

IMPACT OF PHARMACIST-LED ANTIBIOTIC STEWARDSHIP PROGRAM IN THE EMERGENCY DEPARTMENT



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BACKGROUND

- Urinary tract infections (UTIs) is one of the leading causes of infection among patients presenting to the emergency department (ED).¹
- Recent studies have shown increasing rates of inappropriate antibiotic prescribing in the outpatient setting, with more than 30% requiring post-discharge interventions.^{2,3}
- A study published in 2019 revealed that 32.7% of patients were prescribed an inappropriate antibiotic in the ED.⁴
- Antimicrobial treatment of asymptomatic bacteriuria (ASB) is an important contributor to inappropriate antimicrobial use, which not only increases the likelihood of adverse drug effects but has also been linked to increasing the risk of UTIs shortly after therapy.⁵
- Watson concluded that the current management of suspected UTI in ED patients results in unnecessary antibiotic exposure,⁶ highlighting an important opportunity for outpatient antimicrobial stewardship efforts.
- There have been contradicting results when comparing nurse practitioners (NPs) and pharmacists (RPHs) in leading the role of antibiotic stewardship in the outpatient setting, as some studies have shown no difference between RPHs and NPs,⁷ while another study showed 30% increase in interventions when pharmacists were tasked to intervene.^{8,9}

STUDY OBJECTIVES & HYPOTHESIS

OBJECTIVES: The primary objective of this study was to assess the implementation and utilization of an antimicrobial service within the ED and its effect on prescribing habits for urinary tract infections by examining the types of interventions, time to intervention, and overall appropriateness of the treatment. Secondary objectives were to identify inappropriate treatment for ASB.

HYPOTHESIS: Urine cultures monitored by pharmacists will lead to a reduction in time to intervention and increased appropriateness of antibiotic utilization, including dose and duration.

METHODS

- A retrospective cohort study was conducted at a large urban medical center in Sylmar, CA. Institutional review board approval was obtained by both Olive View-UCLA Medical Center (OVMC) and Western University of Health Sciences.
- Patients seen in the ED for suspected UTI had a urine culture obtained and prescribed an antibiotic by the ED provider, if needed. Once the urine culture results were finalized, a telephone follow up was scheduled.
- A search query obtained by the OVMC Information Systems Department identified patients with a positive urine culture from an ED visit from 02/01/2019 – 03/31/2020.
- Inclusion criteria: adults age 18 and older with a positive urine culture obtained in the ED for suspected UTI. Exclusion criteria: pregnancy or patients transferred to another facility.
- Data on demographics, indication, urinary symptoms, urinalysis results, and antibiotic used were collected. Outcome data collected: time to intervention and intervention type.
- Treatment appropriateness was rated on a 5-point scale devised by current literature and guideline recommendations as follows: 1- Optimal, 2- Adequate, 3- Suboptimal, 4- Inadequate, 5-not assessable.
- End points were compared between patients followed by nurse practitioners (Cohort 1) and those followed by pharmacists (Cohort 2).
- Statistical analysis was conducted using Chi-square, Mann Whitney, and unpaired t-tests from GraphPad R Prism® with a P-value < 0.05 considered statistically significant.

RESULTS

Table 1. Baseline characteristics and demographics of patients with positive urine cultures from the ED.

Characteristics	NPs (N=494)	RPHs (N=157)	P-Value
Gender			
Male	20.2%	21.0%	0.83
Female	79.8%	79.0%	
Average Age (yrs)	51.3±16.0	48.2±17.7	0.04
EGFR	90.5±25.4	92.3±27.4	0.48
CKD			
Stage 1	59.3%	63.6%	0.38
Stage 2	28.5%	24.0%	0.32
Stage 3	9.7%	9.3%	0.89
Stage 4	1.4%	2.3%	0.43
Stage 5	1.1%	0.8%	>0.99
Overall			0.78
Indication			
Cystitis	17.0%	15.9%	0.75
Pyelonephritis	30.6%	28.7%	0.65
UTI	38.0%	36.3%	0.69
Other	14.4%	19.1%	0.15
Overall			0.56
UTI symptoms			
Yes	73.8%	76.3%	0.54
No	26.2%	23.7%	

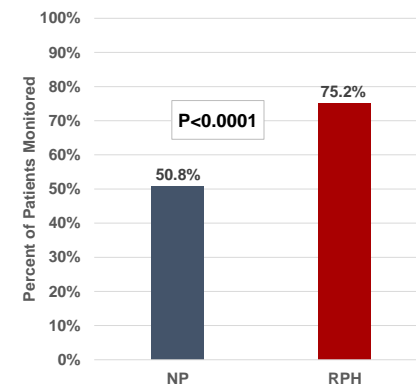


Figure 1. Optimal or adequate treatment appropriateness compared between cohorts.

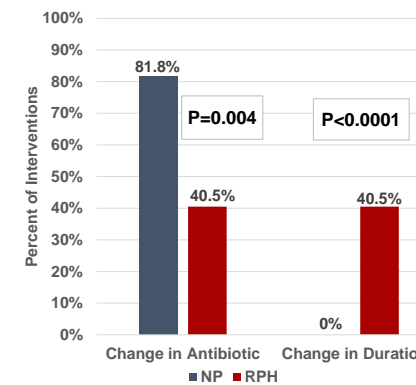


Figure 2. Percentage of most common intervention types.

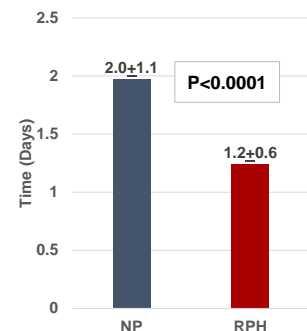


Figure 3. Time to intervention.

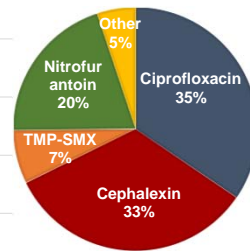


Figure 4. Types of antibiotics initially prescribed for all positive urine cultures.

Category	Percentage
Patients with no symptoms in study (both cohorts)	N=166
Contaminated Urinalysis	71.2%
Treated	86.7%

Table 2. Patients given antibiotic treatment in the absence of UTI symptoms.

DISCUSSION

- Baseline characteristics were similar between cohorts with the exception of age (Table 1). Although Cohort 1 had older patients, both cohorts were non-significant in regard to presence of symptoms, severity of the illness (i.e. indication), renal function, and CKD stage.
- There was a significant difference in appropriateness of treatment between urine cultures monitored by Cohort 2 than those followed by Cohort 1, with Cohort 2 providing more appropriate treatment or assessment (Figure 1).
- Cohort 2 was able to intervene sooner as they were checking urine culture results more frequently compared to Cohort 1 (Figure 3).
- Cohort 1 made more changes in the antibiotic used but made zero changes in the duration of antibiotic (Figure 2). In contrast, 40.5% of the interventions in Cohort 2 were for changes in duration of the antibiotic. In sum, with RPHs in charge of urine culture follow ups, 64 days of antibiotic therapy were avoided in a span of two months.
- This study highlights the underutilization of pharmacists in the role of an antimicrobial stewardship in the outpatient setting. This study and previous ones^{8,9} demonstrate the meaningful impact pharmacist can have in optimizing antibiotic treatment in the outpatient setting, especially considering the training and knowledge base that pharmacists have in the proper use of antimicrobials.

LIMITATIONS

- The study design was a retrospective study, therefore patient assessment was limited to how well the providers documented information.
- Provider diagnoses were not always documented or justified, which made assessing the treatment more difficult.
- Appropriateness of treatment assessment had potential for assessor bias.
- A reduction in number of ED visits for UTI symptoms towards the end of the study was observed (when RPHs were monitoring urine cultures). This may have been due to the COVID-19 pandemic.
- A multivariate regression analysis was not performed.

CONCLUSION

Study results revealed that pharmacists performed more appropriate treatment interventions with faster intervention time, suggesting that a pharmacist-led antibiotic stewardship can be a promising solution to outpatient management of antibiotics for urinary tract infections. Further studies assessing appropriateness of antimicrobial therapy in other disease states will be paramount to validating pharmacist impact in antibiotic stewardship in the outpatient setting.

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