The Impact of Code Sepsis on Inpatient Mortality

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BACKGROUND

In the United States there are more than 750, 000 cases of severe sepsis and septic shock each year and the short term mortality is estimated to be over 20%. Lehigh Valley Hospital (LVH) is an academic tertiary care center which during the year of 2015 had about 1,800 admissions related to sepsis. In the past year the mortality index was 1.4 at LVH when compared to other similar sized hospitals across the United States. This prompted an in-depth review of how providers care for septic patients within the network. A dedicated multidisciplinary task force was formed to identify gaps in care. Through this, it was discovered that there are many inconsistencies in the care provided to septic patients on admission. These shortcomings include the timeliness of fluid resuscitation, delays in administration of antibiotics, and failure of tracking lactic acid levels. The task force began a standardization process for early recognition and identification of septic patients with a focus on early goal directed therapy.

METHODS

The sepsis task force met regularly through quality improvement forums in order to raise awareness throughout the network. As a result, our facility revised and approved the criteria for SIRS/SEPSIS to include alteration in mental status with emphasis on early documentation of vital sign derangements. A new protocol was then instated, detailing multiple algorithms designated to guide ED nurses and physicians in goal directed resuscitation using a 3 and 6 hour bundle of order sets. This served to simplify and expedite the administration of IV fluids, collection of lactate and initiation of antibiotics. An alert system was implemented within the algorithms to identify and warn care teams of patients meeting the criteria for severe sepsis who are at risk for rapid progression to septic shock. This process hastened the transfer of patients from the ED to higher level care. Throughout the process, fluid administration, timely collection of lactate levels, and antibiotic administration were all tracked and quantified. Providers involved in septic patients' care received patient summaries to offer feedback, raise awareness of shortcomings, and track the progress made.

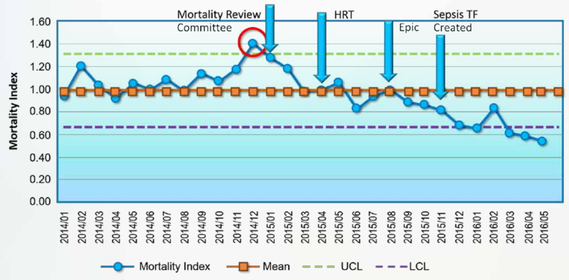
RESULTS

Review of over 570 cases where sepsis alerts were activated reveals that compliance with timely lactate orders increased by 17% for initial levels and approximately 50% for repeating lactate after fluid administration **(Figure 1)**. Meeting the goal for prompt fluid resuscitation (30 cc/Kg) also increased by 22% as did collection of blood cultures and administration of broad spectrum antibiotics - 13% and 12% respectively. The current sepsis mortality index at our institution has declined from 1.6 to 0.6 since the recognition of increased sepsis related deaths and initiation of the sepsis taskforce. LVHN overall mortality index also decrease from 1.4 to 0.6 **(Figure 2)**.

Figure1. Jan to Jul 2016 LVH-CC Sepsis Core Measure Breakdown

Month	Severe Sepsis Present	Initial Lactate Collection	Broadspectrum/ Other ABX	Blood Culture Collection	Fluid Resuscitation for Severe Sepsis/ Septic Shock (30CC/kg)	Repeat Lactate Collection
January	63.00	48/63 (76%)	52/63 (83%)	43/52 (83%)	N/A	15/44 (34%)
February	81.00	70/81 (86%)	68/81 (84%)	59/68 (87)	32/82 (39%)	19/47 (40%)
March	95.00	78/95 (82%)	79/95 (83%)	72/78 (92%)	14/32 (44%)	22/50 (44%)
April	82.00	75/82 (91%)	70/82 (85%)	59/70 (84%)	20/42 (48%)	17/28 (61%)
May	79.00	71/79 (90%)	75/79 (95%)	74/75 (99%)	47/79 (59%)	3446 (74%)
June	80.00	75/80 (93%)	75/80 (94%)	79/80 (99%)	47/80 (59%)	45/52 (86%)
July	94.00	87/94 (93%)	82/86 (95%)	66/72 (92%)	58/94 (61%0	37/46 (80%)

Figure 2. LVHN Mortality Index
Jan 2014 - May 2016



DISCUSSION AND CONCLUSION

We observe that the initial impact on the decline in sepsis mortality at our network stems from recognition of the problem. The creation of a sepsis taskforce was the foundation to raising awareness and initiating further steps to promote early recognition and intervention. Providing a standardized, tangible, and accessible stepwise algorithm to ED personnel defined and enhanced the recognition of septic patients. This in turn decreased the time to initiation of treatment as care teams were more organized and confident in acting. The protocoled treatment of severe sepsis and septic shock has been based on the landmark River's trial (2001). This single center study in which early goal directed therapy (EGDT) was implemented found that in-hospital mortality was 30.5 percent in the group assigned EGDT and 46.5 in the group assigned to standard therapy (p=0.009). This dramatic decrease in mortality of the EGDT group gave credence to hospitals adopting protocol based therapy starting in the emergency department.

However, in 2014 the ARISE and ProCESS trials discredited many of these conclusions, suggesting that protocol based care did not improve outcomes when compared to usual care. These new trials have made some providers critical of protocoled care in the setting of sepsis. However, the sepsis mortality index was at an all-time high at our institution and retrospective chart review revealed that only 39% of septic patients admitted from the emergency department received the 30 cc/kg of fluid bolus that is mandated by the core measures. Providers might point to the ProCESS and ProMISE trial to state that protocol based care does not improve mortality, however, in both of these studies there was no difference in the fluid given to patients with protocol based therapies within 6 hours. In all three groups the volume of the bolus administered was still within the range of 20 to 30 cc/kg which was used by the Rivers trial.

It is our conclusion that despite these newer trials showing no mortality benefit with the use of protocol based therapies, a vital role does exist for standardization of care, especially for underachieving institutions. Potential limitations include mislabeling septic patients, as SIRS criteria is non-specific. Further individualized chart review is needed for clarification.

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