

Routine Urine Cultures for Acute Uncomplicated Urinary Tract Infections

Opposing authors provide succinct, authoritative discussions of controversial issues in emergency medicine. Authors are provided the opportunity to review and comment on opposing presentations. Each topic is accompanied by an Editor's Note that summarizes important concepts. Participation as at authoritative discussant is by invitation only, but suggestions for topics and potential authors can be submitted to the section editors.

Editor's Note: Urine cultures can provide information on the microbiologic cause and optimal treatment for acute uncomplicated urinary tract infections, but the need for routine cultures is unclear. In this *Clinical Controversies* series, our pro and con discussants present opposing viewpoints of the benefits and drawbacks of routine urine cultures among patients with acute uncomplicated urinary tract infections.

URINE CULTURE AND UNCOMPLICATED CYSTITIS: A BIGGER PICTURE?



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Diagnosis of uncomplicated cystitis in a nonpregnant, premenopausal woman hinges on the presence of dysuria, frequency, urgency, hematuria, or suprapubic discomfort. When these signs and symptoms are present, urine testing in the emergency department (ED) helps confirm the diagnosis of urinary tract infection and support the decision to start empiric antibiotic therapy. Considered the diagnostic reference standard for urinary tract infection, quantitative urine culture and susceptibility testing ensure that appropriate antibiotics have been prescribed, inform future empiric antibiotic therapy, and promote ED antibiotic stewardship.

Optimal antibiotic therapy for any infection entails use of “the right drug for the right bug.” Most antibiotic therapy initiated in the ED is by necessity empiric. Guidelines from the Infectious Diseases Society of America aid with

antibiotic selection and help identify patients at risk for antibiotic-resistant infection.¹ Despite the inherent lag in results, a properly collected, noncontaminated urine culture provides objective microbiologic data, allowing emergency physicians to identify bacterium-drug mismatches and adjust therapy accordingly. Studies of ED pharmacist-driven urine culture review for symptomatic urinary tract infection and pyelonephritis report interventions to address inappropriate empiric therapy in up to a quarter of discharged patients, most often because of bacterium-drug mismatch.^{2,3} Although these studies do not focus solely on uncomplicated cystitis, they demonstrate how urine culture maximizes targeted therapy when a robust ED culture follow-up mechanism exists. As antibiotic-resistant infections caused by organisms including extended-spectrum β -lactamase-producing *Enterobacteriaceae* (including *Escherichia coli*) have become more common in ED patient populations,⁴ some in the absence of traditional risk factors (eg, previous antibiotic exposure, health care, travel), urine culture has added importance in uncovering bacterium-drug mismatches. In cases of therapeutic failure despite appropriate antibiotic selection, urine culture also helps determine whether a more extensive evaluation is necessary (eg, evaluation for an anatomic defect predisposing to urinary retention).

Empiric antibiotic therapy for urinary tract infection in the ED is often guided by local antibiotic resistance rates for common uropathogens, namely, *E coli*. Hospital antibiograms are a source of such data, and Infectious Diseases Society of America guidelines discourage use of certain antibiotics once resistance exceeds set thresholds (eg, $\geq 20\%$ for trimethoprim-sulfamethoxazole).¹ Hospital antibiograms are generally derived from urine cultures obtained from inpatients, including those with complicated urinary tract infection, antibiotic-resistant infection, and asymptomatic bacteriuria. Antibiograms vary significantly between inpatient and ED settings at several US institutions,⁵⁻⁸ whereas not so much at others.³ Even ED-specific antibiograms can be subject to sampling bias,

favoring older adults with comorbidities and greater risk of antibiotic-resistant infection.⁹ Antibiograms that accurately reflect the diverse ambulatory population that emergency physicians care for are needed to better inform empiric antibiotic prescribing practices. Their validity may be improved when urine culture is obtained as part of the evaluation for uncomplicated cystitis in both young, healthy patients without comorbid illnesses and those who may be colonized with antibiotic-resistant organisms. ED-specific antibiograms can effectively drive changes in antibiotic prescribing for urinary tract infection.¹⁰

Appropriately targeted antibiotic therapy at the patient level and data-driven empiric treatment strategies at the population level promote ED antibiotic stewardship. Antibiotic therapy tailored to urine culture and susceptibility testing reduces the likelihood of an incompletely treated infection. In situations in which uncomplicated cystitis is difficult to distinguish clinically from pyelonephritis, urine culture can guide adjustments in therapy should a therapeutic failure arise and increase the safety and acceptability of prescribing empiric antibiotics that achieve therapeutic levels only in the urine (eg, nitrofurantoin), even when pyelonephritis cannot be excluded according to history and physical examination (eg, subjective fever, borderline costovertebral angle tenderness). ED-specific antibiograms can further improve emergency physician confidence in the empiric use of narrow-spectrum antibiotics and increase treatment success on the first pass for a broader range of urinary tract infections. Cure of infection with a narrow-spectrum antibiotic or one that concentrates only in the urine minimizes collateral damage to the patient's gastrointestinal microbiome. Such disruptions, commonly associated with fluoroquinolones and broad-spectrum cephalosporins, can lead to the emergence of antibiotic-resistant organisms and *Clostridium difficile* infection. Thoughtful and deliberate use of antibiotics to treat uncomplicated cystitis allows us to be better stewards of finite and diminishing antibiotic resources.

In an era of mounting antibiotic resistance, urine culture remains our primary means of determining whether a prescribed antibiotic for uncomplicated cystitis will be effective against the infecting pathogen. It is also the backbone on which local antibiotic resistance rates are determined and reported to prescribers through antibiograms. Although a single urine culture may not change the management of uncomplicated cystitis in the ED, a population-focused approach to culture and susceptibility testing paints a bigger picture of the evolving epidemiology of urinary tract infection and antibiotic resistance, better and more accurately guiding clinical practice. Future research characterizing ED treatment failure rates for uncomplicated cystitis, the effect of

ED-specific antibiograms on treatment success, and the true value of using empiric antibiotics that are narrow spectrum or that concentrate primarily in the urine in curbing antibiotic resistance in ED populations will help optimize our use of urine culture in the management of uncomplicated cystitis.

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URINE CULTURE AND UNCOMPLICATED CYSTITIS: THE MINUSES OUTWEIGH THE PLUSES



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Urinary tract infection consists of a spectrum of clinical infectious diseases. Acute, uncomplicated cystitis is an