

Decreasing Sepsis Mortality at a Community Hospital

An Interdisciplinary Quality Improvement Project

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Mills Peninsula Medical Center (MPMC)

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As a hospitalist having cared for thousands of sepsis patients, this is an initiative I hold dearly and am proud of our teams' work. Our sepsis initiative has been purposeful, measurable and multidisciplinary. We have driven down our sepsis mortality from greater than 40% to 12%, but rather more meaningful, saved 66 lives in the past year at Mills Peninsula Medical Center. We continue to identify drivers, implement innovative interventions and educate our providers to promote evidence based practices. Ultimately, we are meeting and hopefully exceeding the needs of our community who entrust their care in our hands.

- Ranjit Hundal, MD, Chief Medical Officer

Executive Summary (< 200 words)

Sepsis is a serious, life-threatening disease. According to National Center for Health Statistics, over one million patients each year in the United States, are diagnosed with sepsis. The mortality rate of these patients diagnosed with sepsis is estimated to be 28 to 50 percent.

When we embarked on our improvement journey in 2009, our combined severe sepsis and septic shock mortality rate was **40%**. Through implementation of evidenced-based best practices and the development of innovative interventions, we saw a **72%** reduction in sepsis mortality. This success was achieved through integration of efforts by an engaged multidisciplinary team. Additionally, both physician and organizational leadership played a key role in ensuring sustained focus by adding this initiative to the organizational dashboard. In this way, the reduction goal was aligned with the organizational financial incentives.

As part of a large not-of-profit health system, which provides doctors, hospitals and other health care services in more than 100 Northern California cities and towns, we plan to share our roadmap for success with the hope of decreasing sepsis mortality for many more people.

Our efforts are dedicated to the **152** lives that have been saved so far by our improvement efforts compared to 2012 baseline data.

Background and relevance of the problem being addressed and effort undertaken:

The CDC reports that sepsis kills more than 258,000 Americans each year and leaves thousands of survivors with life-changing after-effects. According to CDC, it is the ninth leading cause of disease-related deaths. Additionally, the National Center for Health Statistics cites that the cost for treatment of sepsis accounts for an estimated \$20.3 billion or 5.2 percent of the total cost for all hospitalizations and that sepsis was the most expensive condition treated in the year 2011. For these reasons, we felt we had a moral imperative to address this issue.

Since 2009, sepsis mortality reduction efforts have been taking place at MPMC. These efforts were funded initially by a Gordon and Betty Moore Foundation Grant. In two years, MPMC was able to achieve significant reduction in combined sepsis and septic shock mortality from 40% to 28%. We continued to improve and by 2011, we had dropped our combined sepsis rate to below 18%. **Appendix 1: Combined Severe Sepsis and Septic Shock Mortality 2009 – 2015**

Though this was an outstanding achievement, we still felt that “good wasn’t good enough” and In April 2014, MPMC joined a system collaborative effort to further reduce sepsis mortality by developing standard work through Lean methodology for early recognition and treatment of the septic patient. Additionally, in December 2014, MPMC volunteered to be a pilot hospital to implement the standard work and integrate the protocol into the electronic medical record.

In 2015 and 2016, we focused our efforts on sustainability and spread. **Appendix 2: Sepsis Mortality Reduction Initiative Timeline (2009-2016)**

Describe the effort

Scope

There were 2 sequential initiatives in this project.

For the first project in 2009; we successfully strove to reduce combined sepsis mortality by 30% in 2 years by implementing the best-practice bundle and integrating the bundle into the Electronic Medical Record (eMR). **Appendix 1: Combined Severe Sepsis and Septic Shock Mortality 2009 – 2015** As you can see from the data, we met our 2009 goal and continued to improve in the subsequent years.

In 2014, we realized our early improvements were not being sustained, so we revisited the effort and added sustainability as a component. **Appendix 3: Process Behavior Chart – Combine Severe Sepsis and Septic Shock Mortality (2011-2016)**

For this second initiative, the aim of MPMC was to reduce combined sepsis mortality from 15% to 10.5% by end of 2016 by focusing on early recognition and treatment of sepsis in the ED and in the acute care areas. We also included critical changes in the organizational structure to ensure the efforts would be sustained.

Process

A key component of our strategy was the formation of an interdisciplinary MPMC Sepsis Committee made up of hospital leadership, physician champions, nursing champions, pharmacy, laboratory, nurse managers and quality improvement staff that is charged with guiding efforts to reduce sepsis mortality by analyzing data to identify opportunities for improvement. Early on, the Sepsis Committee identified gaps in sepsis screen completion and accuracy. Data analysis also revealed variability in compliance with specific bundle elements and barriers to disposition of the patient to the right level of care.

Strategies

The committee decided to focus on 2 key drivers to reduce sepsis mortality:

1. **Early detection:** Increase RN screening completion and accuracy.
2. **Timely, appropriate treatment:** Increase 3-hr and 6-hr bundle compliance through following sepsis care standard work

Tactics utilized

DRIVER #1: Early detection

- A 3-hour training was developed and implemented for all ED and Acute-Care RNs. The training covered the following elements:
 - Definitions for SIRS, sepsis, severe sepsis and septic shock

- Review of Surviving Sepsis Campaign bundle history
- Brief summary of ProCESS, ARISE and ProMISE trials
- Review of standard work for sepsis bundle
- Review of sepsis screen procedure with focus on completion, accuracy and documentation in the electronic health record
- Review activation of Rapid Response Team
- RN Sepsis Champions peer-to-peer knowledge transfer with colleagues
- Nurse Managers use sepsis screen completion reports to follow up with nursing staff that have documented incomplete sepsis screens
- Sepsis Coordinator performs concurrent audits for screening compliance and accuracy with just in time coaching with bedside RN
- One-to-one follow up for coaching and education as needed by Sepsis Coordinator
- Compliance data is reviewed, analyzed and used to design interventions for continuous process improvement utilizing the Institute for Healthcare Improvement (IHI) Model for Improvement Methodology. **Appendix 4: Early Detection: RN Screening Accuracy by Location**

DRIVER #2: Timely, appropriate treatment

- Capitalize on eMR functionality (capturing time zero, order sets, nursing handoffs between levels of care)
- Sepsis Coordinator attends RRTs to support standard work and bundle compliance
- Real time Physician Champion support, as needed
- Retrospective Opportunities for Improvement letters (OFIs) for physicians and nursing to address care gaps (**Appendix 7 & 8- Physician & Nursing Letters**)
- Concurrent review bundle compliance by Sepsis Coordinator to identify opportunities for coaching/education and recognition of a job well done
- Standard work implemented to recognize sepsis early and mobilize resources by activating Rapid Response Teams (RRT)
- To facilitate early detection and rapid implementation of sepsis bundles, RRT process was revised to include an RRT-Sepsis Alert. By calling for an RRT-Sepsis Alert, an RN is able to activate a medical-staff approved protocol that allows for IV administration and immediate blood lactate testing
- Compliance data is reviewed, analyzed and used to design interventions for continuous process improvement utilizing the Institute for Healthcare Improvement (IHI) Model for Improvement Methodology. **Appendix 5: Timely, Appropriate Treatment: Core Sepsis Bundle Compliance by Month**

Examples of Innovation:

- a. Best Practice Alert (BPA) to provide clinical decision support to physicians was built into the eMR for positive sepsis screens
- b. For positive sepsis screens; a rule was built in the eMR to auto repeat lactate orders
- c. All nurses at MPMC go through simulations with a high-fidelity interactive mannequin and subject matter experts to test sepsis screening and treatment competencies
- d. Sepsis attitudes survey was administered to physicians

Example of integration:

- a. ED to ICU handoffs – MPHS establishing of eMR tool for handoffs

- b. Required integration of IT, physicians, nursing, pharmacy, lab, page operators (calling of RRT, sepsis alert, code sepsis), and quality improvement. **Appendix 6: Dr. Everett – All Staff Assembly Video: Sepsis**
- c. Pharmacists staffed in ED – validation on-the-spot and they walk the antibiotics to the nurse. They’ll also make suggestions on appropriate antibiotics.

Challenges encountered and how they were addressed.

There have been several key challenges in our sepsis mortality reduction journey:

Challenge	Intervention
Some physicians are reluctant to give fluid bolus to patients with congestive heart failure or end stage renal disease, even when the patient is in septic shock	<ul style="list-style-type: none"> • Continuing Education (CE) session • Opportunity for Improvement Letters (Appendix 7 & 8- Physician & Nursing letters) • 1:1 follow up and coaching by physician champion • Dissemination and discussion of supportive literature
Nurses reluctance to call RRT for patients meeting criteria for a positive sepsis screen.	<ul style="list-style-type: none"> • Knowledge gap analysis followed by targeted education • “Measurevention” – combining real-time auditing and 1:1 follow-up to change behavior, i.e., concurrent course correction • 1:1 coaching • Competency validation • Frequent messaging to encourage “doing the right thing” and calling an RRT-Sepsis when needed
Variability in screening completion and accuracy	<ul style="list-style-type: none"> • Nurse Managers use sepsis screen completion reports to follow up with nursing staff that have documented incomplete sepsis screens • Sepsis Coordinator performs concurrent audits for screening compliance and accuracy with just in time coaching with bedside RN. • Recruit and train unit champions to disseminate information, act as resources and drive change • Closely tracked, monitored and shared data at interdisciplinary sepsis meetings

Describe the results of the effort

At the start of our journey in 2009 to reduce sepsis mortality the mortality rate for combined severe sepsis and septic shock was 40%. Our current year to date mortality for **YTD 2016 is 11%**, which represents a 72% reduction. Appendix 9: **Annotated Run Chart-Severe Sepsis and Septic Shock Mortality Rate.**

Results were measured through the following methods:

- Chart audits
- Reports generated from eMR and financial software applications

Discuss the significance of the results. How do the results demonstrate outstanding achievement?

Using the Institute of Healthcare Improvement (IHI) Return on Investment (ROI) methodology, the reduction in sepsis mortality from 2012 to 2016 has resulted in 152 lives saved and a decrease length of stay which demonstrates a cost savings of over 6.6 million dollars for YTD 2016. Appendix 10: **Lives and Costs Saved due to Severe Sepsis and Septic Shock Mortality Rate Reduction**

Describe sustainability and scaling of the achievements.

- We have built in the structure for sustainability by budgeting for two people (a Sepsis Coordinator and a Sepsis Clinical Nurse Reviewer) who manage sepsis. Additionally, we have four paid physician champions who were hand-picked to include representation for the intensive care unit and the emergency department. These resources would not be possible without our strong leadership support for this measure
- The interdisciplinary MPMC Sepsis Committee provides the structure for ongoing review of audits and case studies with intervention as needed. We are constantly looking for trends in practice to quickly course correct any drift.
- We utilize inter-departmental sharing and learning – especially our RN champions – these frontline staff help to drive and sustain the change
- The Sepsis Initiative is aligned with the hospital strategic goals. Sepsis performance is tracked on the organizational dashboard. The outcomes are tied to incentives for the entire organization
- We have scaled up the sepsis work to include screening in all acute-care areas of the hospital including the Family Birth Center
- Externally, we are a pilot site in a 24 hospital system. We are currently sharing our success roadmap with other system affiliates
- Additionally, we share our sepsis mortality rates publically (i.e. Centers for Medicare and Medicaid Services; Health Grades), to hopefully inspire other community hospitals with what is possible

Describe key lessons learned and any advice to colleagues who might try to undertake a similar effort.

1. Utilization of Physician Champions and Nursing Champions; you need both!
2. Multi-disciplinary approach is essential. It takes a team. We took time to ensure not just the right departments were represented but the right individuals in those departments who could effectively act as “change agents”.
3. Ensuring you have both outcome and process data. The addition of an ICU nurse for data abstraction allowed for concurrent review of the process changes.
4. Transparent displays of the data to show the progress from the nursing units to the boardroom helped to drive the improvement efforts throughout.
5. Use operational data for course correction and benchmark data to gauge performance. Just monitoring your data will not result in a change. Data must be reviewed with an eye in regards to what story the data is telling and what action needs to be taken.
6. Sepsis Coordinator to keep everything and everyone on track. We found it was key to have an Advance Practice Nurse to provide real-time oversight with physicians and nursing staff. This supported timely intervention and bundle compliance.
7. Senior leadership buy-in and commitment. Our leadership provided both personnel and other financial resources along with visible encouragement to the team.