

Urinary Tract Infection Antibiotic Resistance in the United States

Thomas A. Waller, MD*, Sally Ann L. Pantin, MD, Ashley L. Yenior, MD, George Pujalte, MD

KEYWORDS

- Urinary tract infection (UTI) • Antibiotic resistance
- Uropathogenic *Escherichia coli* (UPEC) • Recurrent UTI

KEY POINTS

- In the United States, there are more than 8 million office visits for urinary tract infection (UTI) each year.
- Patients often present with “classic symptoms” of dysuria and increased frequency, but many often present as asymptomatic or with a mixed picture.
- Antibiotic resistance is a worldwide problem that has developed due to some degree from overprescribing of the medications.
- Prescribers should be aware of the most common bacteria causing UTIs and their propensity for resistance.
- Antibiotic stewardship programs have been designed to help encourage proper recognition and treatment of infections.

INTRODUCTION

Urinary tract infection (UTI) is one of the most common conditions in both outpatient and inpatient settings worldwide, where it has been noted to affect 150 million people annually.¹ In the United States, there are more than 8 million office visits each year.¹⁻³ Although most patients suffer only with a varying range of painful and annoying symptoms, the Centers for Disease Control and Prevention (CDC) reports that UTIs contribute to 13,000 deaths every year.⁴

A UTI is commonly associated with women,⁵ because as many as 50% will likely be affected in their lifetime, and they are approximately 6 times more likely to be affected than men.⁶ Although most UTIs resolve with treatment, almost 30% of women will

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Department of Family Medicine, Mayo Clinic Florida, 4500 San Pablo Road, Jacksonville, FL 32224, USA

* Corresponding author.

E-mail address: Waller.thomas@mayo.edu

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have a recurrence and more than 20% will suffer with multiple recurrences.⁷ For hospitalized patients or those in long-term care facilities with any infection, the urinary tract is frequently the setting.⁸

Because they are so common, UTIs and their associated urinary symptoms are frequently recognized by patients, who have also learned that it often takes an antibiotic to resolve the condition. This has led to many patients seeking treatment at the presence of almost any urinary symptom. Although treatment is often necessary, this can contribute to an increased use of empiric treatment and sometimes overtreatment of symptoms. Nearly 15% of all prescribed antibiotics are for the treatment of UTI.⁹

It was almost the twentieth century before physicians realized that bacteria were causing UTIs.¹⁰ Numerous chemotherapeutic agents were tried and were unsuccessful.¹⁰ Although penicillin was discovered in 1928 and was effective for many infectious diseases, it was not active against *Escherichia coli*.¹⁰ In 1953, nitrofurantoin became available and was the preferred treatment for *E coli* UTI for many years.¹⁰ Later when amoxicillin and trimethoprim/sulfamethoxazole (TMP-SMZ) were released, their overuse led to bacterial resistance against them.¹⁰

Global antibiotic use for UTI has led to resistant bacteria in both outpatient clinics and inpatient hospitals.^{11,12} There are many bacteria that can cause UTIs, but the most common include *E coli*, *Klebsiella pneumoniae*, *Enterococcus* sp., and *Staphylococcus saprophyticus*.³ These bacteria are capable of developing resistance, and the ability to eliminate these bacteria with antibiotics has declined over time. The Food and Drug Administration has been seeking the development of new antibiotics to combat bacterial resistance.^{4,12}

One of the first steps in helping to reduce antibiotic resistance is to accurately diagnose a UTI. Although Hippocrates may have had to drink urine to evaluate the body's status,¹³ we have several more accurate tests available today; however, there are varying methods practitioners often use to reach the diagnosis of UTI. Frequently, a urine culture is not performed to identify the bacterial organism. Other times, patients are treated based simply on their report of classic UTI symptoms. Although this possibly may save time and money, this practice may be contributing to further resistance due to the susceptibility traits of the bacteria. More rapid antimicrobial susceptibility reporting would be helpful.¹

Antibiotic resistance has led to significant challenges in treating UTI. There are more than 12,000 deaths per year from UTIs and, if the patient has bacteremia, the mortality rate can be more than 9%.⁴ Short of death, patients can suffer with pyelonephritis, recurrent infections, renal disease in the young, preterm birth, and even *Clostridium difficile* colitis from antibiotic use.¹⁴ At a minimum, it is a significant, painful illness, which can have an impact on a patient's daily life and the patient's ability to be productive in society.

URINARY TRACT INFECTION SYMPTOMS

UTIs can typically be categorized into upper or lower maladies based on symptoms alone. The lower UTIs, like cystitis, prostatitis, or urethritis, generally present with dysuria and increased urinary frequency, whereas fever and flank or costovertebral angle pain is associated with an upper UTI, like pyelonephritis.¹⁵ Additional signs of UTI include gross hematuria, new or worsening incontinence, odiferous urine, and suprapubic pain.^{16,17} Nonspecific symptoms can range from anorexia, change in mental status, fatigue, and weakness.¹⁸ Of note, vaginal discharge lessens the likelihood of a diagnosis of UTI.^{16,17}

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