ANTIBIOTIC PRESCRIBING PATTERNS IN THE TREATMENT OF URINARY TRACT INFECTIONS IN PRIMARY HEALTH CARE IN SARAJEVO, BOSNIA AND HERZEGOVINA

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Abstract: Urinary tract infections (UTIs) are among the most common bacterial infections managed in primary health care and represent one of the leading causes of antibiotic prescribing in outpatient settings. This study aimed to analyze antibiotic prescribing patterns and treatment outcomes among patients with UTIs treated in primary health care facilities in Sarajevo Canton, Bosnia and Herzegovina. A retrospective observational study was conducted among 200 adult patients diagnosed and treated for UTIs. Data regarding demographic characteristics, prescribed antibiotics, treatment duration, and clinical outcomes were collected from medical records and analyzed using descriptive statistical methods. The mean age of patients was 59.9 ± 16.2 years, and females accounted for 86% of the study population. Fluorokinolons and cefalosporins were the most frequently prescribed antibiotics. Clinical cure was achieved in 92% of patients, with favorable outcomes observed across the most commonly prescribed antimicrobial agents. Despite high treatment success rates, the observed prescribing pattern indicates frequent use of broad-spectrum antibiotics, particularly fluoroquinolones and third-generation cephalosporins, suggesting opportunities for improving adherence to evidence-based recommendations and strengthening antimicrobial stewardship in primary health care.
Keywords: urinary tract infection, antibiotic prescribing, primary health care

1. INTRODUCTION

Urinary tract infections (UTIs) are among the most common bacterial infections managed in primary health care and represent a major reason for antibiotic prescribing in outpatient settings. Although uncomplicated UTIs usually respond well to appropriate therapy, inappropriate antibiotic selection, excessive use of broad-spectrum agents, and prolonged treatment durations contribute to antimicrobial resistance. Current guidelines recommend the use of effective agents with the narrowest appropriate spectrum and the shortest effective duration whenever clinically appropriate (Kranz et al., 2024; Grigoryan & Trautner, 2024). Despite the availability of evidence-based recommendations, antibiotic prescribing practices for UTIs remain variable across healthcare systems. Factors such as patient characteristics, clinical presentation, previous antimicrobial exposure, and local resistance patterns may influence treatment decisions (Sijbom et al., 2023). In Bosnia and Herzegovina, data on antibiotic prescribing patterns for UTIs in primary health care remain limited. Therefore, evaluation of local prescribing practices is important for identifying current treatment trends and opportunities to optimize antibiotic use. This study aimed to analyze antibiotic prescribing patterns in patients treated for UTIs in primary health care facilities in Sarajevo Canton, Bosnia and Herzegovina.

2. MATERIAL AND METHODS

A retrospective observational study was conducted among 200 adult patients diagnosed and treated for urinary tract infections in primary health care facilities in Sarajevo Canton, Bosnia and Herzegovina. Data were collected retrospectively from anonymized electronic medical records. The analyzed variables included patient age, sex, prescribed antibiotic, duration of antibiotic therapy, and treatment outcome. Treatment outcome was classified as clinical cure or treatment failure based on the documented clinical assessment. Descriptive statistical methods were used for data analysis. Continuous variables are presented as mean ± standard deviation (SD), median, and range, while categorical variables are expressed as frequencies and percentages. Statistical analysis was performed using IBM SPSS Statistics software ver 24.0.

3. RESULTS

A total of 200 patients diagnosed with urinary tract infection and treated in primary health care facilities were included in the study. The mean age of the study population was 59.9 ± 16.2 years, with a median age of 63 years (range 22–93 years). Female patients predominated, accounting for 172 (86.0%) of all participants, whereas 28 (14.0%) were male (Table 1).

Table 1. Demographic characteristics of the study population

Variable	Value
Number of patients	200
Age, mean ± SD (years)	59.9 ± 16.2
Median age (years)	63
Age range	22–93
Female sex, n (%)	172 (86.0)
Male sex, n (%)	28 (14.0)

Source: Authors' research

Ciprofloxacin was the most frequently prescribed antibiotic and was used in 63 patients (31.5%). The second most commonly prescribed antibiotic was cefixime, accounting for 51 prescriptions (25.5%), followed by trimethoprim/sulfamethoxazole, prescribed in 30 patients (15.0%). Nitrofurantoin and fosfomycin were prescribed in 22 (11.0%) and 10 (5.0%) patients, respectively. Less frequently prescribed antibiotics included amoxicillin/clavulanate (2.5%), norfloxacin (2.0%), and other antimicrobial agents (7.5%) (Table 2).

Table 2. Distribution of prescribed antibiotics

Antibiotic	n (%)
Ciprofloxacin	63 (31.5%)
Cefixime	51 (25.5%)
Trimethoprim/sulfamethoxazole	30 (15.0%)
Nitrofurantoin	22 (11.0%)
Fosfomycin	10 (5.0%)
Amoxicillin/clavulanate	5 (2.5%)
Norfloxacin	4 (2.0%)
Other antibiotics	15 (7.5%)

Source: Authors' research

The overall mean duration of antibiotic therapy was 7.7 days. The longest average treatment duration was observed among patients receiving amoxicillin/clavulanate (10.4 days), followed by nitrofurantoin (9.0 days), norfloxacin (8.5 days), cefixime (8.4 days), and ciprofloxacin (8.3 days). Patients treated with trimethoprim/sulfamethoxazole received therapy for a mean duration of 7.2 days, whereas the shortest treatment duration was recorded for fosfomycin (2.1 days), reflecting its single-dose therapeutic regimen (Table 3).

Table 3. Mean duration of antibiotic therapy according to prescribed antibiotic

Antibiotic	Mean duration (days)
Amoxicillin/clavulanate	10.4
Nitrofurantoin	9
Norfloxacin	8.5
Cefixime	8.4
Ciprofloxacin	8.3
Trimethoprim/sulfamethoxazole	7.2
Fosfomycin	2.1

Source: Authors' research

Clinical cure was achieved in 184 patients (92.0%), while 16 patients (8.0%) experienced treatment failure. Cure rates exceeded 90% for all of the most frequently prescribed antibiotics. The highest cure rates were observed among patients treated with cefixime (94.1%) and ciprofloxacin (93.7%), followed by trimethoprim/sulfamethoxazole (93.3%). Clinical cure was achieved in 90.9% of patients treated with nitrofurantoin and in 90.0% of those receiving fosfomycin (Table 4).

Table 4. Clinical outcomes according to prescribed antibiotic

Antibiotic	Cure (%)	Failure (%)
Ciprofloxacin	93.7	6.3
Cefixime	94.1	5.9
Trimethoprim/sulfamethoxazole	93.3	6.7
Nitrofurantoin	90.9	9.1
Fosfomycin	90	10

Source: Authors' research

4. DISCUSSION

Our study evaluated antibiotic prescribing patterns for urinary tract infections in primary health care in Sarajevo Canton, Bosnia and Herzegovina, and demonstrated that fluoroquinolones, particularly ciprofloxacin, together with third-generation cephalosporins, were among the most frequently prescribed antimicrobial agents. Although the overall clinical cure rate was high (92%), the observed prescribing pattern indicates substantial use of broad-spectrum antibiotics, suggesting potential gaps between routine clinical practice and current evidence-based recommendations. These findings highlight opportunities for strengthening antimicrobial stewardship and improving appropriate prescribing according to current guidelines (Goebel et al., 2021; Schmiemann et al., 2023). The predominance of female patients (86%) and the mean age of approximately 60 years in our study are similar to recent studies of UTI management in primary care, where women represent the majority of treated patients. These demographic characteristics reflect the higher burden of UTIs among women and older adults, who frequently require antibiotic treatment due to recurrent infections and associated comorbidities (Mullakary et al., 2021). Another important finding was the relatively limited use of nitrofurantoin (11%) and fosfomycin (5%), despite their recommended role as first-line agents for uncomplicated cystitis. Similar prescribing patterns have been reported in outpatient settings, where broad-spectrum antibiotics continue to be used despite recommendations favoring narrower-spectrum alternatives. This highlights the persistent challenge of translating evidence-based recommendations into everyday primary care practice (Cals et al., 2022). The average treatment duration of 7.7 days observed in the present study also needs attention. Although treatment duration varied according to the selected antimicrobial agent, most patients received therapy for approximately one week or longer. Previous studies have shown that antibiotic courses in ambulatory care are frequently longer than necessary, while shorter regimens may provide comparable effectiveness for uncomplicated infections with reduced antibiotic exposure and fewer adverse effects (Kim et al., 2020; King et al., 2020). In our cohort, the shortest treatment duration was observed with fosfomycin, consistent with its recommended single-dose regimen. Despite variations in antibiotic selection and treatment duration, clinical outcomes in our cohort were favorable, with cure rates exceeding 90% across the major antibiotic groups. Similar clinical success rates have been reported in outpatient UTI studies, indicating that several antimicrobial agents may achieve favorable outcomes when appropriately selected and when local resistance patterns remain acceptable (Drekonja et al., 2021, Kornfält et al., 2021).

5. CONSLUSION

This study highlights important characteristics of antibiotic prescribing for UTIs in primary health care in Sarajevo Canton, Bosnia and Herzegovina. The frequent use of broad-spectrum antibiotics, particularly fluoroquinolones and third-generation cephalosporins, indicates areas where prescribing practices may be further optimized.

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