



Clinical Reviews



TOP TEN MYTHS REGARDING THE DIAGNOSIS AND TREATMENT OF URINARY TRACT INFECTIONS

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□ **Abstract—Background:** Urinary tract infections (UTI) are the most common type of infection in the United States. A Centers for Disease Control and Prevention report in March 2014 regarding antibiotic use in hospitals reported “UTI” treatment was avoidable at least 39% of the time. The accurate diagnosis and treatment of UTI plays an important role in cost-effective medical care and appropriate antimicrobial utilization. **Objective:** We summarize the most common misperceptions of UTI that result in extra-neous testing and excessive antimicrobial treatment. We present 10 myths associated with the diagnosis and treatment of UTI and succinctly review the literature pertaining to each myth. We explore the myths associated with pyuria, asymptomatic bacteriuria, candiduria, and the elderly and catheterized patients. We attempt to give guidance for clinicians facing these clinical scenarios. **Discussion:** From our ambulatory, emergency department, and hospital experiences, patients often have urine cultures ordered without an appropriate indication, or receive unnecessary antibiotic therapy due to over-interpretation of the urinalysis. **Conclusions:** Asymptomatic bacteriuria is common in all age groups and is frequently over-treated. A UTI diagnosis should be based on a combination of clinical symptoms with supportive laboratory information. This review will assist providers in navigating common pitfalls in the diagnosis of UTI. © 2016 Elsevier Inc. All rights reserved.

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INTRODUCTION

Urinary tract infections (UTI) are the most common type of infection in the United States. Emergency medicine providers are frequently faced with making this common diagnosis. A Centers for Disease Control and Prevention (CDC) report in March 2014 regarding antibiotic use in hospitals reported “UTI” treatment was avoidable at least 39% of the time (1). How is it that something that seems so simple is so often misdiagnosed and treated in emergency departments (EDs)? The 10 myths outlined below address the common fallacies as they pertain to the diagnosis of UTI, and reveals the evidence behind the myth.

Myth 1: The Urine Is Cloudy and Smells Bad. My Patient Has a UTI

Truth 1: Urine color and clarity or odor should not be used alone to diagnose or start antibiotic therapy in any patient population.

- a. Visual inspection of urine clarity is not helpful in diagnosing UTI in women (2). One hundred female patients at a university hospital had their urine tested by reading newsprint through the sample. The sensitivity, specificity, and positive and negative predictive values were 13.3%, 96.5%, 40.0%, and 86.3%, respectively.
- b. Foul-smelling urine is an unreliable indicator of infection in catheterized patients, and is usually dependent on patients' hydration status and concentration of urea in the urine (3,4).

Myth 2: The Urine Has Bacteria Present. My Patient Has a UTI. Also See Myth 8

Truth 2: The presence of bacteria in the urine on microscopic examination or by positive culture without UTI symptoms is NOT an indication of a UTI due to the possibility of contamination and asymptomatic bacteriuria (5).

- a. UTI is not a laboratory-defined diagnosis. Diagnosis should be based on clinical symptoms whenever possible, and confirmed by positive urine microscopy and culture.
- b. Quantitative colony counts should not be used to guide therapy in asymptomatic patients (6). In *symptomatic* females, colony counts of $>10^2$ cfu/mL are usually clinically meaningful. In *symptomatic* males, colony counts $>10^2$ cfu/mL are usually clinically relevant for diagnosis of UTI or prostatitis.

Myth 3: My Patient's Urine Sample Has >5 Squamous Epithelial Cells per Low-Power Field and the Culture is Positive. Because the Culture is Positive, I Can Disregard the Epithelial Cell Count and Treat the UTI

Truth 3: A good specimen has fewer than five epithelial cells per low-power field on urinalysis (7). Contaminated specimens should be considered for recollection or straight catheterization should be performed.

Myth 4: The Urine Has Positive Leukocyte Esterase. My Patient Should Have a Urine Culture Performed, Has a UTI, and Needs Antibiotics

Truth 4: A urinalysis with positive leukocyte esterase **should not be used alone** to support a diagnosis of UTI or start antimicrobial therapy in any patient population. Medical systems with reflex urine cultures for >5 white blood cells (WBC)/high-power field should be re-evaluated for their utility in the absence of patient symptoms (8–10).

- a. A dipstick leukocyte esterase test has high sensitivity and specificity for the presence of quantitative pyuria, 80–90% and 95–98%, respectively; **however**, a positive leukocyte esterase **alone** is NOT recommended for diagnosis of UTI (7,11). As in myth #2, symptoms are usually required for the diagnosis of UTI; pyuria or bacteriuria alone is not an indication for antimicrobial therapy and can result in an overtreatment rate of up to 47% (4,12).
- b. On rare occasions, a negative leukocyte esterase in the presence of UTI symptoms may still prompt a urine culture if clinically suspected (7,11). More appropriately, this situation should prompt a search for urethritis, vaginitis, or sexually transmitted infection.

Myth 5: My Patient Has Pyuria. They Must Have a UTI

Truth 5: A urinalysis with quantitative urine WBC counts **should not be used alone** to support a diagnosis of UTI or start antimicrobial therapy in any patient population.

- a. In *neutropenic or leukopenic patients*, the WBC count may be artificially low. In systems with reflex culture (the algorithm-based performance of culture based on laboratory values), reflex culturing may not occur. The microbiology laboratory should be contacted and a specific order for a urine culture made if **urinary symptoms are present** and urinary source of infection is suspected.
- b. Borderline WBC counts of 6–10 cells/mL may reflect the patient's state of hydration. For example, patients with *oliguria or anuria* (dialysis) usually have some degree of pyuria. If a UTI is defined solely by WBCs more than 3 per high-power field, then overtreatment can be as high as 44% (12). WBCs may also be seen in the presence of moderate hematuria.
- c. Noninfectious conditions, such as acute renal failure, sexually transmitted infections, or noninfectious cystitis from the presence of a bladder catheter may result in pyuria.

Myth 6: The Urine Has Nitrates Present. My Patient Has a UTI

Truth 6: Urine nitrates **should not be used alone** to diagnosis or start antimicrobial therapy in any patient population.

- a. Urine nitrate has a high true-positive rate for bacteriuria, but bacteriuria, as noted above in Myth 2, does not define a clinically significant UTI. Diagnosis of UTI should be considered in a patient with elevated urine nitrate in the presence of clinical signs and symptoms of UTI (5).

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