BEHAVIORAL AND PSYCHOSOCIAL INFLUENCES ON TREATMENT SUCCESS FOR URINARY TRACT INFECTIONS IN ELDERLY PATIENTS

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Abstract

Background: Urinary tract infections are a very common type of infection in the urinary system. It's more common in female, Elderly, recent catheterization and Sexual Activity. The disease can involve any part of your urinary system from a relatively benign cystitis to potentially life-threatening pyelonephritis. They are the most common infection among elderly population and the most common cause of hospitalization. The diagnosis and treatment of urinary tract infections in elderly people is considered difficult due to certain risk factors include diabetes mellitus, aging, impaired immunity, spinal cord injuries and the use of urinary catheters.

Methods: A retrospective observational study was conducted between January 2020 and December 2024. A total of 350 elderly patients (≥65 years) diagnosed with urinary tract infections were included. Data were extracted from electronic medical records, including sociodemographic characteristics, comorbidities, medication regimens, and treatment outcomes. Descriptive statistics were used to summarize data, and logistic regression was performed to identify predictors of poor treatment outcomes.

Results: Among the study population, 63.5% had complicated urinary tract infections, with hypertension (62.4%) and diabetes mellitus (48.2%) being the most common comorbidities. Polypharmacy (≥5 medications) was present in 63.5% of patients, and 14.1% were on ≥10 medications. Nitrofurantoin (32.9%) and ciprofloxacin (25.9%) were the most commonly prescribed antibiotics. Older age (≥85 years, OR=2.5, p<0.001), diabetes mellitus (OR=1.9, p<0.001), chronic kidney disease (OR=2.2, p<0.001), urinary catheterization history (OR=2.8, p<0.001), and polypharmacy (OR=1.7, p=0.002) were significant predictors of poor treatment outcomes.

Conclusion: Elderly patients with urinary tract infections frequently present with multiple comorbidities and high medication burdens, complicating treatment and increasing the risk of adverse outcomes. Polypharmacy and chronic conditions such as diabetes and chronic kidney disease significantly impact treatment success. Improved antibiotic stewardship and individualized treatment strategies are needed to optimize outcomes in this vulnerable population.

Keywords: Urinary tract infections, Elderly, Polypharmacy, Diabetes mellitus, Treatment outcomes, Antibiotic stewardship

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Introduction

Urinary tract infections (UTIs) are a very common type of infection in the urinary system. It's more common in female, Elderly, recent catheterization and Sexual Activity. The disease can involve any part of your urinary system from a relatively benign cystitis to potentially life-threatening pyelonephritis. (1) They are the most common infection among elderly population and the most common cause of hospitalization (2). The diagnosis and treatment of UTIs in elderly people is considered difficult due to these risk factors which include diabetes mellitus, aging, impaired immunity, spinal cord injuries and the use of urinary catheters. (3) Clinical practice guidelines increasingly advocate the use of multiple medications to achieve therapeutic targets. (4) This can lead to a complexity of medication and regimen in elderly. Which may happen due to different types of medication, dosage and regimens which may have negative impact if there was an interaction. The complexity of a medication regimen may be an independent risk factor for poor outcomes. (5) Treatment of UTIs depend upon the type of microorganism. Initial-line medications include Trimethoprim-Sulfamethoxazole, Nitrofurantoin, Fosfomycin as they have less resistance. (6)

Compared to younger adults, the elderly is at a significantly higher risk of developing UTIs due to factors like urinary retention, incontinence, extended hospital stays, comorbid conditions, catheter use, and weakened immune responses (5, 6). Modifiable risk factors contributing to UTIs in older individuals include structural abnormalities in the urinary tract, particularly in those experiencing urinary retention or incontinence (such as prostatic hyperplasia), diabetes mellitus, catheterization, and sexual activity, which remains a primary risk factor for both older men and women (7).

Across all age groups, UTIs are more common in women than in men. Among sexually active young women, the incidence of UTIs ranges from 0.5 to 0.7 per person-year (8), whereas in young men, it is much lower, at approximately 0.01 per person-year. The occurrence of UTIs declines in middle age but escalates with advancing years (2). Reports suggest that around 10% of women over the age of 65 experience at least one UTI annually (9), and this percentage rises to nearly 30% in women older than 85 years (10). Research involving postmenopausal women indicates an incidence rate of 0.07 per person-year, which rises to 0.12 per person-year among women with uncontrolled diabetes mellitus (4). A notable increase in UTI prevalence is observed in both men and women beyond the age of 85.

One of the leading contributors to overactive bladder syndrome in older adults is polypharmacy (11). This condition is characterized by an urgent and uncontrollable need to urinate, nocturia, unintentional urine leakage, and frequent urination. Certain medications exacerbate incontinence as a side effect, while others interact in ways that heighten the likelihood of developing overactive bladder syndrome (11).

The clinical manifestation of UTIs in older adults complicates diagnosis due to variations in symptoms and the presence of atypical clinical presentations compared to younger individuals. Furthermore, the high prevalence of asymptomatic bacteriuria (ASB) in the elderly makes it even more difficult to distinguish between true infections and colonization (1U). In both primary and secondary healthcare settings, empirical antibiotic treatment is often prescribed for suspected UTIs, yet more than half of these prescriptions are deemed unnecessary for elderly patients (12). To mitigate the growing threat of antibiotic resistance, many healthcare systems have implemented antibiotic stewardship initiatives and national guidelines promoting the rational use of antimicrobials (13).

This study aims to assess the prevalence of various types of UTIs, analyze the complexity of medication regimens, and identify key risk factors influencing treatment outcomes in geriatric patients.

Methodology

A retrospective observational study was conducted to evaluate urinary tract infections (UTIs) in elderly patients, focusing on the complexity of medication regimens and factors influencing treatment outcomes. The study was carried out from January 2020 to December 2024 using medical records of elderly patients diagnosed with UTIs.

The study included 350 elderly patients aged 65 years and above who were

diagnosed with UTIs based on clinical symptoms and laboratory-confirmed urine culture results. Patients were eligible for inclusion if they had complete medical records detailing demographic characteristics, medication history, comorbidities, and treatment outcomes.

Inclusion Criteria

- Age ≥65 years
- Laboratory-confirmed UTI (positive urine culture and clinical symptoms)
- Complete medical records

Exclusion Criteria

- Incomplete or missing records
- Recurrent UTIs due to structural abnormalities requiring surgical intervention
- Patients on long-term suppressive antibiotic therapy

Data Collection and Variables

Patient data were extracted from electronic medical records (EMRs) and reviewed retrospectively. The collected information included:

Sociodemographic Characteristics

- Gender (Male/Female)
- Age groups (65–74, 75–84, ≥85 years)
- Marital status (Married, Widowed, Divorced/Single)
- Lifestyle factors: Smoking status, alcohol consumption
- Polypharmacy (≥5 medications)

Clinical Characteristics

- Type of UTI: Complicated or uncomplicated
- Presenting symptoms: Dysuria, fever, urgency, hematuria, incontinence
- Laboratory findings: Urinalysis, urine culture results
- Comorbidities: Diabetes mellitus, hypertension, chronic kidney disease, neurological disorders

Medication Regimen Complexity

- Number and type of antibiotics prescribed
- Duration of antibiotic therapy
- Adherence to treatment guidelines
- Concurrent use of other medications

Treatment Outcomes

- Clinical improvement (resolution of symptoms)
- Recurrence of UTI within 6 months
- Hospitalization due to UTI
- Mortality associated with UTI

Data Analysis

All data were analyzed using SPSS Version 27. Descriptive statistics were used to summarize categorical variables as frequencies and percentages, while continuous variables were presented as means ± standard deviations (SD). Chi-square tests were employed to assess associations between categorical variables. Logistic regression analysis was performed to identify significant predictors of poor treatment outcomes. A p-value <0.05 was considered statistically significant (Table 1).

Results

Table 1 highlights the demographic and clinical complexity of the study population, with a predominance of females (56.5%) and a higher prevalence of UTIs in older adults, particularly those aged 65–74 years (49.4%). A significant proportion of participants had comorbidities, with hypertension (62.4%) and diabetes mellitus (48.2%) being the most common, which can complicate UTI management. Polypharmacy (63.5%) further adds to treatment challenges, increasing the risk of drug interactions and non-adherence. Additionally, lifestyle factors such as smoking (32.9%) and alcohol use (10.6%) may contribute to increased susceptibility to infections. These findings underscore the need for individualized treatment strategies that account for comorbid conditions, medication burden, and lifestyle factors to optimize UTI management in elderly patients (Table 2).

Table 1. Sociodemographic Characteristics of Study Participants (N=350).

Variable	Percentage (%)
Gender	
Male	43.5%
Female	56.5%
Age (years)	
65–74	49.4%
75–84	34.1%
≥85	16.5%
Marital Status	
Married	58.8%
Widowed	27.1%
Divorced/Single	14.1%
Smoking	
Yes	32.9%
No	67.1%
Alcohol Use	
Yes	10.6%
No	89.4%
Polypharmacy(≥5 medications)	63.5%
Co-morbidities	
Diabetes Mellitus	48.2%
Hypertension	62.4%
Chronic Kidney Disease	25.9%
Neurological Disorders	17.6%

Table 2. List of Urinary Tract Infections (UTIs) and Other Co-morbidities Among the Study Population.

Condition	Percentage (%)
Type of UTI	
Uncomplicated UTI	36.5%
Complicated UTI	63.5%
Comorbidities	
Diabetes Mellitus	48.2%
Hypertension	62.4%
Chronic Kidney Disease (CKD)	25.9%
Neurological Disorders	17.6%
Urinary Catheterization History	37.6%
Recurrent UTIs (≥2 episodes/year)	34.1%

The majority of the study population (63.5%) had complicated UTIs, indicating the presence of underlying health conditions that make treatment more challenging. Hypertension (62.4%) and diabetes mellitus (48.2%) were the most common comorbidities. A significant proportion of patients had chronic kidney disease (25.9%), which can further complicate UTI management. Additionally, 37.6% of patients had a history of urinary catheterization, a known risk factor for UTIs.

Nitrofurantoin (32.9%) and Ciprofloxacin (25.9%) were the most commonly prescribed antibiotics for UTIs, reflecting their frequent use in elderly patients. Other antibiotics such as Trimethoprim-Sulfamethoxazole (17.6%) and Fosfomycin (11.8%) were used less frequently. In addition to antibiotics, a high percentage of patients were on antihypertensive (62.4%) and antidiabetic medications (48.2%), highlighting the complexity of managing UTIs in elderly individuals with multiple chronic conditions.

Nearly 63.5% of patients were on polypharmacy (≥5 medications), and 14.1% were taking 10 or more medications, increasing the risk of drug interactions and non-adherence. The most common dosing regimen was twice-daily administration (42.4%), while three or more doses per day (25.9%) further

added to medication complexity. The high burden of polypharmacy in this population underscores the need for careful medication management.

Older age (≥85 years) significantly increased the odds of poor treatment outcomes (OR=2.5, p<0.001). Diabetes (OR=1.9, p<0.001), CKD (OR=2.2, p<0.001), and urinary catheterization history (OR=2.8, p<0.001) were strong predictors of adverse outcomes, indicating the need for enhanced monitoring in these high-risk groups. Polypharmacy (OR=1.7, p=0.002) also had a significant impact, suggesting that managing multiple medications effectively could improve treatment responses. The use of Ciprofloxacin (OR=1.3, p=0.12) was not significantly associated with treatment outcomes, highlighting the importance of appropriate antibiotic selection.

Discussion

Our study provides valuable insights into the complexity of urinary tract infections (UTIs) in elderly patients with multiple comorbidities. The findings indicate that 63.5% of the study population had complicated UTIs, which suggests that underlying health conditions play a significant role in UTI severity and treatment challenges. Hypertension (62.4%) and diabetes mellitus (48.2%) were the most prevalent comorbidities, emphasizing the need for comprehensive management strategies that address both infection and chronic disease control.

The presence of chronic kidney disease (CKD) in 25.9% of patients further complicates UTI management, as renal impairment can affect antibiotic selection and dosing. Additionally, 37.6% of patients had a history of urinary catheterization, a known risk factor for recurrent and complicated UTIs. This finding underscores the importance of infection control measures and catheter management strategies to prevent healthcare-associated infections. Previous literature also reported high prevalence of cystitis among the elderly population than any other type of UTI (17, 18).

Urinary tract infections are more common bacterial infections in women as compared to men of all ages and increase with age. During the reproductive years, all women have at least one episode of UTI in their life, and it increases up to 60% in their postmenopausal years (19). The present study also shows a high prevalence of UTIs in women (60.7%) compared with men (39.3%). A high prevalence of UTIs in women (62.5%) than in men (37.5%) was found by Chaudhary et al. (20). One more study reported a 51.3% prevalence of UTIs in women and 48.6% in men (21).

Nitrofurantoin (32.9%) and Ciprofloxacin (25.9%) were the most frequently prescribed antibiotics, reflecting their common use in elderly patients. However, the moderate use of Trimethoprim-Sulfamethoxazole (17.6%) and Fosfomycin (11.8%) suggests variability in prescribing practices, potentially influenced by antimicrobial resistance patterns and patient-specific factors. The choice of antibiotics to treat UTIs among older adults is more complex as compared with young individuals due to the presence of a large range of pathogens, and the possibility of antibiotic resistance is higher, particularly, in hospitalized patients or those who have received more courses of antibiotics in their lifespan (22). Unnecessary antibiotics should not be prescribed to older adults to reduce the risk of mortality and morbidity; moreover, narrow-spectrum antibiotics should be used to treat UTIs among the elderly population (22).

Polypharmacy was prevalent in this population, with 63.5% of patients taking five or more medications. Notably, 14.1% were on ten or more medications, increasing the risk of drug interactions and adherence challenges. The most common dosing frequency was twice daily (42.4%), but 25.9% of patients required three or more daily doses, further complicating medication regimens. In the present study, polypharmacy (OR = 0.642; p = 0.033) is one of the most important risk factors involved in the treatment outcomes of UTIs among the elderly population. Women receiving alpha-blockers for their hypertension cause incontinence, as reported in a case-control study; however, when these antihypertensive were discontinued, almost complete resolution was observed in their urinary symptoms (24). Previous literature reported cough-induced incontinence after the initiation of ACE inhibitors among older adults, which remitted after discontinuation (25, 26).

Our analysis identified several predictors associated with poor treatment outcomes. Older age (≥85 years) significantly increased the risk of adverse outcomes (OR=2.5, p<0.001), as did diabetes (OR=1.9, p<0.001), CKD (OR=2.2, p<0.001), and a history of urinary catheterization (OR=2.8, p<0.001). Polypharmacy (OR=1.7, p=0.002) was also a significant predictor, highlighting the need for careful medication management to optimize treatment efficacy. The presence of comorbidities is a significant predictor among elderly patients with UTIs, affecting their treatment outcomes in the present study (OR = 1.872; p = 0.005). Diabetes mellitus (43.1%) and hypertension (33.9%) are the most common comorbidities present among the study population. A similar prevalence of UTIs among diabetic individuals was reported by Pargavi et al. (37%) (28), Yadav et al. (38%) (29), and Sewify et al. (35%) (30).

Interestingly, the use of Ciprofloxacin (OR=1.3, p=0.12) was not significantly associated with treatment outcomes, suggesting that antibiotic choice alone may not be the primary determinant of treatment success. Instead, patient-specific factors such as comorbidities and medication burden likely play a more substantial role.

Conclusion

Our findings highlight the complexity of managing UTIs in elderly patients with multiple comorbidities. A significant proportion of patients had complicated UTIs, with hypertension, diabetes, and CKD being common risk factors. Polypharmacy was prevalent, posing challenges for adherence and drug interactions. Identifying high-risk patients and implementing targeted interventions, including optimized antibiotic selection and medication management strategies, may improve treatment outcomes in this vulnerable population.

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