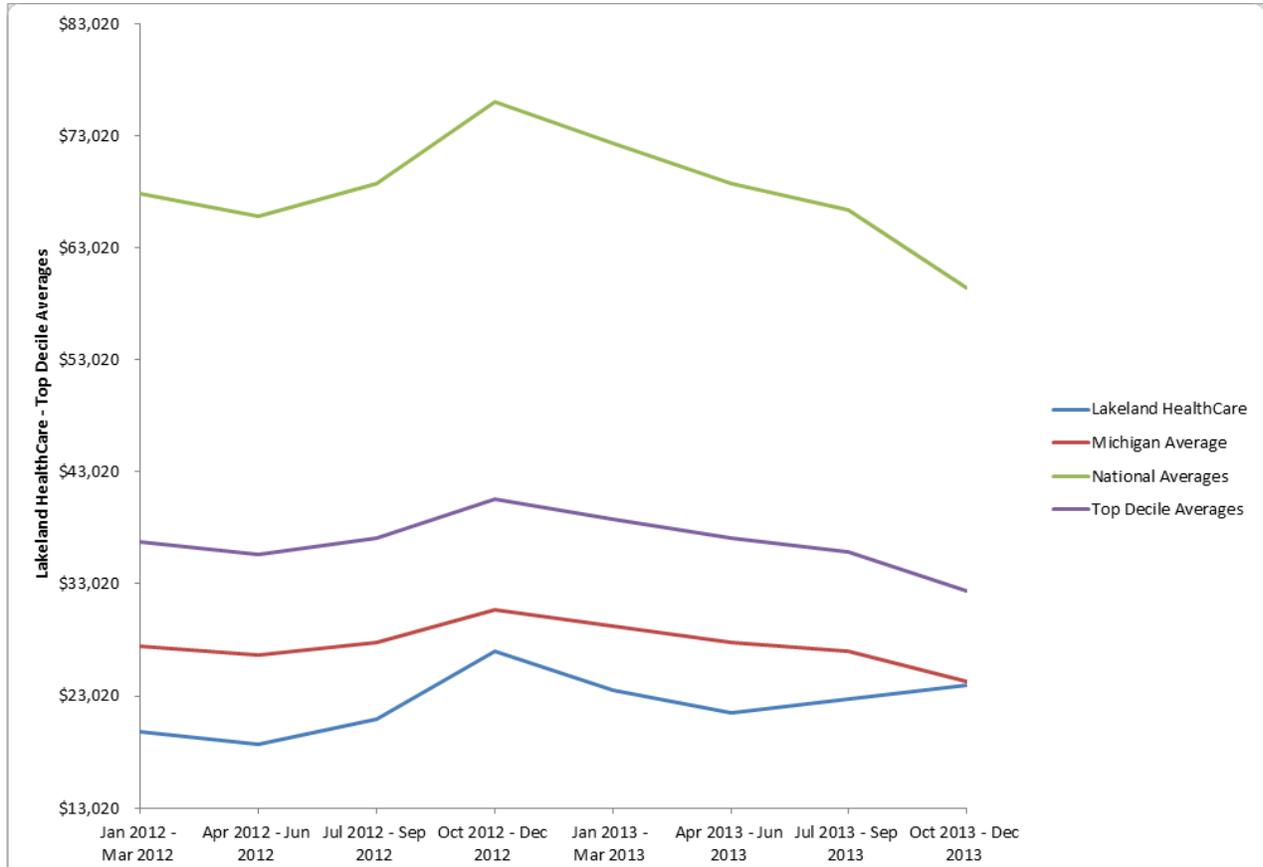
Education on SIRS criteria and understanding why the intervention is necessary is essential to successfully identify and treat septic patients. The clinical staff should be required to know SIRS criteria and septic patients are a true emergency and time is a factor. With this knowledge they are able to identify the logic behind the BPA built in EHR system. Understanding increases compliance in completing essential protocol processes. The emergency department staff increased the number of lactic acids ordered on septic patients and fluid resuscitation was initiated within hours of the emergency visit. Once one experienced nurse mastered the workflow, other nurses started modeling after. Nursing staff became empowered.

#### **Financial Considerations**

In terms of economic value, Lakeland HealthCare continues to be a leader in sepsis care. It is difficult to compare cost effectiveness across hospital committees, though the Crimson tool does give benchmarks for charges. Lakeland's charges to patients have remained in the low to mid \$20,000 range while comparative data shows an average of \$60,000 to \$70,000 nationally.

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Concentrating on state averages, which probably are a more fair comparison, we still continue to provide exceptional value.



We hope to show not only that Lakeland is delivering excellent value to the community, but to also show that the clinical interventions aren't hinging on expensive tests or treatments. We were able to control costs while deploying a purposeful, evidenced based set of interventions that resulted in improved outcomes for our patients. A true return on investment is a return on lives, from the implementation of the electronic health record to beginning of quarter one in 2014 not only were we able to drop our mortality rate, we also were able to save an estimated 62 lives, in comparison to the Top Decile with an estimated 24 lives.

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