

# Bacteruria and Urinary Tract Infections in the Elderly



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## KEYWORDS

• Asymptomatic bacteriuria • Bacteriuria • Urinary tract infection • Cystitis • Pyuria

## KEY POINTS

- Despite several consensus guidelines proposed by various interest groups in recent years, a concise definition of urinary tract infection and associated symptoms does not exist.
- Results of urinalysis are often misinterpreted and mishandled.
- Treatment of elderly patients with bacteriuria necessitates skilled history taking, examination, and complete diagnostic urine testing.
- It is now being suggested that the healthy urinary tract is not a sterile environment, but in fact is populated by a dynamic set of microorganisms that change throughout time based on environmental and behavioral factors.
- Multiple studies have shown no morbidity or mortality benefit to antibiotic therapy in either community-dwelling elderly or long-term care facility residents with asymptomatic bacteriuria.

## INTRODUCTION

Both urinary tract infection (UTI) and asymptomatic bacteriuria (ASB) are common among elderly adults and represent a significant health care burden. UTIs are responsible for 15.5% of infectious disease hospitalizations in adults aged 65 or older, second only to pneumonia, and they are responsible for 6.2% of infectious disease-related deaths.<sup>1</sup> Despite their frequency, differentiating between ASB and true UTI remains controversial among health care providers. In light of emerging antibiotic-resistant pathogens, this distinction has become increasingly important, because although symptomatic UTI requires appropriate antibiotic therapy, ASB does not.

## PURPOSE OF THIS REVIEW

This article will review proposed definitions of ASB and UTI, highlight emerging research in causes and prevention of bacteriuria and UTI in the elderly, and examine improvements in patient outcomes over the past 20 years with improved practice guidelines. The authors' search criteria for the literature review utilized the PubMed database with the following key words: urinary tract infection, asymptomatic bacteriuria, bacteriuria, urinary tract microflora, urinary tract infection treatment, urinary tract infection risk factors, and combinations thereof. For inclusion, papers must have been published after 1980 and written in English. Exclusion criteria included foreign journal articles not translated to English.

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The authors have nothing to disclose.

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## DEFINITIONS OF ASYMPTOMATIC BACTERIURIA

As defined by the Infectious Disease Society of America (IDSA), ASB is the presence of 10<sup>5</sup> colony-forming units per milliliter (CFU/mL) or more of 1 bacterial species in 2 consecutive urine specimens in women, or a single urine specimen in men, in the absence of clinical signs and symptoms of UTI. A single specimen containing greater than or equal to 10<sup>5</sup> CFU/mL of a bacteria species is sufficient when obtained by catheterization in both men and women.<sup>2</sup>

## DEFINITIONS OF URINARY TRACT INFECTION

For the purpose of this article, UTI means infection localized anywhere along the urinary tract, manifesting as cystitis, pyelonephritis, or prostatitis. Despite several consensus guidelines proposed by various interest groups in recent years, a concise definition of UTI and associated symptoms does not exist. Conserved criteria typically include pyuria as evidenced by presence of leukocyte esterase or white blood cells on urinalysis, symptoms attributable to the urinary tract, and a urine culture confirming a pathogenic source.<sup>2-4</sup> Of these components, what constitutes urinary tract symptoms is most variable. Typical symptoms include fever greater than 38 C or chills, dysuria, frequency, urgency, new-onset or worsening incontinence, and suprapubic or flank pain. Clinicians often include lethargy, confusion, or a change in baseline function, but this can be particularly difficult to assess in complicated patients with baseline impaired cognition or extensive comorbidities.

## CHALLENGES AND CONTROVERSY IN DIAGNOSIS

Several challenges exist in the evaluation of urinary symptoms in the elderly patient. Symptoms of UTI are highly variable, often nonspecific to infection, and can be difficult to assess in patients with limited communication abilities or poor baseline function. Additionally, problems are frequently encountered in the collection, testing, and interpretation of urine specimens. Urine specimens should be obtained midstream by clean catch, or by in-and-out catheter when controlled voiding or cooperation is problematic. Chronic indwelling catheters should be removed and a new catheter inserted prior to obtaining samples, as biofilm is ubiquitous to long-term catheters. However, explanation and adherence to these collection standards are lacking. A prospective observational study by Pallin and colleagues<sup>5</sup> examined

emergency department cases at a major academic hospital that included urinalysis as part of their evaluation. By postencounter interview, it was found that 57% of the 137 participants received no instruction on urine collection, and that only 6% of participants had in fact used proper midstream clean-catch technique. Improper collection leads to specimen contamination by normal genitourinary flora, increasing the likelihood of false-positive urinalysis or misinterpretation of normal flora as pathogenic infection.

Results of urinalysis are often misinterpreted and mishandled. Pyuria, for example, can be a useful laboratory component in making the diagnosis of UTI but can also lead clinicians astray. Although absence of pyuria has strong negative predictive value for ASB or UTI, presence of pyuria is poorly specific for clinically significant infection.<sup>2</sup> Pyuria may be present in up to 45% of chronically disabled or incontinent adults, and in up to 90% of institutionalized adults, regardless of colonization or infection status.<sup>4,6</sup> A retrospective review of 339 cases from 2 academic centers found that pyuria was present in 70% of cases of UTI and 42.3% of cases of ASB, but was associated with inappropriate antimicrobial treatment by an odds ratio of 3.27 (95% confidence interval [CI], 1.49–7.18).<sup>7</sup> Specimens that do demonstrate pyuria should reflexively be sent for urine culture for confirm presence of a pathogen, but this step remains a common struggle in many health care institutions. In the observation study by Pallin and colleagues,<sup>5</sup> only 59% of samples with positive urinalysis were sent for urine culture, but again positive urinalysis regardless of symptoms was associated with antibiotic treatment by an odds ratio of 4.9 (95% CI, 1.7–14). These findings highlight the necessity of skilled history taking, examination, and complete diagnostic urine testing for the appropriate treatment of elderly patients.

## EPIDEMIOLOGY

### *Asymptomatic Bacteriuria*

Prevalence of asymptomatic bacteriuria increases in both men and women with age. Although ASB is uncommon in young men and found in only 1% to 2% of young women, prevalence increases to 6% to 16% in women and 5% to 21% in men ages 65 to 90 years. The prevalence increases further with increasing comorbidities, and may be as high as 25% to 50% in institutionalized women and 15% to 35% of institutionalized men, although a significant number of these patients have been observed to spontaneously develop negative urine cultures within 3- to 6-month time frames.<sup>8</sup> In elderly patients with chronic indwelling catheters,

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