

Data-Driven Approach Improves Evidence-Based Trauma Care



EXECUTIVE SUMMARY

Complex trauma systems require several individual processes to facilitate evidence-based patient care. The success of a trauma program's effectiveness in delivering high-quality patient care relies on the ability to continuously monitor process measures.

North Carolina's Mission Health trauma services provide evidence-based care. Despite its efforts to measure the impact of this care on outcomes, the overwhelming burden of manual data review limited its ability to effectively monitor key process measures in a timely manner. This prompted Mission to use data and analytics for timely insights into injury-specific process measure performance and concurrent chart review to improve trauma care. Results include:

- 4.4 percent mortality rate for patients with a traumatic spleen injury, well below the 7 to 18 percent national average.
- 3.8 percent mortality rate for patients with a rib fracture, well below the 10 percent national average.
- \$1.06 million annual savings, the result of a 17.5 percent relative decrease in average length of stay (LOS).

HEALTHCARE ORGANIZATION

Integrated Delivery System

PRODUCTS

- Health Catalyst® Data Operating System (DOS™) Platform
- Trauma Advanced Analytics Accelerator

SERVICES

- Professional Services

EVALUATING TRAUMA PROGRAM EFFECTIVENESS

Trauma systems are complex, requiring many individual processes to facilitate evidence-based patient care. Ongoing monitoring of process measures is key to evaluating trauma program effectiveness in delivering high-quality patient care.¹

One of the nation's leading providers of healthcare services, HCA Healthcare is made up of locally managed facilities that include 185 hospitals and 119 freestanding surgery centers located in 21 U.S. states and in the United Kingdom. Mission Health, an operating division of HCA, based in Asheville, North Carolina, is the state's sixth-largest health system and includes six hospitals, numerous outpatient and surgery centers, post-acute care



“We can now look at injuries and identify information that pinpoints trends. The ability to peel back layers is powerful. We can look at groups and subgroups with the ability to do things we could only dream about 12 months ago.”

William Shillinglaw, DO
Medical Director Trauma/
Critical Care Services at
Mission Hospitals

provider CarePartners, and the long-term acute care provider Asheville Specialty Hospital. It also has the region’s only dedicated Level II trauma center, Mission Hospital, which provides care to over 3,500 trauma registry patients annually. The organization sought to ensure the quality of its trauma systems.

MANUAL PROCESSES CREATE INCONSISTENCIES

Mission trauma services provide evidence-based care. Despite best efforts to measure the impact of the evidence-based care on outcomes, the overwhelming burden of manual data review limited the organization’s ability to effectively monitor compliance with key process measures in a timely fashion.

Access to data was delayed up to six months. The available trauma registry data was pulled from different sources, each with different definitions, requiring manual processes to discern the true meaning of the data, making concurrent case review difficult. The disparity in data definitions led to unclear expectations and inaccuracies or omissions in the documentation of grade/level of a spleen injury, impacting the decision process for definitive treatment.

Pain management after a rib fracture varied widely by clinicians, resulting in some patients with rib fractures developing ineffective breathing patterns, requiring transfer to critical care for airway management and possible intubation.

Mission desired a data-driven solution for improving trauma care and gaining timely insight into injury-specific process measure performance. The organization needed to perform concurrent chart reviews, allowing program leaders to provide feedback to clinicians, and drive adoption of the evidence-based care that results in the best possible patient outcomes.

DATA-DRIVEN INSIGHTS IMPROVE TRAUMA CARE

Mission relies on care process models (CPMs) to decrease variation and standardize care throughout the organization, ensuring patients receive evidence-based best practice, patient-centered care, delivered in the right care setting at the lowest cost to patients. The CPM for patients with traumatic injuries involves interventions and process measures to drive care from the point of presentation to discharge, including for patients admitted to inpatient care.

“ We have experienced a giant leap in our ability to view and process what is happening within our own population. We are also beginning to become real-time, which is remarkable.

William Shillinglaw, DO
 Medical Director Trauma/
 Critical Care Services at
 Mission Hospitals

The CPM for patients with spleen injury was developed to guide clinicians in assigning accurate grade/level of spleen injury and the standard documentation required. Clear understanding of the grade/level of injury supports better decision-making for managing the patient’s treatment, including non-operative, interventional radiology, or operative management.

As a data-driven organization, Mission leverages the Health Catalyst® Data Operating System (DOS™) and a robust suite of analytics applications, including the Trauma Advanced Analytics Accelerator, to gain insight into trauma injury data. The analytics accelerator allows the trauma program team to review injury-specific trauma data, enabling concurrent review of trends in care delivery, and timely evaluation of patient outcomes. Mission can efficiently review patterns of injury, compliance with different CPMs, adherence to CPM interventions and process measures, and can compare the outcomes of patients who have received these interventions with those who have not.

Using the analytics accelerator and robust trauma program data, the Mission trauma program team was able to effectively and efficiently analyze the volume of patients with spleen injuries, and the various grade/level of injury (see Figure 1).

FIGURE 1. TRAUMA ADVANCED ANALYTICS ACCELERATOR SPLEEN INJURY VISUALIZATION

- 1 Filter by date, patient, care area, interventions, and patient disposition.
- 2 Displays patient volume and care received.
- 3 Graphs CPM compliance and spleen injury grade.

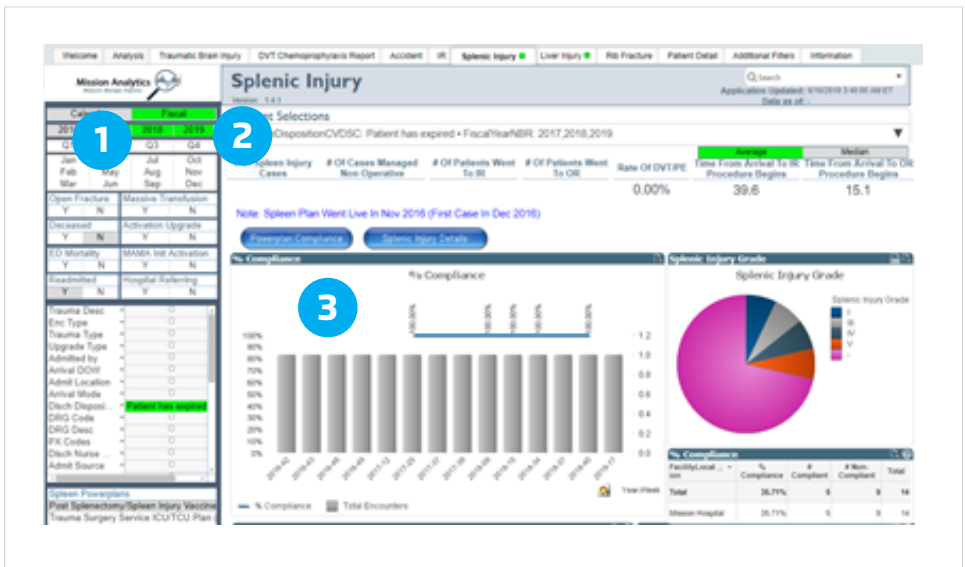


Figure 1: Trauma Advanced Analytics Accelerator spleen injury visualization

“We are now provided with a level of review that we did not have before that can be built upon, allowing us to look at a specific subgroup of patients, as needed. It is movable and breathable, with the ability to expand and grow as we do. That is pretty attractive.”

Terrie Smith, BSN, RN,
CCRN, TCRN
Trauma Clinical Coordinator
Trauma Services
Mission Health

FIGURE 2. RIB FRACTURE CPM OUTCOME COMPARISON VISUALIZATION

- 1 Filter by cohort of interest, date, and care area.
- 2 Displays comparison between those who received CPM and those who did not.

The trauma program can complete concurrent case review, using the data from the analytics accelerator to advance the adoption of the CPM for patients with spleen injury, increasing the number of patients who receive the most appropriate evidence-based interventions. The trauma program can offer both aggregate and individual performance data to individual clinicians, identifying opportunities to improve, and sharing feedback about positive performance. Data is shared with clinicians in peer to peer conversations, and during department meetings.

Individual clinicians are provided access to the analytics accelerator, and receive education on how to use this tool, enabling ongoing self-assessment. The trauma program is also able to use the analytics accelerator to gain insight into compliance with the CPM for pain management for patients with a rib fracture and evaluate the impact of the CPM on patient outcomes. The difference in outcomes can be visualized between patients who received the rib fracture CPM with those who did not and can demonstrate the value of using the CPMs to their teams (see Figure 2).

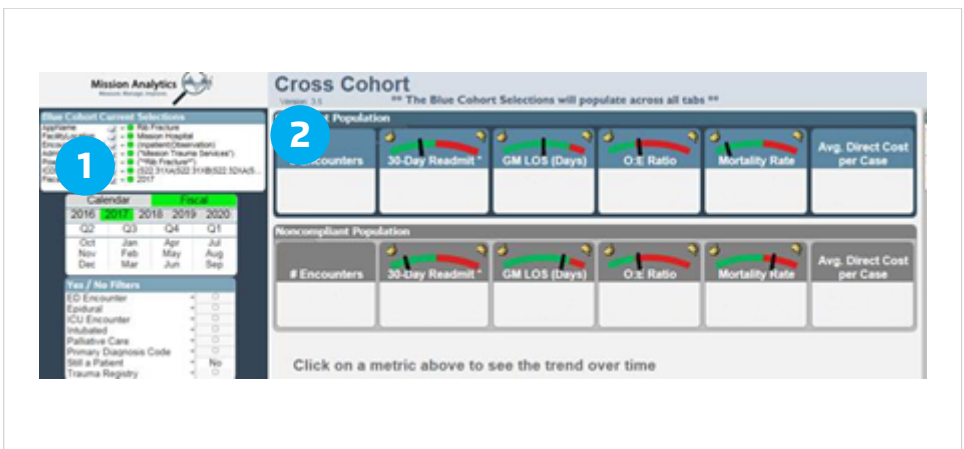


Figure 2: Rib fracture CPM outcome comparison visualization

RESULTS

Using this data-driven approach, Mission has achieved meaningful improvements in the care of patients with rib fractures and spleen injuries, including:

Patients with spleen injury:

- 4.4 percent mortality rate for patients with a traumatic spleen injury who received CPM interventions, well below the 7-18 percent national average.



The analytics accelerator is flexible and modifiable allowing us to add or change filters to build specific reports, giving us the ability to manage the volume of data and impact care to drive better outcomes for patients, which is the ultimate goal.

Terrie Smith, BSN, RN,
CCRN, TCRN
Trauma Clinical Coordinator
Trauma Services
Mission Health

- Two-fold increase in the number of patients with a traumatic spleen injury who received the less-invasive interventional radiology procedure, including those to prevent further complications.
- 19.6 percent relative decrease in the number of patients with a traumatic spleen injury who required more invasive surgical intervention.

Patients with rib fracture injury:

- \$1.06 million annual savings, the result of a 17.5 percent relative decrease in average LOS.
- 20.8 percent relative decrease in the number of patients with a rib fracture who required intubation.
- 3.8 percent mortality rate for patients with a rib fracture receiving the CPM interventions, well below the 10 percent national average.
- \$476,409 in annual savings, the result of a 9.3 percent relative decrease in average direct costs.

WHAT'S NEXT

Mission intends to extend its data-driven process to support the implementation of its aggressive deep vein thrombosis prophylaxis protocol for patients with traumatic injury. The organization also plans to use the analytics accelerator for ongoing monitoring of performance, and comprehensive evaluation of patient outcomes. 📈

REFERENCES

1. Gregory, J. S., Walker, C., Young, K., & Ralchenko, A. (2018). Essential processes of successful trauma systems: Template for analysis of trauma systems. *J Emerg Crit Care Med* 2(22). Retrieved from <http://jeccm.amegroups.com/article/view/4127/4725>

ABOUT HEALTH CATALYST

Health Catalyst is a leading provider of data and analytics technology and services to healthcare organizations, committed to being the catalyst for massive, measurable, data-informed healthcare improvement. Our customers leverage our cloud-based data platform—powered by data from more than 100 million patient records, and encompassing trillions of facts—as well as our analytics software and professional services expertise to make data-informed decisions and realize measurable clinical, financial, and operational improvements. We envision a future in which all healthcare decisions are data informed. Learn more at www.healthcatalyst.com.

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