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Emerg Med Clin N Am
26 (2008) 413–430

EMERGENCY
MEDICINE
CLINICS OF
NORTH AMERICA

Urinary Tract Infections: Diagnosis and Management in the Emergency Department

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Urinary tract infections (UTIs) are among the most common infectious diseases encountered by emergency physicians in the United States. Therefore, it is important to review and update the evidence-based guidelines for evaluation and treatment of cystitis and pyelonephritis in the emergency department. This is particularly important in light of increasing antibiotic resistance among the typical UTI pathogens and the increase in complicated hosts in the community, such as those with anatomic and immunologic abnormalities from solid organ transplantation.

It is estimated that between 7 and 8 million outpatient visits and more than 1 million hospitalizations occur each year because of UTIs [1]. Women are five times more likely than men to be hospitalized with pyelonephritis, but they have a lower mortality rate (7.3 versus 16.5 deaths per 1000 cases) [2], likely because of the complicated nature of UTIs in men. The most common bacterium associated with UTIs remains *Escherichia coli*, but other aerobic gram-negative bacteria and gram-positive bacteria, such as *Staphylococcus saprophyticus* and enterococci, are frequently isolated [2]. Enterococcal cystitis and pyelonephritis are particularly common in older men with urinary tract obstruction, such as from prostatic hypertrophy or cancer.

The diagnostic workup of UTIs has changed little in the past few decades; however, the management has become much more complex. With the emergence of *E coli* resistant to ampicillin, trimethoprim-sulfamethoxazole (TMP-SMX), and the fluoroquinolones, the choice of empiric antibiotic

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0733-8627/08/$ - see front matter
doi:10.1016/j.emc.2008.02.003 *emed.theclinics.com*

therapy has become more challenging. The goals of this article are to summarize the pathophysiology, epidemiology, diagnosis, and treatment of uncomplicated and complicated UTIs in the emergency department; discuss the practical implications of emerging antibiotic resistance; and summarize the data supporting the use of fluoroquinolones as the current antibiotic class of choice for empiric treatment of uncomplicated UTIs. The authors also address the treatment of asymptomatic bacteriuria and antibiotic use in the pregnant patient.

Definitions

To discuss infection of the urinary tract, it is necessary to begin by defining the various diagnostic categories of UTI *Urinary tract infection* is a general term used to describe an inflammatory response of any of the cells lining the urinary tract to micro-organisms [3]. This may involve the upper tract (ureters and kidneys), lower tract (bladder), or both.

Cystitis is an inflammatory response of the bladder to micro-organisms without involvement of the upper tract. Symptoms commonly include dysuria, frequency, urgency, hematuria, and suprapubic pain [3].

Pyelonephritis refers to an infection of the upper structures of the urinary tract, specifically the ureters, renal pelvis, and renal parenchyma. Pyelonephritis is often separated into acute versus chronic infection, which has significant implications regarding treatment. The term *chronic pyelonephritis* typically refers to recurrent upper tract infections, which are often the result of an underlying anatomic abnormality, such as neurogenic bladder with vesicoureteral reflux. Common complaints of patients who have pyelonephritis include fever, chills, and flank or low back pain [3]. The Infectious Diseases Society of America (IDSA) guidelines suggest that a urine culture growing at least 10,000 colony-forming units (CFUs) per cubic millimeter of bacteria should be used as a criterion to support this diagnosis [2]. As addressed elsewhere in this article, however, it is important to note that some patients who have pyelonephritis do have lower colony counts.

Uncomplicated UTI is one in which the structure and function of the genitourinary tract are normal. Essentially, this occurs in young, healthy, nonpregnant women with normal urinary tract anatomy [3].

Complicated UTI is associated with an underlying structural or functional problem with the genitourinary tract, obstruction, immune dysfunction, recent urinary tract instrumentation, health care–associated infection, male gender, or pregnancy. Some examples of patients who would fall into this category would be those who have renal stones, neurogenic bladder, an indwelling urinary catheter, diabetes, a fistula to the urinary tract, or polycystic kidney disease; recently hospitalized patients; patients with renal or other solid organ transplantation; patients who are immunocompromised for other reasons; and older patients. For all practical purposes, any patient other than a young, healthy, nonpregnant woman from the