

# Improving Identification of Hospitalized Patients with Sepsis



## EXECUTIVE SUMMARY

Patients who are diagnosed with sepsis present on admission (POA) account for nearly 85 percent of cases. However, outcomes for patients with sepsis not on arrival (NPOA) are poorer due to higher acuity of the sepsis at the time of diagnosis. Because of the challenge associated with the early identification of sepsis for hospitalized patients, those with sepsis NPOA have a mortality rate as high as 35 percent, making outcome improvements for this patient population a top priority for hospitals.

Mission Health, a comprehensive healthcare system located in Asheville, North Carolina, sees the early identification of sepsis as a key part of achieving its goal of providing exceptional patient care. However, Mission lacked a mechanism to assist the clinicians in differentiating between sepsis and the patient’s acute illness, making the early diagnosis of sepsis challenging, negatively impacting outcomes. With the help of data analytics, Mission was able to gain a comprehensive view of sepsis outcomes, so that improvement efforts that help clinicians identify and provide early intervention for patients who may be septic could be effectively implemented and sustained.

## RESULTS

- 45.3 percent relative reduction in severe sepsis and septic shock NPOA mortality rate.
- 14.4 percent relative reduction in length of stay (LOS) for patients with severe sepsis and septic shock NPOA.

## DIAGNOSING SEPSIS IN HOSPITALIZED PATIENTS REMAINS A CHALLENGE

Nationally, patients who are diagnosed with sepsis POA account for nearly 85 percent of cases. Outcomes for patients with sepsis NPOA are poorer due to higher acuity of the sepsis at the time of diagnosis. Mortality rates for patients with sepsis NPOA are as high as 35 percent.<sup>1</sup>

### HEALTHCARE ORGANIZATION

Integrated Delivery System

### PRODUCTS

- Health Catalyst® Data Operating System (DOS™) Platform
- Sepsis Prevention Advanced Application

### SERVICES

- Installation Services

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Early identification of patients who develop sepsis as a result of their hospitalization is challenging. This is a particularly vulnerable patient population, with a concurrent illness where subtle changes of early sepsis may go unrecognized and lead to higher mortality rates.

James Bates, MD  
Internist, Mission Health

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For patients who are already hospitalized, early detection of sepsis can be difficult, and failure to identify sepsis symptoms quickly is linked to higher mortality rates. Clinicians must differentiate sepsis from the patient’s other acute conditions that have similar signs or symptoms. The evidence-based quick sequential organ failure assessment (qSOFA) risk stratification tool is used to identify patients with an infection risk and higher risk for death from sepsis, facilitating early recognition and treatment to reduce mortality rates.<sup>2</sup>

Mission, based in Asheville, North Carolina, is the state’s sixth largest health system with six hospitals, numerous outpatient and surgery centers, and the region’s only dedicated Level II trauma center. Mission’s BIG(GER) Aim drives its daily work to improve outcomes by helping every person to achieve their desired outcome, first without harm, also without waste and always with an exceptional experience for each person, family, and team member. Early, accurate identification of sepsis is an important area of focus for the organization.

## LACK OF ACTIONABLE DATA SLOWS INPATIENT SEPSIS CARE

As part of its ongoing sepsis improvement efforts, Mission sought to identify methods to improve early sepsis recognition for hospitalized patients with sepsis NPOA. However, Mission lacked an effective mechanism to assist clinicians in differentiating between sepsis and a patient’s acute illness that may have similar signs and symptoms. This resulted in potentially delayed sepsis diagnosis and treatment, further contributing to higher-than-desired mortality and LOS rates.

The actionable data needed to make improvements was not readily available. Mission relied largely on manual chart review to obtain data, delaying the timeliness of data, and limiting the ability of leadership to identify and monitor improvement efforts.

## ANALYTICS IMPROVE IDENTIFICATION AND MONITORING OF SEPSIS IMPROVEMENT EFFORTS

Mission had established a multidisciplinary sepsis improvement team with representatives from all phases of sepsis care. The team was charged with establishing evidence-based early sepsis recognition and treatment care processes, with the [initial focus on the emergency care setting to address the sepsis POA population](#).

Mission had used an evidence-based sepsis screening alert, treatment order set and protocols, reducing mortality for patients in the emergency department (ED) with severe sepsis and septic shock. Following this

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The aim of the Mission Sepsis Team is to be smart consumers of the evidence, focused on the application of current science for the early identification and treatment of our septic population. Most importantly, we continuously ask ourselves how do we know we are making a difference for our patients. The answer to that question is what drives our team in our improvement efforts.  
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Jeanie Bollinger, MSN, RN,  
ACCNS-AG, CCRN-K  
Clinical Nurse Specialist  
Mission Health

success, the sepsis committee identified key strategies to translate the ED care processes to the inpatient settings.

The committee members developed and deployed an awareness campaign addressing early sepsis recognition, ensuring providers and registered nurses (RN) had a clear understanding of sepsis criteria, including subtle changes in vital signs that should be considered to differentiate sepsis from other acute illnesses.

Initial improvement efforts focused on adult patients admitted from the ED to a medical-surgical unit who did not have a sepsis diagnosis. A sepsis alert, including the qSOFA score, was built into the EMR to improve the recognition of sepsis in NPOA patients. Additionally, RNs assess each patient for organ dysfunction using the qSOFA once every shift. The alert assigns one point for:

- Systolic blood pressure  $\leq 100$  mmHg.
- Respiratory rate  $\geq 22$  breaths per minute.
- New change in mentation.

If the patient scores two or greater on the qSOFA, the alert prompts the RN to activate further sepsis screening and care activities.

- If the patient is stable, defined as mean arterial pressure (MAP)  $\geq 65$ , the RN orders lab tests and notifies the hospitalist when the lab results are ready for review.
- If the patient is unstable, defined as MAP  $\leq 65$ , the RN orders the same lab tests and activates the rapid response team to begin treating the patient using standard evidence-based orders.

The rapid response team and hospitalists use the standard order sets that are built into the EMR to drive evidence-based three-hour and six-hour bundle interventions, streamlining the ordering process and reducing sepsis care variation.

To gain insight into sepsis performance to identify and monitor improvement efforts, Mission leveraged the Health Catalyst® Data Operating System (DOS™) Platform, implementing the Sepsis Prevention Analytics Application. The analytics application is designed for clinicians, medical directors, operational directors, and clinical program guidance teams in the emergency, intensive care, and inpatient units. It provides near real-time actionable data to help improve early recognition of sepsis, early intervention for severe sepsis, and early therapy for septic shock to reduce mortality.

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Our team’s success comes from always striving for perfection, but never letting perfection be the enemy of good—meaning, we aim for rapid cycle improvements to get new ideas at our patients sooner. This team feeds off making a difference—and our results tell us we’re doing just that!”

Liz LaFitte, MBA, CSSBB  
Manager, Clinical Performance  
Improvement, Mission Health

Using the data within the analytics application, the committee can monitor performance on an individual patient, clinician, unit, and at a hospital level, enabling ongoing feedback on sepsis alert activations and bundled compliance, including how patient outcomes such as mortality and LOS rates are impacted.

In reviewing the data within the application, the lead hospitalist identified issues with accurate sepsis coding, impacting the accuracy of data used to communicate sepsis outcomes. With this new insight, the lead hospitalist was able to design and deliver ongoing education on documentation requirements, improving the accuracy of reports.

## RESULTS

By increasing sepsis awareness for clinicians caring for hospitalized patients and improving early recognition and treatment of sepsis NPOA, Mission has achieved substantial reductions in severe sepsis/septic shock mortality and LOS rates at Mission Hospital, resulting in:

- 45.3 percent relative reduction in severe sepsis and septic shock NPOA mortality rate.
- 14.4 percent relative reduction in LOS for patients with severe sepsis and septic shock NPOA.

## WHAT’S NEXT

Mission has begun to spread this effort across the system and continues to use PDSA cycles to further refine the inpatient sepsis screening to better identify time zero for sepsis interventions, with the goal of decreasing the time of initial antibiotic administration to within one hour of the sepsis alert. 📌

## REFERENCES

1. Rothman, M., Levy, M., Dellinger, R. P., Jones, S. L., Fogerty, R. L., Voelker, K. G., . . . Beals, J. (2017). Sepsis as 2 problems: Identifying sepsis at admission and predicting onset in the hospital using an electronic medical record–based acuity score. *Journal of Critical Care*, 38, 237-244. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0883944116302775>
2. Seymour, C. W., Liu, V. X., Iwashyna, T. J., Brunkhorst, F. M., Rea, T. D., Scherag, A., Rubenfeld, G., Kahn, J. M., Shankar-Hari, M., Singer, M., Deutschman, C. S., Escobar, G. J., . . . Angus, D. C. (2016). Assessment of clinical criteria for sepsis: For the third international consensus definitions for sepsis and septic shock (Sepsis-3). *JAMA*, 315(8), 762-74. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5433435/>

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Health Catalyst is a next-generation data, analytics, and decision support company committed to being a catalyst for massive, sustained improvements in healthcare outcomes. We are the leaders in a new era of advanced predictive analytics for [population health](#) and [value-based care](#) with a suite of machine learning-driven solutions, decades of outcomes-improvement expertise, and an unparalleled ability to integrate data from across the healthcare ecosystem. Our Health Catalyst Data Operating System (DOS™), a next-generation data warehouse and application development platform—powered by data from more than 100 million patients, encompassing over 1 trillion facts—helps improve quality, add efficiency and lower costs for organizations ranging from the largest US health system to forward-thinking physician practices. Our technology and professional services can help you keep patients engaged and healthy in their homes, communities, and workplaces, and we can help you optimize care delivery to those patients when it becomes necessary. We are grateful to be recognized by Fortune, Gallup, Glassdoor, Modern Healthcare and a host of others as a Best Place to Work in technology and healthcare.

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