# **Reducing Inpatient Adult Severe Sepsis and Septic Shock Mortality: A Quality Improvement Project**

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### BACKGROUND

- Sepsis is a medical term to describe the body's systemic and detrimental response to a known or suspected infection.
- If sepsis is not identified and treated early in the infectious process it can progress to severe sepsis (one organ system failure), septic shock (multiple organ failure), and death.
- Sepsis contributes to over 500,000 emergency room (ED) visits in the U.S. annually with associated costs over \$20 billion.
- Over 80% of adult inpatients with sepsis are admitted through the ED.
- Patients with severe sepsis or septic shock consistently have higher hospital mortality rates resulting from delayed provider recognition and lack of standardized treatment interventions.
- Sepsis continues to be a primary cause of infection related deaths in the U.S. with mortality rates up to 50%.
- Sepsis is one of the most expensive diseases treated in the U.S. compared to all other hospitalizations (\$103,529 vs. \$17,298).
- Severe sepsis and septic shock mortality and associated length of stay (LOS) may be reduced when bundled care treatments are implemented.

### **OBJECTIVE**

- Reduce adult inpatient sepsis mortality and associated length of stay (LOS) by implementing standardized processes for early recognition and treatment of severe sepsis and septic shock in the ED.
- Primary Outcome
- Reduce adult inpatient severe sepsis and septic shock mortality by 25% (12% to 9%).
- Secondary Outcome
- Reduce hospital LOS by 10% (6.5 days to 5 days).
- Achieve outcomes in a 12 month period: January to December, 2014

### INTERVENTION

- In two non-profit community based Magnet hospitals three root causes of sepsis mortality were identified:
- Provider and staff sepsis knowledge base
- Delayed recognition of signs and symptoms of sepsis, severe sepsis, and septic shock

- Lack of standardized sepsis treatment interventions

- Quality Improvement Interventions:
- Provider and staff sepsis education using computer-based training and highfidelity simulation
- Implement sepsis screening at ED triage
- Implement sepsis alert and treatment algorithms
- Implement electronic ED sepsis order set (includes Surviving Sepsis Campaign Guidelines 3 and 6 hour bundle treatment interventions)
- Revise ED RN collaborative practice orders



## **METHODS**

- Data Sources - University Health System Consortium database
- Electronic health records
- Inclusion shock
- Analysis Retrospective data collected monthly
- Fisher's Exact test was used to analyze categorical variables
- Two-tailed independent t-test was used to compare continuous variables
- Quality measures: - Adult inpatient sepsis mortality - Adult inpatient sepsis LOS
- Process measures:
- Serum lactate within three hours of sepsis detection
- Blood cultures drawn prior to antibiotic administration
- Antibiotics administered within one hour of sepsis detection
- Appropriate fluid resuscitation (30 ml/kg) initiated
- Utilization of the electronic ED sepsis order set

- Pre-post intervention QIP study design
- Pre-intervention: October December, 2013
- Post-intervention: October December, 2014
- Adult patients  $\geq 18$  years old admitted to an adult inpatient unit
- Primary or secondary discharge diagnosis of sepsis, severe sepsis, or septic

### **RESULTS/OUTCOMES**

- 650 encounters included - Pre-intervention group (n=223): 44% female, 56% male.
- Post-intervention group (n=427): 45% female, 55% male.
- Reduced adult inpatient severe sepsis and septic shock mortality by 33% (*OR* = 1.51, *z* = 1.48, *p* < 0.139; 95% CI [0.87, 2.61])



• Decreased adult inpatient sepsis LOS from 6.5 (M = 6.25, SD = 4.76) to 5.23 days (*M* = 5.23, SD = 4.63); *t* (648) = 2.32, *p* =0.021



- Overall compliance with process measures showed small improvement; 47% to 50%
- Reduced sepsis related ICU bed utilization from 43% to 22%
- Reduced sepsis related mean observed cost of care by 23%

















### **CONCLUSIONS**

- UC Health Northern Region's sepsis initiative has been successful and continues to evolve.
- Appropriate and timely sepsis screening in the ED improves early recognition and appropriate treatment of the sepsis patient; reducing sepsis mortality and length of stay.
- Improved adherence to treatment algorithms and bundled interventions in the ED was found to be essential to consistently improve patient outcomes.

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