A novel automated clinical decision support solution reduces mortality in patients with severe sepsis

East Jefferson General Hospital EJGH

John DePaula, MD, Infectious Disease Sepsis Champion, East Jefferson General Hospital
Courtney Merwin, BS, RRT, Quality Analyst, East Jefferson General Hospital
Raymond DeCorte, MD, Chief Medical Officer, East Jefferson General Hospital
Ya-Ting Chen, PhD, Executive Director, Healthcare Services and Solutions, Merck & Co., Inc.
Brandon Palermo, MD, MPH, Chief Medical Officer, ILÚM Health Solutions, Merck & Co., Inc.
Srinivasan Rajagopalan, PhD, Med Data Analytics, Inc.
Ami Mayo, MD, Chairman, Medical Department, medCPU
Jeanne Gorrondona, RN, BSN, Infection Control Supervisor, East Jefferson General Hospital
Donna Carbajal, RN, RRT, MBA, Senior Director of Quality, East Jefferson General Hospital

Contact Information
Brandon Palermo, MD
2000 Galloping Hill Road
Kenilworth, NJ 07033
brandon.palermo@merck.com

BACKGROUND

Severe sepsis is a major complication of infection and sepsis. Patients with severe sepsis are at increased risk for developing septic shock and have higher associated mortality and healthcare utilization. To improve sepsis outcomes, international guidelines emphasize the importance of strategies and quality improvement initiatives that focus on early detection of sepsis and severe sepsis and adherence to evidence-based management bundles that include optimal broad-spectrum antibiotics and intravenous (IV) fluids.

OBJECTIVE

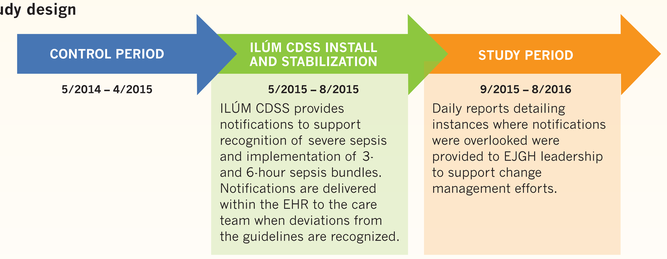
This study assessed the impact of a novel automated clinical decision support solution (CDSS) on adherence to guideline-based sepsis care, mortality, and resource use in patients with severe sepsis.

METHODS

The study is a quasi-experiment design at East Jefferson General Hospital (EJGH) (Figure 1). The CDSS provides notifications at the point of care to support early recognition of sepsis and severe sepsis, and adherence to 3- and 6-hour bundles. Notifications are delivered within the electronic health record (EHR) to the care team when there are deviations from hospital guidelines.

Figure 1.

Study design

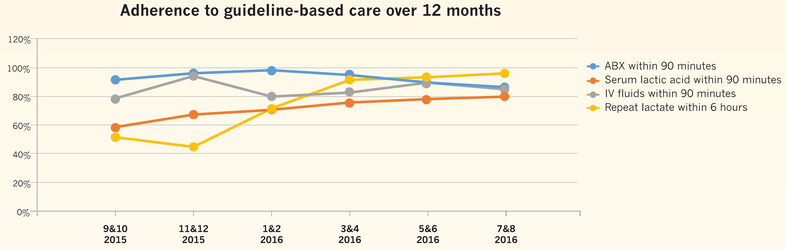


Data were obtained from EJGH's claims database using ICD-9 diagnostic code for severe sepsis. Sepsis-associated mortality was defined as death with a principal discharge diagnosis of sepsis.

RESULTS

Implementation of the automated CDSS resulted in high adherence to guideline-based care, including antibiotic ordering, measurement of serum lactic acid, and administration of IV fluids in patients with hypotension or elevated serum lactic acid. Adherence to repeated lactic acid measurement performed within 6 hours of sepsis time zero was also high. By the end of the study period, the adherence to guideline-based care reached 80% or higher for all metrics measured (Figure 2).

Figure 2.



A total of 207 patients with severe sepsis were included in the study; 56 in the control group and 151 in the study group. Each group had a similar gender and age distribution (Table 1).

Table 1.

	All patients (N=207)	Control group (N=56)	Study group (N=151)	*P* value
Gender, female, n (%)	90 (43.5)	22 (39.3)	68 (45.0)	0.53
Age, mean (SD), years	70.69 (16.49)	70.50 (15.67)	70.75 (16.84)	0.74

There was a trend toward reduction of ICU/CCU admission rate with 57.1% in the control group vs 45.7% in the study group (odds ratio=0.63, 95% CI, 0.32-1.22; *P*=0.16).

A significant reduction in all-cause and sepsis-associated mortality was observed post CDSS implementation (Figures 3 and 4).

Figure 3.

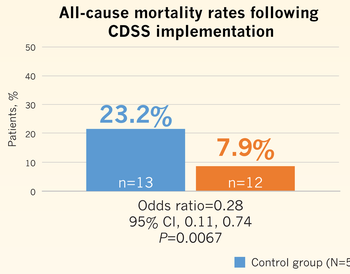
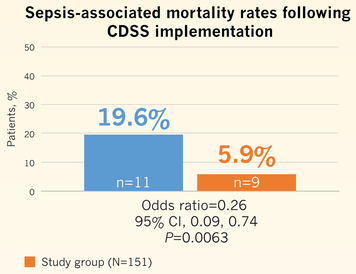


Figure 4.



DISCUSSION

Early recognition of sepsis and severe sepsis, and adherence to evidence-based management guidelines, may help avoid further deterioration in patients with severe sepsis and reduce risk for mortality. EJGH utilized an automated CDSS for a sepsis quality improvement initiative, which resulted in improved adherence to guideline-based care and significant reduction in all-cause and sepsis-associated mortality.

Our findings of reduced mortality and trends of reduced ICU/CCU admissions were based on billing data in a relatively small cohort of patients with severe sepsis. Diagnoses of severe sepsis likely were under-reported in billing data. In fact, the CDSS database identified many more severe sepsis patients (N=634) based on clinical information within the EHRs.

CONCLUSION

Implementation of an automated sepsis CDSS resulted in a significant reduction in all-cause and sepsis-associated mortality. These observations warrant validation in a larger prospective study.

ilúm™ HEALTH SOLUTIONS
Powering Better Outcomes