

Urinary Tract Infection Prevention in Patients With Traumatic Brain Injury and Spinal Cord Injury: Evaluating Surveillance Gaps Using National Healthcare Safety Network Criteria

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INTRODUCTION

Patients with traumatic brain injury and spinal cord injury frequently require intermittent or indwelling catheterization because of neurogenic bladder dysfunction, placing them at increased risk for urinary tract infection. In these populations, recognition of infection can be difficult because neurologic impairment may limit typical symptom reporting, and clinically significant infection may present with atypical manifestations rather than standard urinary complaints.

RESULTS & CONCLUSIONS

RESULTS

- Total urine culture events reviewed: 44 (2022–2025)
- Met NHSN SUTI criteria: 36% (n = 16)
- Did NOT meet NHSN criteria: 64% (n = 28)
- Most common organisms identified:
 - *Escherichia coli*
 - *Klebsiella species*
 - *Enterococcus species*
 - *Proteus species*
- Among cases not meeting NHSN criteria, common atypical presentations included:
 - Increased spasticity
 - Autonomic dysreflexia
 - Altered mental status
 - Urinary retention
 - Hypothermia

Key finding: *A majority of urine culture events with clinical concern for infection did not meet standard NHSN criteria but demonstrated neurologically relevant atypical symptoms.*

CONCLUSIONS

National Healthcare Safety Network criteria may underestimate urinary tract infection burden in patients with traumatic brain injury and spinal cord injury. Broader clinical consideration of atypical neurologic and systemic symptoms may be needed to improve recognition and prevention efforts.

METHODS

Setting: This review was conducted within a pediatric acute specialty care hospital specializing in the management of patients with traumatic brain injury and spinal cord injury, many of whom require catheterization due to neurogenic bladder.

Design: This was a retrospective observational chart review of urine culture events collected between January 2022 and December 2025. Each urine culture event was treated as an independent case and evaluated for evidence of infection using standardized surveillance criteria.

Participants: The analysis included 44 urine culture events from patients diagnosed with traumatic brain injury or spinal cord injury. Patients with and without indwelling urinary catheters were included.

Main Measures: Cases were assessed using National Healthcare Safety Network symptomatic urinary tract infection criteria. A case was classified as meeting criteria if the patient demonstrated at least one qualifying sign or symptom, including fever greater than 38°C, suprapubic tenderness, costovertebral angle pain or tenderness, urinary urgency, urinary frequency, or dysuria, in addition to a urine culture with no more than two organisms identified, with at least one bacterial species present at $\geq 100,000$ colony-forming units per milliliter.

Secondary Review: Cases that did not meet National Healthcare Safety Network criteria underwent detailed chart review to identify atypical neurologic or systemic indicators of infection relevant to this population. These included increased spasticity, autonomic dysreflexia, altered mental status, urinary retention, and hypothermia.

Analysis: Descriptive analysis was performed to determine the proportion of urine culture events meeting standard surveillance criteria and to characterize the frequency and patterns of atypical presentations among cases not meeting criteria.

PUBLIC HEALTH SIGNIFICANCE

Improved surveillance approaches for high-risk neurologic populations may strengthen infection detection, support earlier intervention, and enhance patient safety outcomes.