Urinary Tract Infections

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KEYWORDS

- Urinary tract infection • Pyelonephritis
- Asymptomatic bacteriuria

Urinary tract infection (UTI) is the most common urological disorder among men and women, with most cases presenting to primary care physicians in the outpatient clinical setting.[1,2] UTIs represent 4% of all outpatient physician visits.[3] Of the total number of visits for UTI, 52% of patients present to primary care clinics, and 23% present to emergency departments.[4] UTIs are also the most common nosocomial infections of hospitalized patients. As men and women become older, UTI becomes more likely, and UTIs lead to more hospital-based care.[1,2]

A woman's lifetime risk of UTI is greater than 50%.[2] Women develop four times more urinary tract infections than men because of anatomic differences including a shorter urethra and because of normal vaginal flora that colonize the external urethra.[5,6] Infection in women most often results from perineal or periurethral bacteria that enter the urethra and ascend into the bladder, often in association with sexual activity, or due to mechanical instrumentation such as catheterization.[5,6]

ASYMPTOMATIC BACTERIURIA

Asymptomatic bacteriuria (ASB) is the presence of 100,000 microorganisms per milliliter of urine without clinical symptoms.[5] Usually no treatment is needed. Screening for ASB is not recommended for nonpregnant women,[6] elderly living in the community,[7] diabetic women,[8] institutionalized elderly,[9] or persons with spinal cord injuries.[9] However, screening with treatment of positive cultures is recommended for pregnant women in the first trimester.[5–7]

UNCOMPLICATED UTIS

An uncomplicated UTI is diagnosed in patients with cystitis symptoms who have normal urinary tract anatomy, no fever, no kidney disease, and no contributing medical

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problems such as diabetes, neurogenic bladder, or renal stones.[5,10,11] Characteristic symptoms of cystitis include dysuria, urgency, increased frequency, pyuria, and bacteriuria on urinalysis, and sometimes suprapubic pain, fullness, and hematuria.[5,6] No long-term adverse effects have been seen on renal function or increased mortality with acute uncomplicated UTI in the nonpregnant female population; therefore, treatment goals are aimed at symptom resolution.[10]

The differential diagnosis for uncomplicated UTI includes

- Acute urethritis caused by sexually transmitted infections (STIs), often *Neisseria gonorrhea* or *Chlamydia trachomatis*.
- Irritative voiding symptoms due to urethral syndrome, interstitial cystitis, recurrent UTI,[12] vaginitis, vulvovaginitis, or dysmenorrhea.[7]

Using Clinical Predictors

Helpful positive predictors include symptom onset with recent sexual intercourse, history of pyelonephritis, and resolution of symptoms within 48 hours of starting antibiotic treatment.[12] Negative predictors include nocturia more than twice per evening, and persistent symptoms between acute episodes; these patients should undergo work-up for other causes. Neutral predictors, neither favoring nor disfavoring the diagnosis of UTI, include hematuria and dyspareunia.[12] Patients with unsure pregnancy status should be tested,[7] as diagnostic criteria and treatment options differ.

Diagnostic Testing

Many studies and organizations refer to urine dipstick testing that is positive for leukocyte esterase or nitrite as confirmatory for uncomplicated UTI.[5–7] The European Association of Urology also recommends urine microscopy for white and red blood cells and nitrites.[9] In one study, the absence of four markers (blood, leukocyte esterase, nitrite, and protein) on urine dipstick at the point of care had a 98% negative predictive value, with sensitivity of 98.3% and specificity of 19.2%.[13] This conflicts with another study in which patients with clinical symptoms but negative urine dipstick symptomatically improved after taking antibiotics.[13] If treatment is driven by symptom reduction, use of empiric antibiotics for a 3-day course in low-risk patients with dysuria, frequency, and absence of vaginal symptoms can be recommended without use of dipstick, with 80% accuracy.[13,14]

Even with clinical predictors indicating greater than 90% probability of UTI, many physicians also order urine culture and sensitivities,[14] which add cost and laboratory workload and make little difference in the treatment of uncomplicated UTIs.[14,15] Urine culture is defined as positive for bacteriuria when there is isolation of no more than two microorganisms, each with at least 100,000 cfu/mL, from a clean voided midstream urine sample.[5,16] Changing this criterion to 1,000–10,000 cfu/mL would improve sensitivity to >90% without much loss of specificity,[5,9] and has been used by some practices.

Uropathogens

Escherichia coli remains the primary agent responsible for UTIs in both outpatient and inpatient settings.[5,6,17] Other common uropathogens are *Enterococcus faecalis, Enterobacter* species, *Staphylococcus saprophyticus, Klebsiella pneumoniae, Proteus mirabilis*, and *Pseudomonas* species.[5,6,10,18] Knowing local variations in sensitivity among the common uropathogens, in both inpatient and outpatient settings, can help physicians make the best treatment choices. First-line antibiotics may have better sensitivity rates in the outpatient setting compared with the inpatient setting.[18]

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