Improving Severe Sepsis Mortality Through Improving Sepsis Bundle Compliance

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Background

30 million people worldwide are afflicted with sepsis every year, with someone dying of sepsis every 2 seconds. The mortality rate for the United States is between 28-50% and carries a cost of $20 billion to the healthcare system. In October 2015, the Centers for Medicare & Medicaid Services (CMS) released sepsis bundle guidelines based on the efforts of many from the Surviving Sepsis Campaign. These bundles called for timed interventions intended to collectively improve outcomes and survival for patients with severe sepsis and septic shock.

Objective

We hypothesized that improved compliance with both the 3- and 6-hour bundle measures would result in a mortality reduction. The 3-hour bundle elements include serum lactate level, appropriate antibiotic administration after blood cultures, and the administration of a 30 mL/kg actual body weight crystalloid fluid bolus. The 6-hour bundle includes repeat serum lactate level, assessment of volume status (a.k.a. "focused exam"), and optimization of perfusion.

Methods

From September 2015 through the authorship of this abstract in July 2016, Newark Beth Israel Medical Center mobilized an interdisciplinary team to improve sepsis bundle compliance for patients with known or suspected severe sepsis or septic shock. The interdisciplinary team included the Patient Safety Officer and ICU Director, Emergency Department (ED) leadership, Rapid Response Team (RRT), Quality and risk managers (QRM), screeners, coders, billers, hospitalists and trainees. The interdisciplinary team met weekly to review best practice, ensure efficient and consistent bundle implementation, and discuss actual cases. All failures to comply with bundle elements underwent a mini-root cause analysis (RCA) process, elicited real time feedback to bedside providers, and triggered corrective action plans that were updated regularly. The RRT team members, hospitalists, and Emergency Department staff were instructed to escalate all potential failures in real time to the Safety Officer or ED Chairman for immediate intervention to improve bundle compliance. QRM developed an Excel™ spreadsheet to capture all data and to assimilate commonalities and trends.

Results

Sepsis Bundle Compliance
p=.003

%	Q2,Q3,Q42015,Q1,Q22016	Q3,Q42016,Q12017
%	48.65%	93.09%

Sepsis Mortality
p=.000115

%	Q1,Q2,Q3,Q42015,Q12016	Q2,Q3,Q42016,Q12017
%	37.36%	25.34%

2015-2017 Sepsis Compliance Rate (3 and 6 hour)

$y = 3.1976x + 29.572$
$R^2 = 0.6781$

Conclusions

Mortality from severe sepsis/septic shock improved concomitantly with increased 3- and 6-hour sepsis bundle compliance at NBIMC. RRT engagement, real time escalation of issues, and concurrent review of cases effectively facilitated this change. Leadership support and the committed efforts of bedside clinicians were instrumental in the success of this project.

Results

Sepsis mortality rates decreased between quarters 1,2,3,4 of 2015 and Q1 of 2016 [37.36%] and quarters 2,3,4 of 2016 and Q1 2017 [25.34%] with a Chi square p value of 0.000115 during the intervention to improve sepsis bundle compliance. Compliance with all of the bundle elements improved between quarters 2, 3, 4 of 2015 and Q1 and 2 of 2016 [48.65%] and quarters 3, 4 of 2016 and Q1 of 2017 [93.09%] with a Fisher exact test p value of 0.003. There is a significant increase in the bundle compliance from April 2015 to March 2017 with a trend line R2 at .6781. is There is a strong positive correlation [r^2 =0.81] between bundle compliance and decreased sepsis mortality rate, which mirrors observations in the current evidence-based literature.