Urinary Tract Infections in Surgical Patients

Rajesh Ramanathan, MD[a], Therese M. Duane, MD, FCCM[b,*]

KEYWORDS

• Urinary tract infections • Catheter-associated urinary tract infection • CAUTI
• Urosepsis • Patient safety • Hospital acquired conditions

KEY POINTS

- Short-term catheter-associated urinary tract infections (CAUTI) are associated with increased patient hospital stay, morbidity, and mortality.
- CAUTI negatively impact public reporting of hospital safety and reimbursement.
- CAUTI are increased by unnecessary use of catheters and duration of catheterization.
- Understanding and educating care providers about appropriate indications for catheters and alternatives to indwelling urinary catheters can decrease the incidence of CAUTI.
- Developing institutional guidelines for appropriate use, duration, removal, and alternatives decreases the incidence of CAUTI.

INTRODUCTION

Scope of the problem

- Urinary tract infections (UTI) account for up to 40% of all health care–acquired infections.
- Nearly 80% of all UTI occur in patients with short-term urinary catheters and are tracked as catheter-associated UTI (CAUTI) by regulatory agencies.
- CAUTI increases patient morbidity and mortality, and increases health care costs.
- Hospital incidence of CAUTI is tracked by regulatory agencies and CMS, and affects public reporting on patient safety and hospital reimbursement.

The 2001 Institute of Medicine report, *To Err is Human*, highlighted the opportunity that exists for health care providers to decrease preventable nosocomial events and allow

The authors have nothing to disclose.

[a] Virginia Commonwealth University Medical Center, 1200 East Broad Street, PO Box 980454, Richmond, VA 23298, USA; [b] JPS Health Network, Department of Surgery, 1500 S. Main Street, 3rd Floor OPC Suite 300, Ft. Worth, TX 76104, USA
* Corresponding author. JPS Health Network, Department of Surgery, 1500 S. Main Street, 3rd Floor OPC Suite 300, Ft. Worth, TX 76104.
E-mail address: tduane@jpshealth.org

Surg Clin N Am 94 (2014) 1351–1368
http://dx.doi.org/10.1016/j.suc.2014.08.007 **surgical.theclinics.com**
0039-6109/14/$ – see front matter

patient outcomes to fully reflect the positive care delivered.[1] This and subsequent reports focused public and regulatory attention on health care practices that are potentially preventable. The federal Agency for Healthcare Research and Quality and the Centers for Medicare and Medicaid Services (CMS) have identified a core set of potentially preventable patient safety events that are increasingly being used as publically reported indicators of hospital safety and quality.[2–4] In 2007, the CMS instituted a change in reimbursement policy whereby hospitals would be held financially responsible, with no increase in reimbursement, for the development of any of 8 preventable, hospitalization-related complications.[4] A subsequent rule change by CMS financially penalizes hospitals for the development of such predefined hospital-related complications.

Catheter-associated urinary tract infection (CAUTI) is a hospital-acquired condition that is recognized by Agency for Healthcare Research and Quality and CMS as a preventable patient safety event. Urinary catheters are widely used with 12% to 16% of all surgical and medical inpatients being exposed during a hospitalization.[5–7] Inpatient urinary tract infections (UTI) account for up to 40% of all health care–acquired infections in the United States.[8,9] Up to 80% of these UTI are urinary catheter associated.[6,10] Specifically, among surgical patients, rates of UTI range from 1.8% to 4.1% based on surgery type, and development of UTI has been associated with increased duration of hospital stay, increased incidence of surgical site infections, increased incidence of prosthetic infections, and increased mortality.[11–15] Financially, nosocomial UTI account for more than $400 million in increased annual health care costs.[16] The development of urinary complications are directly related to urinary catheter use and duration, and thus efforts to more accurately identify, manage, and prevent CAUTI are relevant in the quest to improve patient care and safety.

In addition to those with short-term urinary catheter needs, up to 5% of long-term care facility patients have indwelling urinary catheters, and long-term urinary drainage is a prescient concern for patients with spinal cord injury and other congenital and acquired urologic conditions.[10] Given the magnitude and preventable potential of CAUTI in patients with short-term urinary catheter needs, this review focuses primarily on the pathogenesis, evaluation, definition, management, and prevention of CAUTI in the patient with short-term urinary drainage needs.

PATHOGENESIS

Pathogenesis summary

- The presence and duration of catheterization are the strongest risk factors for bacteriuria development. Approximately 10% to 25% patients with bacteriuria progress to symptomatic UTI and 1% to 4% develop urosepsis.
- Microbial seeding of the urinary bladder occurs during catheter placement and subsequently owing to ascension of microbe-laden biofilms along urinary catheters.
- Biofilms form rapidly, within 1 to 3 days, on the intraluminal and extraluminal catheter surface. Biofilms are dynamic, with changes in the microbial populations and virulence over time.
- Biofilms on catheters encourage microbial growth and ascension into the urinary system, and hinder antimicrobial action.
- Extraluminal microbial colonization likely results from surrounding fecal contamination, whereas intraluminal colonization results from contamination of the closed collection apparatus.