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PEORIA CHICAGO ROCKFORD URBANA

Uncomplicated Urinary Tract Infection (UTI) in Ambulatory Primary Care Pediatrics. Are We Using Antibiotics Appropriately?
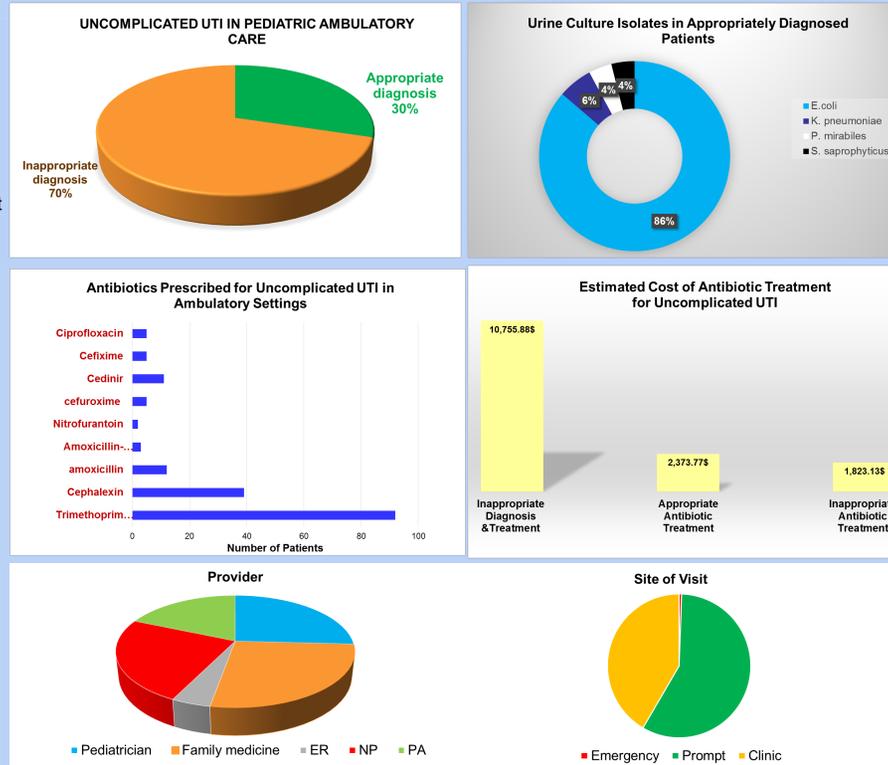
Ban AL-Sayyed, MD1, Jeremy Le, MD2, Mohammad Mousbah Al-Tabbaa, MD2, Brian Barnacle, MD Candidate2, Jinma Ren, PhD2, Meenakshy Aiyer, MD3 and Richard Tapping, PhD4, (1)Pediatrics, University of Illinois College of Medicine at Peoria (UICOMP)-Children's Hospital of Illinois, Peoria, IL, (2)University of Illinois College of Medicine at Peoria, Peoria, IL, (3)Internal Medicine, University of Illinois College of Medicine at Peoria, Peoria, IL, (4)University of Illinois, Urbana, IL

OSF HealthCare
Children's Hospital of Illinois

OSF SAINT FRANCIS MEDICAL CENTER

Background

Most antimicrobial stewardship programs (ASPs) target antimicrobial use in the inpatient care sites. However, most of antimicrobial prescribing happens at ambulatory sites. We conducted a retrospective study to determine the appropriateness of diagnosis and treatment of uncomplicated UTI in children in the ambulatory clinics at our institution. We also estimated the cost of appropriate and inappropriate antibiotic treatment in the included patients.

Methods

We reviewed electronic records of patients aged 2-18 years diagnosed with uncomplicated UTI and treated with antibiotics in the outpatient clinics from January 1, 2016 to April 30, 2016. Appropriate diagnosis was defined as confirmed UTI which included: pyuria (>5 white blood cells per HPF or positive for LE), a positive urine culture (≥50,000 colony units/mL of a single uropathogen for a catheterized sample or ≥ 100,000 colony units/mL for a clean catch urine sample), and lower urinary tract symptoms. Treatment was considered appropriate if the patient was prescribed first-line antibiotic for the susceptible isolate (trimethoprim sulfamethoxazole/*TMP-SMX*, amoxicillin-clavulanate, cephalexin, and nitrofurantoin), appropriate dose was calculated, and duration of treatment was 5-10 days. Third generation cephalosporins, and quinolones were considered broad spectrum antibiotics. Cost of antibiotic treatment was estimated for both groups.

UNCOMPLICATED UTI IN PEDIATRIC AMBULATORY CARE

Appropriate diagnosis 30%
Inappropriate diagnosis 70%

Urine Culture Isolates in Appropriately Diagnosed Patients

86%
6%
4%
4%

- E.coli
- K. pneumoniae
- P. mirabiles
- S. saprophyticus

Antibiotics Prescribed for Uncomplicated UTI in Ambulatory Settings

Ciprofloxacin
Cefixime
Cedinir
cefuroxime
Nitrofurantoin
Amoxicillin-...
amoxicillin
Cephalexin
Trimethoprim...

Number of Patients (0, 20, 40, 60, 80, 100)

Estimated Cost of Antibiotic Treatment for Uncomplicated UTI

10,755.88$ — Inappropriate Diagnosis & Treatment
2,373.77$ — Appropriate Antibiotic Treatment
1,823.13$ — Inappropriate Antibiotic Treatment

Provider

- Pediatrician
- Family medicine
- ER
- NP
- PA

Site of Visit

- Emergency
- Prompt
- Clinic

Results

We included 178 patients diagnosed with uncomplicated UTI and treated with antibiotics. Of all patients, 70.2% were inappropriately diagnosed (n=125) with polymicrobial growth in their urine cultures (56.8%, n=71). Antibiotics prescribed mostly in this group were *TMP-SMX* (52.8%, n=66) and cephalexin (21.6%, n=27). Only 29.8% of all included patients were appropriately diagnosed (n=53). *E.coli* was isolated in 83.0% of this group (n=44) and was sensitive to cephalexin in 96.2% (n=51) and to *TMP-SMX* in 83.0% of cases (n=44). Of all appropriately diagnosed patients (n=53), 26.4% were treated inappropriately (n=14) with wide spectrum antibiotics (n=8) or with low calculated dose (n=6). Wide spectrum antibiotics were prescribed in 14.6% of cases (n=26). The estimated cost of antibiotic treatment for inappropriately diagnosed group (n=125) was10,755.87$.

Conclusions

ASPs should target the pediatric outpatient settings. Antibiograms for outpatient settings should be developed to enhance empiric antibiotic selection and appropriate treatment. Education of providers about the appropriate diagnosis and treatment of uncomplicated UTI in children is essential in delivering cost-effective therapy.