



# Improving Pediatric Sepsis Outcomes: Reducing Time to First Appropriate Antibiotic in Cases of Non-Severe Sepsis

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## Aim Statement

- Our aim is to decrease the average time to first appropriate antibiotic in patients with suspected non-severe sepsis from 162 minutes to 60 minutes by June 30, 2020

## Background

### What is sepsis?

- Sepsis is the body's overwhelming and life-threatening response to infection
- Defined as a systemic inflammatory response syndrome (SIRS) plus a confirmed or suspected infection
- SIRS response is characterized by changes in body temperature, HR, RR and/or WBC count
- Non-severe sepsis (NSS) is considered vital sign and/or WBC count changes plus infection without end-organ damage
- If left untreated, this pro-inflammatory response can progress to more severe tissue damage, organ failure, and death

### Why do this project?

- Sepsis is more prevalent than one might think and a leading cause of death among hospitalized children
- Delayed antimicrobial therapy is an independent risk factor for mortality and prolonged organ dysfunction in pediatric sepsis
- Every hour delay in treatment increases mortality by 5-8%

## Measures and Goals

### Outcome Measure

- The average time from order to administration of the first appropriate antibiotic in patients with suspected NSS
- Goal: The average time will be reduced to 60 minutes

### Process Measure

- The percentage of patients with suspected NSS for which providers use the Sepsis Yellow order set
- Goal: The order set will be used in 50% of cases of NSS

## Team Members

### IPSO Antibiotic Workgroup

- John P. Licata, MD – Pediatric Resident
- Amanda Sebring, MD – Pediatric Intensivist
- Jeanne Forrester, PharmD – ASN Pharmacist
- Wyn Wheeler, PharmD – Pharmacy Manager
- Nora Raynor, MSN, RN – Clinical Nurse Specialist
- Sue Ann Weddington, RN, BSN, CPAN, NE-BC – Performance Improvement Coordinator
- Talia Buitrago-Mogollon, MHA, CPHQ – QI Coach

## Methodology

### Improvement Science

- The IPSO Antibiotic Workgroup used the Model for Improvement and rapid plan-do-study-act (PDSA) cycles
- Key drivers were used to determine a plan of action and prioritize the testing of the multiple PDSA cycles
- The care team made up of ordering physician, bedside nurse, and pediatric pharmacist was the target of intervention

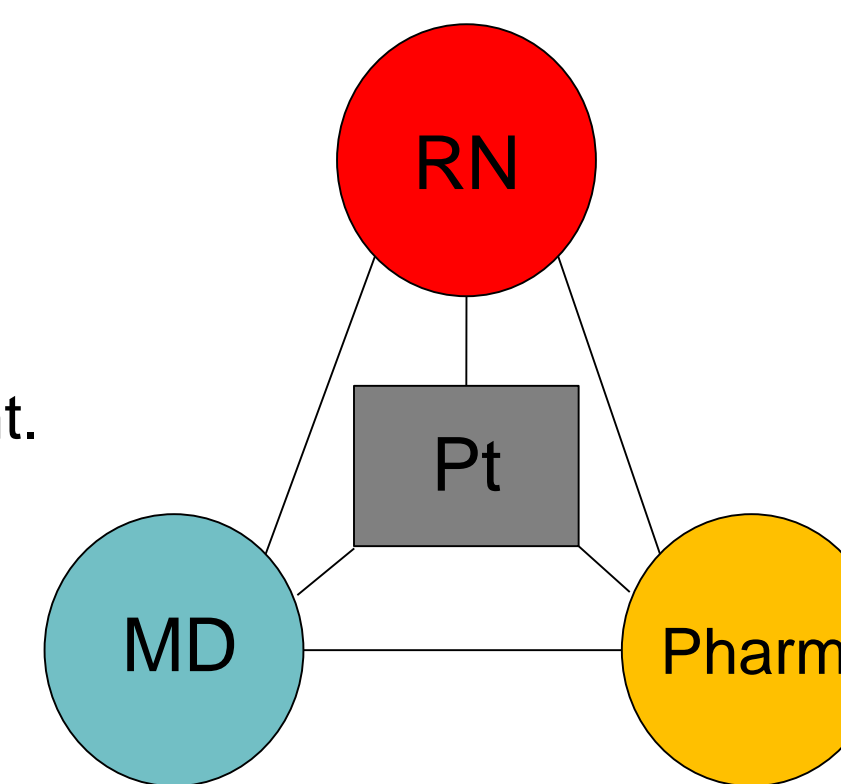


Figure 1. Care team diagram. RN = Nurse, MD = Physician, Pharm = Pharmacist, Pt = Patient.

## Tests of Change

### Rationale

- Three areas for improvement were identified:
  - Provider education
  - Nursing workflow
  - Care team communication

### Change Ideas

- Sepsis Awareness Month – September 2018
- Sepsis Morning Report – January and February 2019
- Pediatric Sepsis Checklist Cycle #1 – March 2019
- Pediatric Sepsis Checklist Cycle #2 – May 2019
- CHIPS monthly email reminder – June 2019

## Conclusions

- It is possible to decrease the average time to the first appropriate antibiotic in pediatric cases of NSS
- There was an early reduction in time to first appropriate antibiotic near the goal of 60 minutes in Fall 2018
- The time has increased and been more variable since then with a current average of 95 minutes
- Implementing changes across a multidisciplinary care team of providers and staff has proven difficult
- There are multiple pitfalls in the sepsis workflow that make it difficult to sustain timely administration

## Future Plans

### Next Steps

- Evaluate the effectiveness of the Pediatric Sepsis Checklist and the CHIPS reminder email
- Review antibiotic data and care team feedback 1-3 months after implementation

### Potential Changes

- Create automatic alerts in Cerner to notify nurses and providers at the 30-minute mark if a STAT antibiotic for suspected sepsis has not been administered
- Post the Sepsis reminder in the CHIPS and physician workrooms as a real-time reference

### Future Directions

- Rearrange the Pharmacy priority list as it relates to STAT antibiotic orders for suspected sepsis
- Increase the care team's sense of urgency when it comes to the initial management of septic patients

## Quantifiable Results

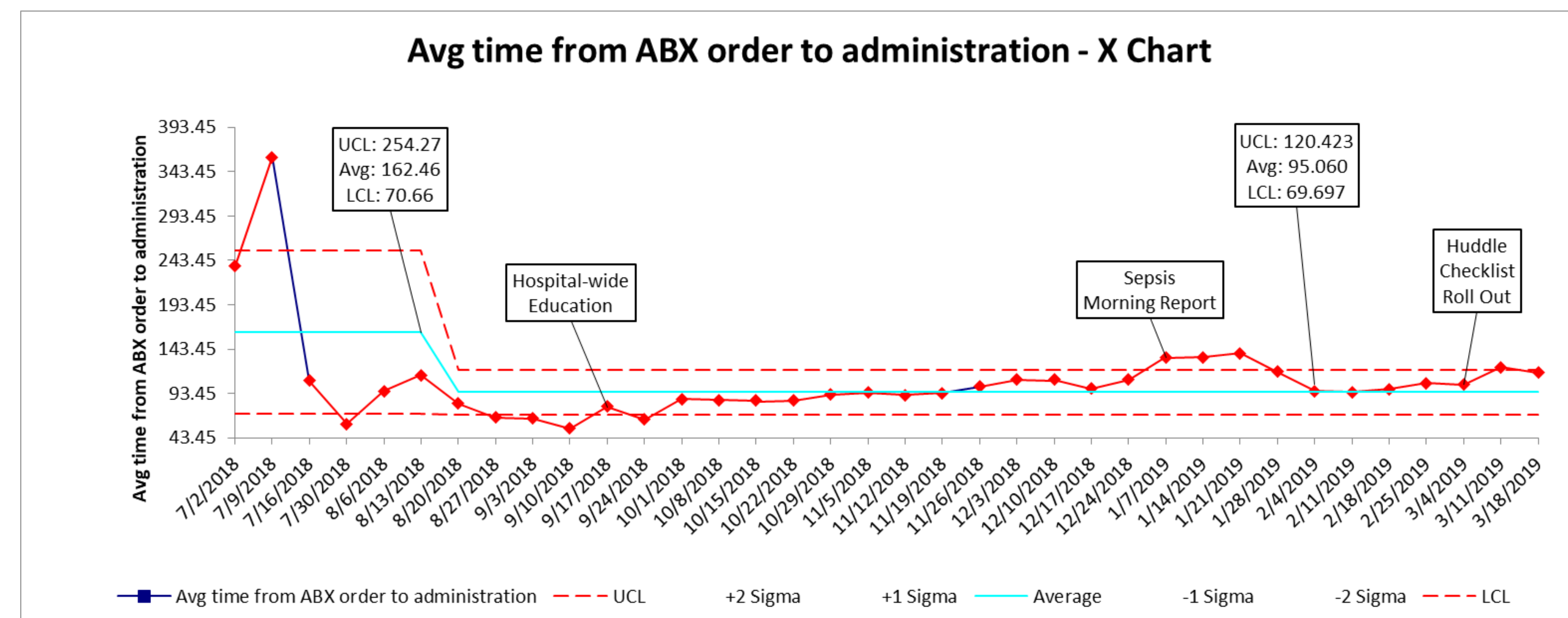


Figure 2. Control chart of average time from antibiotic order to administration in pediatric cases of NSS at LCH. Annotations are included to highlight various tests of change. Data are provided from baseline Fall 2018 and updated Spring 2019.

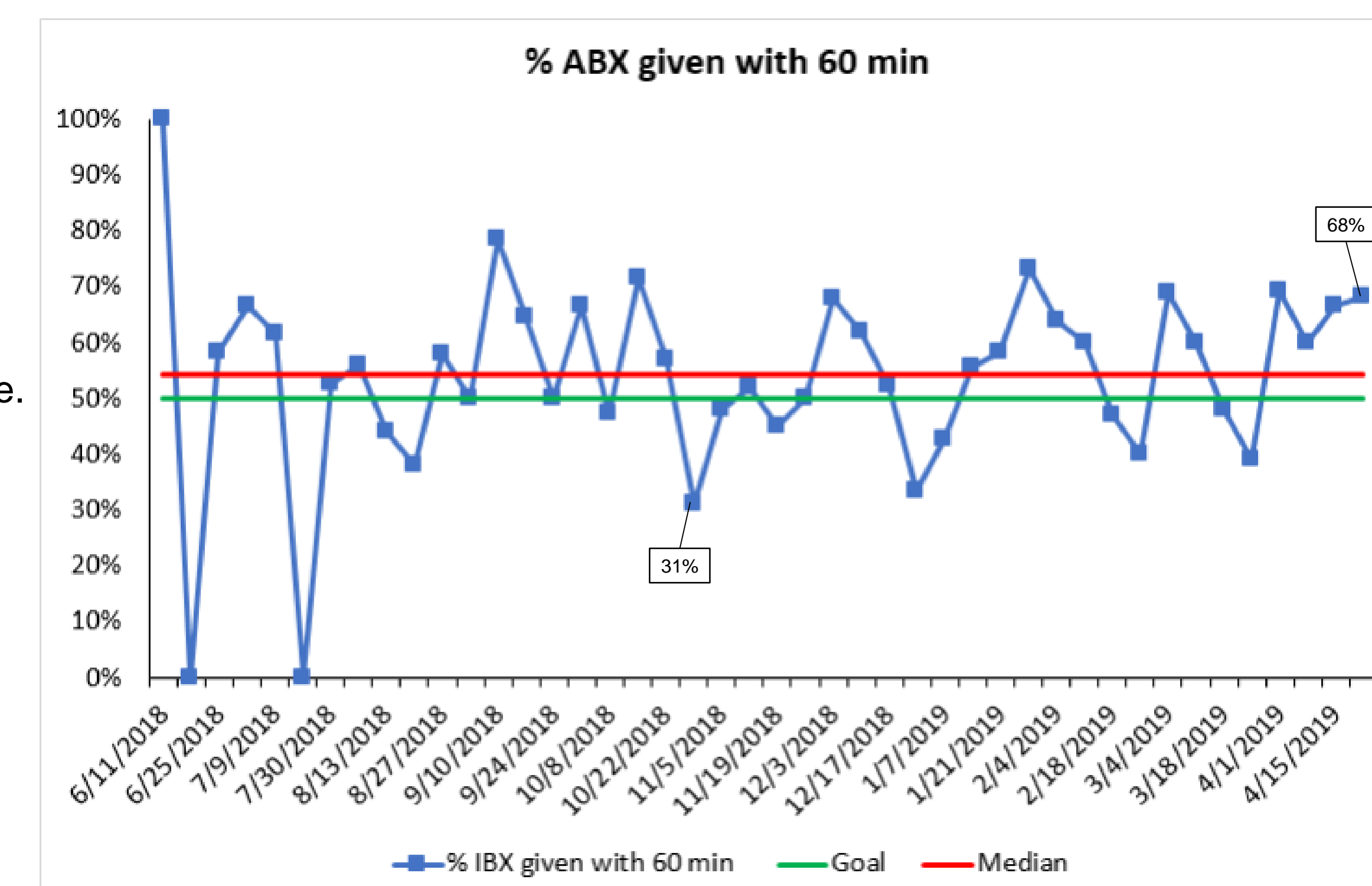


Figure 3. Run chart of percentage of antibiotics given within 60 minutes in pediatric cases of NSS at LCH. Data are provided from October 2018 and April 2019 for reference.

## References

- Ruth A, McCracken CE, Fortenberry JD, et al. Pediatric severe sepsis: current trends and outcomes from the pediatric health information systems database. *Pediatr Crit Care Med.* 2014;15(9):828–838.
- Weiss SL, Fitzgerald JC, Balamuth F, et al. Delayed Antimicrobial Therapy Increases Mortality and Organ Dysfunction Duration in Pediatric Sepsis. *Critical care medicine.* 2014;42(11):2409-2417.
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