Strategies for Prevention of Urinary Tract Infections in Neurogenic Bladder Dysfunction

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KEYWORDS

- Spinal cord injuries • Neurogenic bladder • Urinary tract infection
- Catheter-associated urinary tract infection (CAUTI)

KEY POINTS

- Urinary tract infection (UTI) is a clinical diagnosis, and treatment depends on the presence and severity of symptoms.
- Providers should not treat asymptomatic bacteriuria, and pyuria alone may not be an indication for treatment.
- Because of an increased incidence of resistant bacterial species in persons with spinal cord injury and disorders (SCI & D), urine culture should be obtained before the initiation of antibiotic therapy.
- Urodynamic evaluation is the standard of care to ensure safe bladder function, and intermittent catheterization is the preferred bladder management.
- Mechanical strategies for the prevention of UTIs in persons with SCI & D include use of hydrophilic, closed-system, and antibiotic-coated catheters as well as bladder irrigation and fluid restriction.
- Medical strategies for the prevention of UTIs in persons with SCI & D include antibiotic prophylaxis, cranberry compounds, D-mannose, methenamine, urinary acidifiers, and bacterial interference.

INTRODUCTION

Neurogenic bladder is a common and distressing complication of spinal cord injury and disorders (SCI & D). Individuals with neurogenic bladder dysfunction are often unable to completely empty their urinary bladders. As a result, many of these individuals must perform clean intermittent catheterization (CIC) or use indwelling urinary catheters. Use of urinary catheters is associated with high rates of urinary tract infections

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(UTIs), termed catheter-associated UTIs (CAUTI). UTIs remain the most frequent type of infection in persons with SCI & D, with an average of 2.5 episodes per year.[1,2]

Before World War II, urinary tract complications were considered to be the number 1 cause of death in the acute period after SCI. However, advances in urologic diagnosis and management through the use of urodynamic assessments and CIC have reduced acute deaths and complications, improving the urinary tract–related quality of life for persons with SCI & D. Despite these advances, morbidity from UTIs remains common. In this regard, optimal urinary tract management is critical not only for the prevention of complications and illnesses but for the optimal social integration of the person with SCI & D.

This article is not intended to provide an exhaustive review of neurogenic bladder dysfunction after SCI & D, because detailed reviews of neurogenic bladder dysfunction have previously been published[3,4] Rather, the objectives of the article are to: (1) define the problem of UTIs after SCI & D, (2) discuss the relationship of bladder management to UTIs, (3) describe mechanical strategies for UTI prevention in SCI & D, and (4) describe medical strategies for UTI prevention in SCI & D. The reader is also referred to the detailed guideline by Hooton and colleagues,[5] which details evidence and recommendations regarding practices for prevention of CAUTI.

THE PROBLEM OF UTIS AFTER SCI & D

Bacteriuria

The definitions of what represents significant bacteriuria vary. Investigators and clinicians frequently define infection based on bacteriuria levels ranging from 10^3 to 10^5 colony-forming units (CFU) per milliliter of urine. However, insufficient data exist to recommend a standardized level for the diagnosis of CAUTI.[5] Historically, the medical literature pertaining to urinary catheters has not made clear distinctions between asymptomatic bacteriuria and UTI. Often the term UTI has been used when bacteriuria (with or without symptoms) is present.[5] The key problem, then, is that persons with SCI & D who use urinary catheters commonly have bacteriuria. The standard of care among SCI & D providers is not to treat asymptomatic bacteriuria, which has been defined as 10^5 CFU of 1 or more organisms in an appropriately collected specimen in an asymptomatic person,[5] with antibiotics.

Pyuria

Pyuria, defined as white blood cells (WBC) in the urine, is also commonly seen in individuals with neurogenic bladder dysfunction and especially in catheterized patients. However, in the catheterized patient, pyuria alone is not diagnostic of either asymptomatic bacteriuria or CAUTI.[1,5] Different researchers have defined significant pyuria variably, with levels as low as 5 WBC per high-powered field being considered clinically significant. However, there is disagreement regarding a threshold for significant pyuria, because many persons with SCI & D have chronic pyuria but no overt signs of illness (eg, fevers, chills, nausea, vomiting).

Bacterial Colonization

Colonization of the bladder with bacteriuria is the norm in persons with SCI & D who use urinary catheters, either indwelling or intermittent.[1,6] As noted earlier, treatment with antibiotics is not justified based on the presence of bacteriuria alone. Because of the risk of recurrent infections and development of resistant organisms in individuals with SCI & D, urine cultures should be obtained before initiation of antibiotic therapy in symptomatic persons. Empirical therapy may then be initiated with the opportunity of adjusting antimicrobial therapy based on culture results.