Improving Early Antibiotic Administration for Treatment of Sepsis at Children’s Hospital of Richmond at VCU: 2012-2019

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**BACKGROUND**

- The Surviving Sepsis Campaign recommends initiating IV antibiotic administration within one hour of recognition of severe sepsis.
- Several studies have shown that prompt blood culture collection, administration of broad-spectrum antibiotics, and fluid resuscitation following recognition improves child survival.

**OBJECTIVE**

- Our goal was to evaluate effectiveness of sepsis initiatives and institutional changes in the timing of early antibiotic administration at the Children’s Hospital of Richmond.

**METHODS**

- Pediatric Sepsis Committee with representatives from each unit formed in 2013.
- In 2016, the committee started tracking time from the order of a first stat dose IV antibiotic to administration as a marker of early treatment.
- Data was reviewed on a monthly basis with run charts for overall and unit-specific data.
- Other interventions:
  - Improved availability of antibiotics in automated dispensing machines.
  - Sepsis screening and alert systems, sepsis huddles.
  - Auto-generated pages to charge nurses upon order of stat IV antibiotics.

**RESULTS**

- Across all units, the centerline of first dose stat antibiotics delivered within one hour improved from a baseline of 34% in 2012 to 76% in 2019.
- Unit Specific Improvement:
  - NICU centerline improved by 53% with 67% of antibiotics given within 1 hour.
  - Improvement followed a shift of focus of unit QI group to sepsis.
  - Pediatric ED improved by 18% with 84% of stat antibiotics given within 1 hour.
  - Immediate improvement noted after sepsis order set was creation in the electronic health record (EHR).
  - PICU improved by 48% with 73% of antibiotics given within one hour.
  - Initiation of page to charge nurse after stat antibiotic order placed was followed by a steep uptrend of antibiotics administered under 1 hour.
  - Acute Care Pediatrics (ACP) improved by 26% with 50% of stat antibiotics given within 1 hour.
  - EHR sepsis order set and charge nurse pages were followed by improved time to antibiotics.

**CONCLUSION**

- Time from order to stat antibiotic administration has improved in all units receiving quality improvement initiatives.
- Improvements were made possible by widespread emphasis on the dangers of untreated sepsis, multidisciplinary collaboration between nursing and physician staff, structural pharmacy changes and electronic alerts.
- Further studies are needed to determine impact on patient outcomes.

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Background: Pediatric Sepsis

- Accounts for approximately 4% of hospitalized pediatric patients, 8% admitted to PICU
- In the United States, mortality estimates are 5-20%
- The Surviving Sepsis Campaign 2019 Pediatric Guidelines recommend starting antimicrobial therapy as soon as possible, within 1 hour of recognition
- Bundled care within 1 hour has been associated with lower in-hospital mortality and shorter hospital length of stay
Methods

• Multi-disciplinary Pediatric Sepsis Committee started reviewing time to antibiotic delivery data on a monthly basis with run charts for overall and unit-specific data in 2016

• For this review all stat antibiotics orders from January 2012 to September 2019 are included

• Time to antibiotics is defined as time from stat antibiotic order to charted administration

• Statistical process control charts were used to review data

• Interventions included: sepsis screening and EHR alert systems, bedside sepsis huddles, autogenerated pages to charge nurses, improved accessibility of antibiotics
Results: All Units

% Antibiotics in <60 minutes - All Pediatric Units

- January 2013: Learning Exchange Sepsis Education Powerpoint released
- January 2015: Antibiotics present in automated dispensing machines on all units
- January 2016: Started tracking data for time to antibiotic administration
- January 2017: Children's Hospital Association IPSO Collaborative joined
- October 2018: Difficult IV Access Guideline published
Results: By Unit

- **% Antibiotics in <60 minutes-NICU**
  - April 2013-June 2013: Prospective sepsis data collected for NICU QI group.
  - May 2015: NICU sepsis order set became active.
  - December 2015: NICU GI group determined barriers to sepsis identification and management.
  - January 2016: Sepsis QI Group formed.
  - November 2016: Sepsis Committee chartered.

- **% Antibiotics in <60 minutes-Pediatric Emergency Department**
  - November 2015: Sepsis Committee chartered.
  - January 2016: Sepsis order set activated.
  - September 2019: ED sepsis alert started.
  - June 2016: ED Sepsis order set activated.

- **% Antibiotics in <60 minutes-ICU**
  - July 2015: ICU QI group formed.
  - November 2015: Sepsis Committee chartered.
  - August 2016: Change in protocol for ICU antibiotics.

- **% Antibiotics in <60 minutes-Acute Care Pediatrics**
  - April 2017: ACP sepsis order set activated.
  - January 2019: Sepsis order set activated.
  - February 2019: New sepsis screening protocol implemented.
Conclusion

- Time from order to stat antibiotic administration has improved in all units receiving quality improvement initiatives

- Improvements were made possible by:
  - Widespread education efforts and increased awareness of sepsis
  - Multidisciplinary collaboration between nursing and physician staff
  - Structural pharmacy changes and electronic alerts

- Further studies are needed to determine impact on patient outcomes