2020

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

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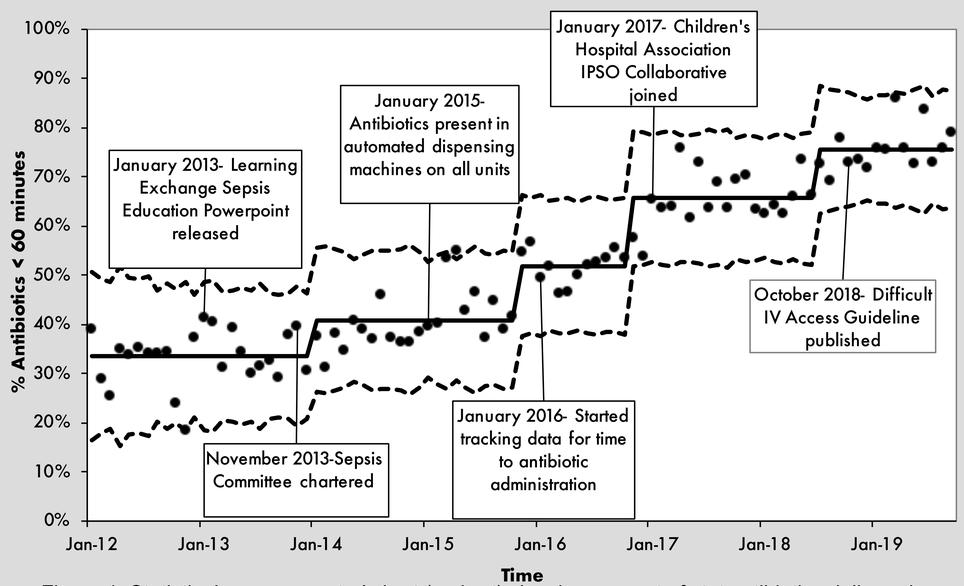

Figure 1. Statistical process control chart (p-chart) showing percent of stat antibiotics delivered within one hour of order between January 2012 and September 2019 across all units.

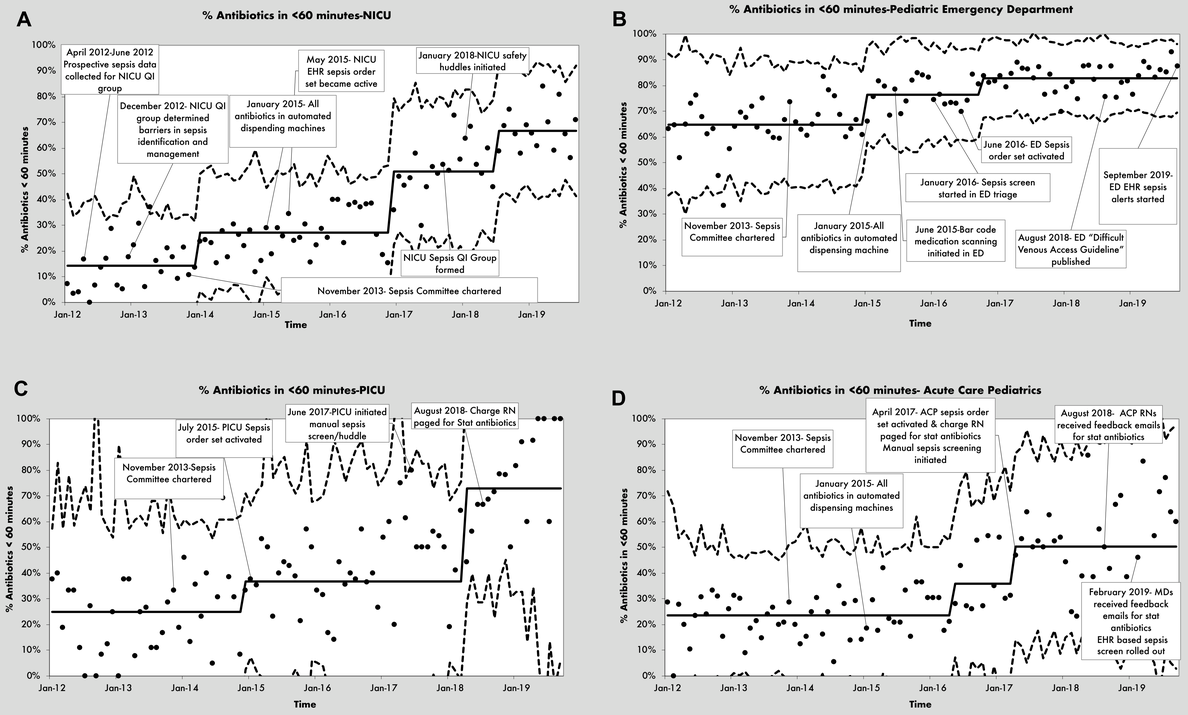

Figure 2. Statistical process control charts (p-charts) showing percent of stat antibiotics delivered within one hour of order between January 2012 and September 2019 on individual units (A) NICU (B) Pediatric ED (C) PICU (D) Acute Care Pediatrics

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% 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.

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

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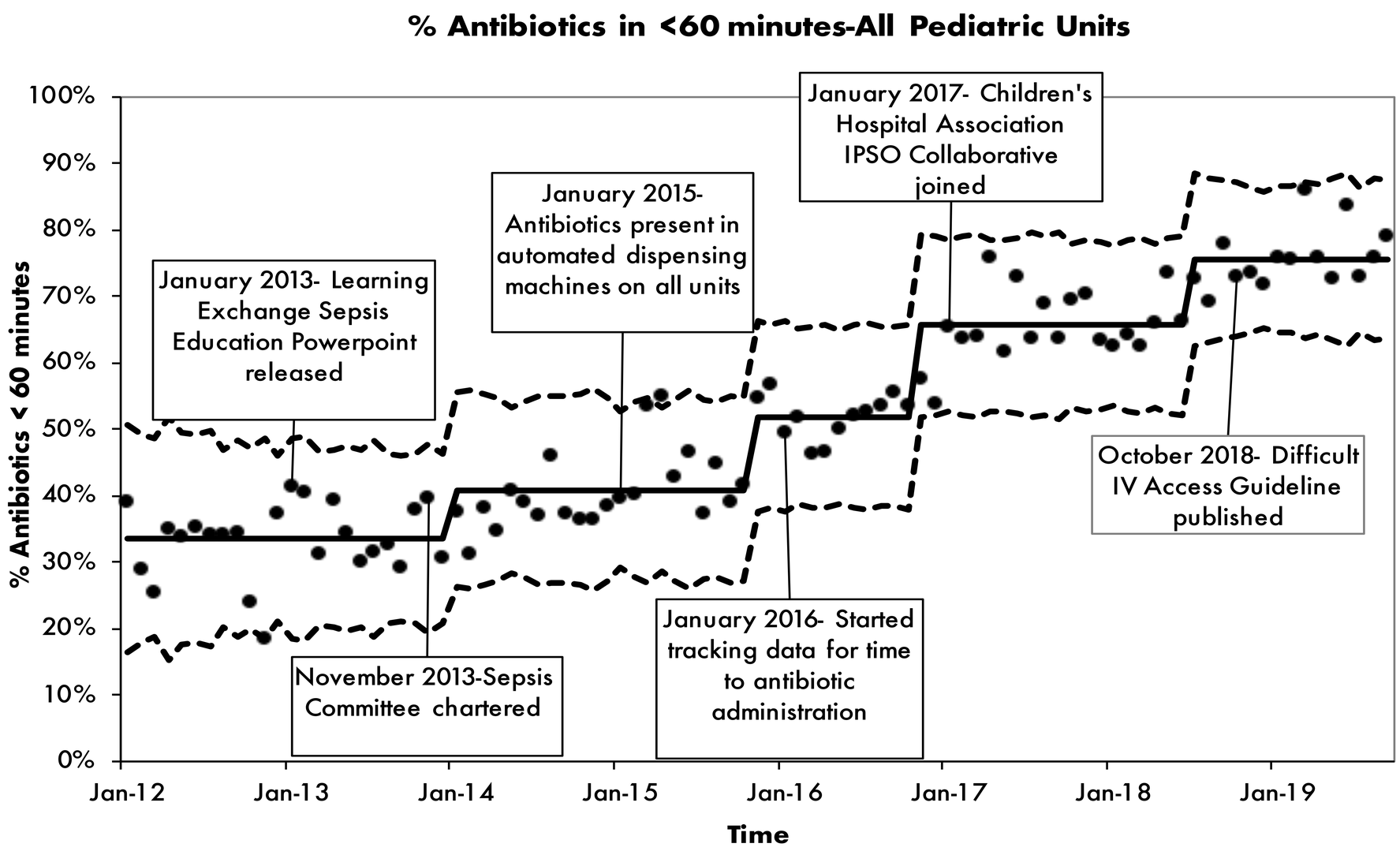
Methods

- 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



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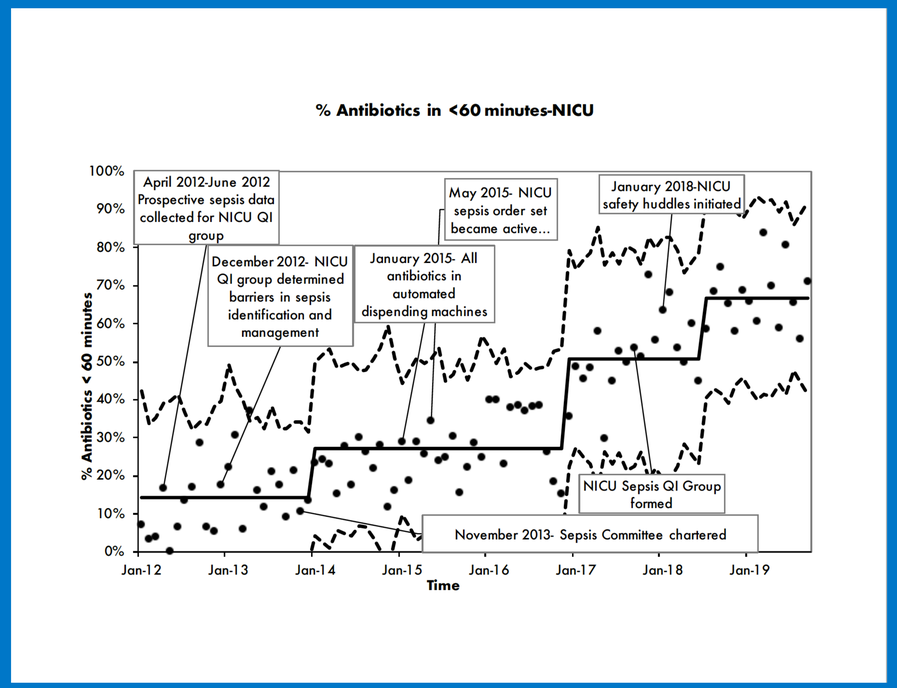
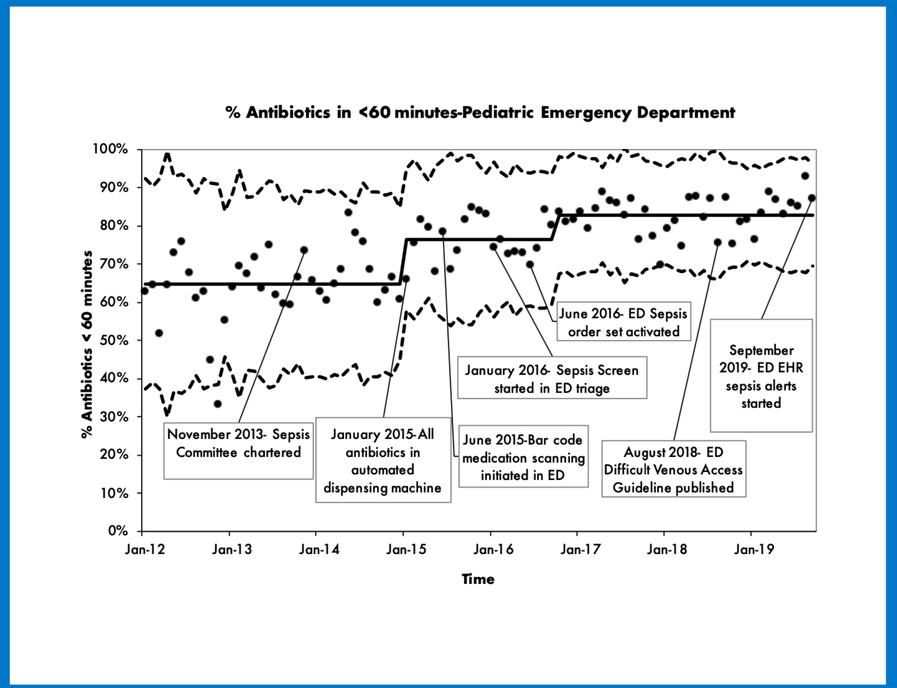
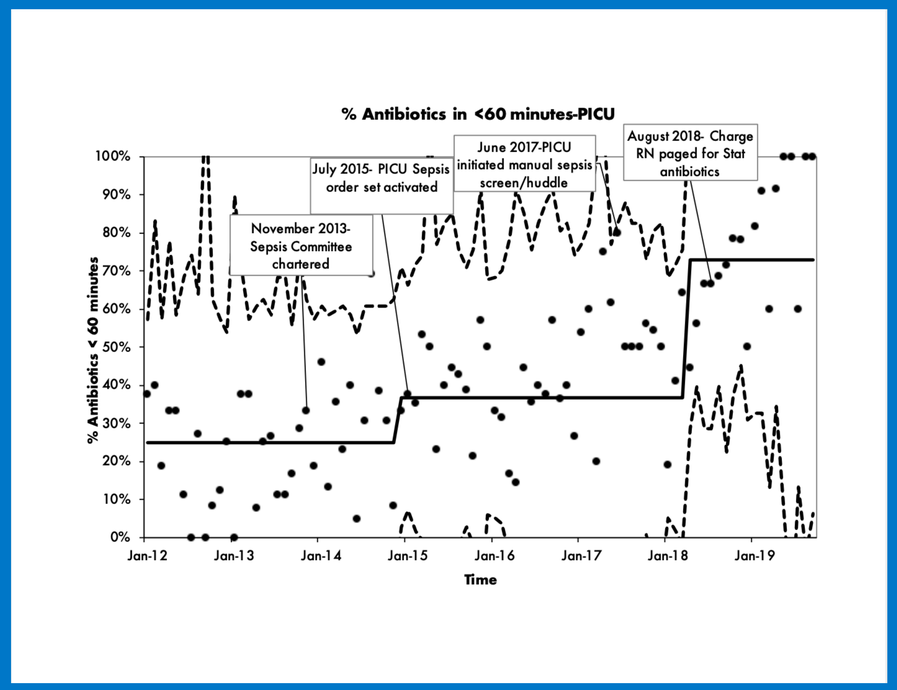
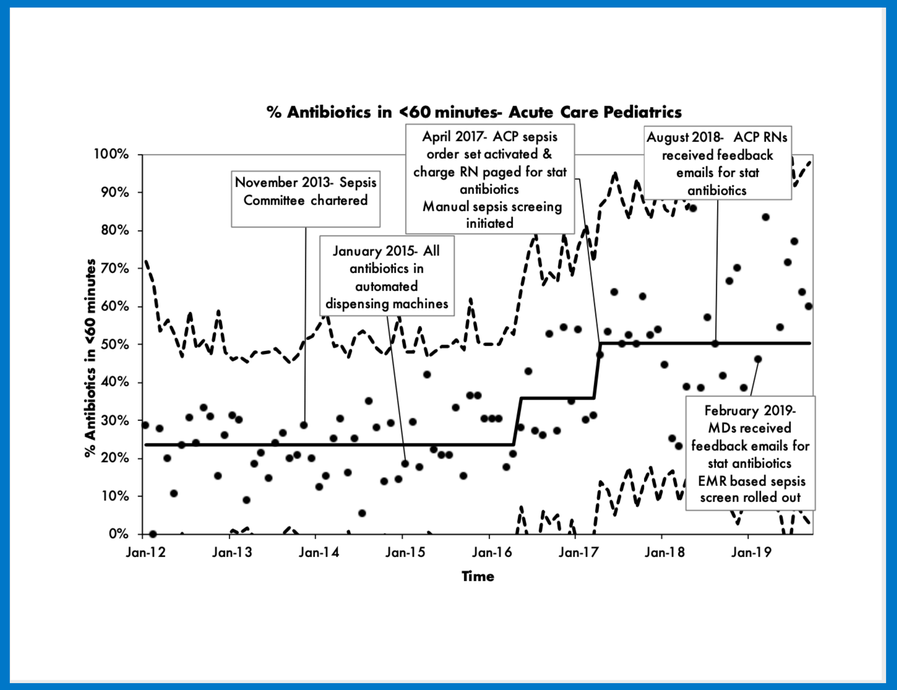
Results: By Unit









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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

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