Pediatric Urinary Tract Infections: A Choosing Wisely Initiative to Advance Antimicrobial Stewardship and Diagnostic Accuracy in the Emergency Department

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Background

- Urinary tract infection (UTI) is a common diagnosis in the pediatric emergency department (ED) that often results in empiric antibiotic treatment prior to culture results.
- A 2016 cohort study[1] from our center found that 47% of children diagnosed with a UTI and prescribed antibiotics had a negative urine culture. None of these patients were notified of the misdiagnosis or told to discontinue antibiotics.

1. Alghounaim M, Ostrow O, Timberlake K, Richardson S, Science M. Antibiotic Prescription Practice for Pediatric Urinary Tract Infection in a Tertiary Center. Open Forum Infectious Diseases. 2017;4(1):S350-S350.

Methods

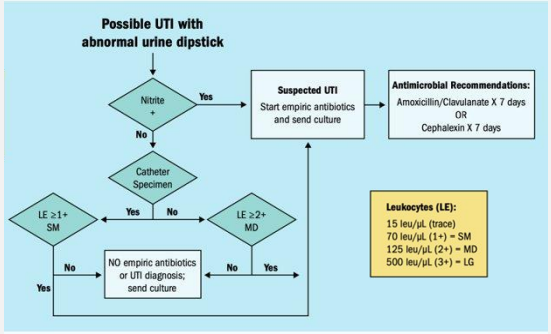

Figure 1: Low risk UTI diagnosis/treatment algorithm. For patients with UTI symptoms, urine dipstick results were used to determine need for empiric antibiotic treatment.

- Quality improvement project with a multi-faceted intervention implemented using Plan-Do-Study-Act (PDSA) cycles, including:
  - Low risk UTI diagnosis/treatment algorithm embedded in the electronic medical record
  - Negative urine culture callback system
- Outcome measures: percent UTI misdiagnosis (discharge diagnosis UTI but negative urine culture), antibiotic-days saved
- Process measures: duration of antibiotic treatment, timely antibiotic discontinuation, physician adherence to algorithm
- Balancing measure to assess for unforeseen harm: missed UTI diagnosis, return ED visits, hospital admissions

Results

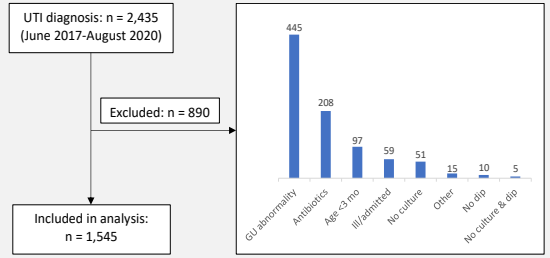

Figure 2: Included/excluded patients. From June 2017-August 2020, 2,435 patients <18 years were diagnosed with UTI. 1,545 (63.4%) met inclusion criteria.

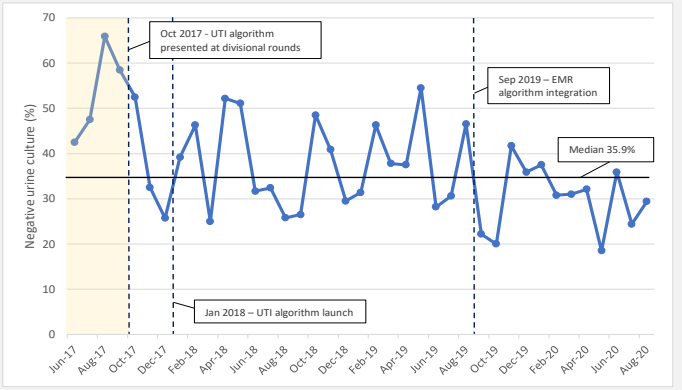

Figure 3: Run chart of UTI misdiagnosis rate. Following algorithm launch, median misdiagnosis decreased by 20% (52.5% vs 32.3%) and median correct antibiotic duration (7 days) increased by 31% (45.2 vs 76.2%, data not shown).

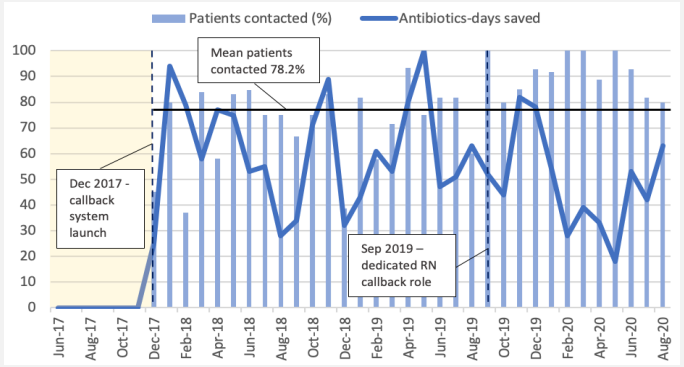

Figure 4: Following launch of the negative urine culture callback system in December 2017, mean patients called to discontinue antibiotics increased from 0% to 78.2% and 1,854 antibiotic-days were saved.

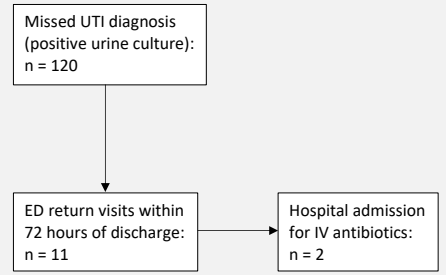

Figure 5: As a balancing measure to assess for unforeseen harms, missed UTI diagnoses were investigated. Since October 2017 (algorithm launch), there were 120 missed UTI diagnoses (discharge diagnosis not UTI but urine culture positive). 11 patients returned to the ED within 72 hours of discharge, of which 2 patients were admitted for intravenous antibiotics.

Conclusions

- In the pediatric ED, a UTI diagnosis/treatment algorithm can reduce low risk UTI misdiagnosis and promote standardized, evidence-based antibiotic therapy.
- Both the diagnosis/treatment algorithm and callback system promote antibiotic stewardship .
- Limitations: missed patients who returned to outside EDs, algorithm not yet validated.
- Future directions: improved algorithm adherence through targeted audit and feedback.