PROGRAM PROFILE

Impact of a Pharmacist-Led Emergency Department Urinary Tract Infection Aftercare Program

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Background: Current evidence demonstrates that a significant proportion of prescriptions for antibiotics that originate from the emergency department (ED) are inappropriate. Urinary tract infections (UTIs) are a frequent indication for prescribing an antibiotic in the ED. The Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS) piloted a pharmacist-led ED aftercare program to promote appropriate antimicrobial management of outpatient UTIs.

Methods: A single center, retrospective chart review included veterans discharged with an oral antibiotic for UTI treatment from the VAGLAHS ED and evaluated by clinical pharmacists between June 1, 2021, and June 30, 2022. For patients with multiple ED visits, only the initial ED encounter was reviewed. Patients were excluded if they had a complicated UTI diagnosis requiring intravenous antibiotics or if they were admitted to the hospital.

Results: Of 449 veterans with an index UTI ED aftercare follow-up, 200 patients were evaluated. A cystitis diagnosis was made for 132 patients (66.0%) and 121 (60.5%) were empirically prescribed β-lactams. For 98 of 133 (73.6%) cases, appropriate empiric antibiotic selection led to no changes in index therapy. Sixty-seven cases required pharmacist intervention. Therapy modifications were made for 34 (17.0%) patients and 33 (16.5%) patients discontinued treatment. Discontinued therapy helped patients avoid 144 days of antibiotic exposure. Twelve (6.0%) patients had a subsequent urinary-related ED visit within 30 days.

Conclusions: Implementation of a pharmacist-driven UTI ED aftercare program at a US Department of Veterans Affairs medical center reduced unnecessary antimicrobial exposure and improved antibiotic management of UTIs.

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The emergency department (ED) is estimated to provide half of all medical care in the United States, serving as a conduit between ambulatory care and inpatient settings.[1] According to the Centers for Disease Control and Prevention, around 11 million antibiotic prescriptions were written in EDs in 2021.[2] A previous study conducted at a US Department of Veterans (VA) Affairs medical center found that about 40% of all antimicrobial use in the ED was inappropriate.[3] The ED is a critical and high-yield space for antimicrobial stewardship efforts.[4]

Urinary tract infections (UTIs) are one of the most common reasons for ED visits.[4] In 2018, there were about 3 million UTI discharge diagnoses reported in the US.[5] Diagnosis and management of UTIs can vary depending on patient sex, upper or lower urinary tract involvement, and the severity of the infection.[6] Most UTIs are uncomplicated and can be safely treated with oral antibiotics at home; however, if mismanaged, they can lead to increased morbidity and mortality.[6]

Antimicrobial prescribing in the ED is predominantly empiric with challenges such as diverse patient needs, rising antimicrobial resistance, and limited microbiologic data at the time of discharge.[6] The lack of a standardized process for urine culture follow-up after discharge represents another major complicating factor in the outpatient management of UTIs. Studies have shown that ED pharmacists play a vital role in providing quality follow-up care by optimizing antimicrobial use, resulting in improved patient outcomes in various infectious syndromes, including UTIs.[7-13]

PROGRAM DESCRIPTION

In June 2021, the VA Greater Los Angeles Healthcare System (VAGLAHS) piloted an ED pharmacist-led aftercare program to optimize postdischarge antimicrobial therapy management of UTIs. After a patient is discharged from the ED, the clinical pharmacist reviews urine culture results, interprets available antimicrobial susceptibility, conducts patient interviews, adjusts for patient-specific factors, and addresses potential antibiotic-associated adverse events. The ED pharmacist is then responsible for managing therapy changes in consultation with an ED health care practitioner (HCP).

METHODS

This single center, retrospective chart review included veterans who were discharged with an oral antibiotic for UTI treatment from the VAGLAHS ED and evaluated by clinical pharmacists between June 1, 2021, and June 30, 2022. For patients with multiple ED visits, only the initial ED encounter was reviewed. Patients were excluded if they had a complicated UTI diagnosis requiring intravenous antibiotics or if they were admitted to the hospital. Data were generated through the Corporate Data Warehouse by VAGLAHS Pharmacy Informatics Service. Each patient was assigned a random number using the Microsoft Excel formula =RAND( ) and then sorted in chronological order to ensure randomization at baseline prior to data collection.

The primary aim of this quality improvement project was to characterize the impact of ED pharmacist-led interventions by evaluating the proportion of empiric to targeted therapy adjustments, antibiotic therapy discontinuation, and unmodified index treatment. The secondary objectives evaluated time to ED pharmacist aftercare follow-up, days of antibiotic exposure avoided, 30-day ED visits related to a urinary source, and transition of care documentation. Descriptive statistics were performed; median and IQR were calculated in Microsoft Excel.

RESULTS

A total of 548 ED UTI encounters were identified, including 449 patients with an index ED UTI aftercare follow-up evaluation. Of the 246 randomly screened patients, 200 veterans met inclusion criteria. The median age of included patients was 73 years and most (83.0%) were male (Table 1). One hundred thirty-two patients (66.0%) had a cystitis diagnosis, followed by complicated UTI (14.0%) and catheter-associated UTI (11.0%). The most frequently isolated uropathogen was *Escherichia coli* (30.5%). β-lactams were prescribed for empiric treatment to 121 patients (60.5%), followed by 36 fluoroquinolones prescriptions (18.0%). The median treatment duration was 7 days.

The median time to ED pharmacist UTI aftercare evaluation was 2 days (Table 2).

TABLE 1 Baseline Characteristics (N = 200)

Criteria	Results
Age, median (IQR), y	73 (63-78)
Sex, No. (%)	
Male	166 (83.0)
Female	34 (17.0)
CCI score, median (IQR)	4.65 (2.9)
WBC, median (IQR), cells x 10^3	7.44 (6.0-9.3)
Creatinine clearance, median (IQR), mL/min	63.4 (43.0-79.8)
Antibiotic allergies, No. (%)	
β-lactams	16 (8.0)
Sulfa	12 (6.0)
Others	7 (3.5)
> 1 allergy	6 (3.0)
Symptoms, No. (%)	
Acute hematuria	28 (14.0)
Dysuria	25 (12.5)
Urgency	4 (2.0)
Frequency	3 (1.5)
> 1 symptom	78 (39.0)
Others	46 (23.0)
None	16 (8.0)
Diagnosis, No. (%)	
Cystitis	132 (66.0)
Complicated urinary tract infection	28 (14.0)
Catheter-associated	22 (11.0)
Asymptomatic bacteriuria	16 (8.0)
Prostatitis	2 (1.0)
Index antibiotic at discharge, No. (%)	
β-lactam	121 (60.5)
Fluoroquinolone	36 (18.0)
Sulfamethoxazole-trimethoprim	20 (10.0)
Nitrofurantoin	18 (9.0)
Others	3 (1.5)
> 1 antibiotic	2 (1.0)
Duration of therapy, median, d	7
Positive urinalysis, No. (%)	177 (88.5)
Urine microbiology, No. (%)	
Escherichia coli	61 (30.5)
Klebsiella pneumoniae	10 (5.0)
Proteus mirabilis	15 (7.5)
Enterococcus faecalis	19 (9.5)
Others	24 (12.0)
Polymicrobial	15 (7.5)
Mixed urogenital flora	8 (4.0)
Likely contamination	11 (5.5)
Negative culture	36 (18.0)
No culture obtained	1 (0.5)

Abbreviations: CCI, Charlson Comorbidity Index; WBC, white blood cell.

Sixty-seven cases required pharmacist intervention, which included 34 transitions to targeted therapy (17.0%) and 33 antibiotic discontinuations (16.5%). A total of 144 days of antibiotic exposure was avoided (ie, days antibiotic was prescribed minus

TABLE 2 Pharmacist Interventions

Interventions	Results
Modification of index treatment to targeted therapy, No. (%)	34 (17.0)
Discontinuation of antibiotic, No. (%)	33 (16.5)
No changes to index treatment plan, No. (%)[a]	133 (66.5)
Pathogen susceptible to index treatment	98 (49.0)
No change per discussion with prescriber	18 (9.0)
Intervention recommended but unable to reach patient	8 (4.0)
Signed out to community nursing home	4 (2.0)
Therapy completed	4 (2.0)
Patient refusal	1 (0.5)
Time to follow-up from discharge, median (IQR), d	2 (2-3)
30-day ED visits related to a urinary source, No. (%)	12 (6.0)
Patient returned to ED prior to pharmacist follow-up	2 (1.0)
Persistent UTI/worsening urinary symptoms	8 (4.0)
Recurrent UTI	2 (1.0)
Transition of care documentation, No. (%)	
Yes	106 (53)
No	68 (34)
No primary care practitioner	26 (13)
Time for antibiotic discontinuation, d[b]	
Index treatment at discharge, total time	230
Therapy prior to intervention, total time	86
Antibiotic exposure avoided, total time	144

[a]Proportion (%) of UTI cases without a modification in index treatment and their respective reasons are listed with values relative to the total number of cases with no change in treatment (eg, n = 133).
[b]n = 33.
Abbreviations: ED, emergency department; UTI, urinary tract infection.

days therapy administered). The majority of cases without modification to index therapy were due to appropriate empiric treatment selection (49.0%). Twelve (6.0%) patients had a subsequent urinary-related ED visit within 30 days due to 8 cases of persistent and/or worsening urinary symptoms (66.7%) and 2 cases of recurrent UTI (16.7%).

DISCUSSION

Outpatient antibiotic prescribing for UTI management in the ED is challenging due to the absence of microbiologic data at time of diagnosis and lack of consistent transition of care follow-up.[6] The VAGLAHS ED UTI aftercare program piloted a pharmacist-driven protocol for review of all urine cultures and optimization of antibiotic therapy.

Most ED UTI discharges that did not require pharmacist intervention had empiric treatment selection active against the clinical isolates. This suggests that the ED prescribing practices concur with the VAGLAHS antibiogram and treatment guidelines. Clinical pharmacists intervened in about one-third of UTI cases, which included modification or discontinuation of therapy. Further review of these cases demonstrated that about half of those with a subsequent 30-day ED visit related to a urinary source had therapy modification. Most patients with a 30-day ED visit had persistent and/or worsening urinary symptoms, prompting further exploratory workup.

Although this project did not evaluate time from urine culture results to aftercare review, the VAGLAHS ED pharmacists had a median follow-up time of 48 hours. This timeline mirrors the typical duration for urine culture results, suggesting that the pilot program allowed for real time pharmacist review and intervention. Consequently, this initiative resulted in the avoidance of 144 unnecessary days of antibiotic exposure.

While the current protocol highlights the work that ED pharmacists provide postdischarge, there are additional opportunities for pharmacist intervention. For example, one-third of these clinical encounters were completed without HCP notification, indicating an ongoing need to ensure continuity of care. Additionally, all 16 patients diagnosed with asymptomatic bacteriuria were discharged with an oral antibiotic, highlighting an opportunity to further optimize antibiotic prescribing prior to discharge. ED pharmacists continue to play an important role in mitigating inappropriate and unnecessary antibiotic use, which will reduce antibiotic-related adverse drug reactions, *Clostridioides difficile* infection, and antimicrobial resistance.

Limitations

Inconsistent and incomplete documentation of clinical data in the electronic health record made the characterization of patient encounters challenging. Furthermore, ED HCPs varying clinical practices may have impacted the heterogeneity of UTI diagnosis and management at VAGLAHS.

CONCLUSIONS

Implementation of an ED pharmacist-driven UTI aftercare program at VAGLAHS reduced unnecessary antimicrobial exposure, im-

proved antibiotic management, and ensured continuity of care postdischarge. Findings from our project implicate possible future pharmacist involvement predischarge, such as targeting inappropriate asymptomatic bacteriuria treatment.[14-16] This pilot program suggested the feasibility of integrating antimicrobial stewardship practices within the ED setting in an ongoing effort to improve the quality of care for veterans.

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Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies.

Ethics and consent

This project was reviewed by the Veterans Affairs Greater Los Angeles Institutional Review Board and was determined to be exempt from research review.

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