

# Management of Non-catheter-associated Complicated Urinary Tract Infection

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## KEYWORDS

- Urinary tract infection • UTI • Complicated UTI • Upper tract infection
- UTI in pregnancy • Renal abscess • Perirenal abscess • Prostatitis

## KEY POINTS

- A urinary tract infection (UTI) is considered complicated when it occurs in the setting of a structural or functional abnormality of the urinary tract, a compromised host (eg, diabetes, immunosuppression), pregnancy, or as a result of bacteria with increased virulence and antimicrobial resistance. UTI in men and boys should be considered complicated until proven otherwise.
- Initial evaluation of a patient with a suspected complicated UTI includes a detailed history, physical examination, urinalysis, and urine culture, as well as imaging.
- The selection of imaging modality should depend on the clinical condition of the patient, the clinical question to be answered by the study, and the strengths and limitations of the modality.
- In the setting of UTI with genitourinary tract obstruction, prompt urologic consultation is warranted for prompt decompression.
- UTI in pregnancy should be taken seriously given the risk of pyelonephritis and its associated morbidity for mother and fetus. Pregnant women should be screened and treated for asymptomatic bacteriuria to decrease this risk.

## INTRODUCTION

Urinary tract infection (UTI) is an inflammatory response to the invasion of the urothelium by a pathogenic organism, resulting in a wide range of upper and lower urinary tract disease. It is one of the most commonly encountered infectious diseases worldwide, and as such, one of the most common reasons for outpatient medical

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evaluation. In the United States alone, UTI is the chief complaint in 8 million clinic and emergency department visits.<sup>1</sup> Most UTIs are uncomplicated, self-limited infections, which are confined to the bladder and effectively treated with short-course, empiric antimicrobials. Conversely, complicated infections occur in the setting of structural or functional abnormalities, a compromised host (ie, pregnant, diabetic), or causative bacteria with increased virulence or antimicrobial resistance. UTI in men and boys should be considered complicated until proper evaluation proves otherwise. There is a significant increase in the morbidity and mortality associated with complicated infections, ranging from loss of renal function to sepsis and death, so timely recognition is vitally important. Structural and functional abnormalities may be known before infection, but often, patients present with an infection whose clinical features are merely suggestive of unrecognized abnormalities. Therefore, care of these patients can be a significant clinical challenge. Provided, is a guide to enable the treating physician to maintain an appropriate index of suspicion, select the optimal diagnostic and imaging tests that would lead to quick and accurate diagnosis of complicated UTI, and institute effective therapy, to minimize morbidity.

## **DIAGNOSING A COMPLICATED UTI**

### ***Understanding the Natural Defense of the Genitourinary System***

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The natural antegrade flow of urine through the genitourinary system is its greatest defense against pathogenic intruders. Virtually all complicated infections result from an impairment in the ability to “flush” out microorganisms. All conditions that promote complicated UTI do so by disrupting antegrade urine flow, causing structural or functional obstruction, or contributing to nidus formation. Obstruction to urinary drainage can lead to changes in intrarenal blood flow, decreasing delivery of agents of the body’s humoral defenses as well as antimicrobials. Retrograde flow of urine, both by physiologic reflux and by instrumentation, allow for inoculation of the upper urinary tract. The presence of any static agent in the urinary tract, be it urine, foreign body, or stone, provides residence for pathogens as well as fortress against effective antimicrobial therapy. Understanding this concept is an excellent starting point to inform which clinical questions you will ask in an evaluation and how you may choose to go about answering them.

### ***History and Physical Examination***

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Initial evaluation with history and physical examination is a primary tool in the timely recognition of complicated UTI. It should elucidate pre-existing or potential complicating factors, exclude other causes of genitourinary symptoms, and identify patients at risk for significant morbidity associated with infection (**Box 1**). The most common symptoms of uncomplicated UTI are dysuria, urgency, and frequency. Suprapubic pain and hematuria can be present as well, although less often. Clinical signs and symptoms that should heighten concern for complicated infection include flank pain, fever, and other signs systemic inflammatory response syndrome, like hypotension. A thorough medical history should include assessment of pregnancy status, structural and functional genitourinary abnormalities, kidney stones, renal insufficiency, immune deficiency, pelvic surgery, diabetes mellitus, neurologic disorders, as well as any recent antibiotic use, hospitalization, or genitourinary instrumentation. A pertinent physical examination must include vital signs, an abdominal and flank examination to assess for tenderness, a full external genital examination in men and women, and a limited pelvic examination in women to assess for evidence of pelvic organ prolapse or urethral diverticula.

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