The Prevention of Hospital-Acquired Urinary Tract Infection

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(See the article by Saint et al. on pages 243–50)

The prevention of hospital-acquired infection has recently received increased prominence as infection rates have been propelled into the spotlight of mandated public reporting, together with expectations of “getting to zero” as the benchmark for infection incidence. These revolutionary initiatives were initially directed toward surgical site infection, ventilator-associated pneumonia, and bloodstream infection. The fourth leg of the tetrad of major hospital-acquired infections—urinary tract infection—has received relatively little attention. This neglect seems exceptional, because urinary infection is the single most common hospital-acquired infection [1].

Health care–acquired urinary infection is a substantial burden for patients and the health care system [1]. They constitute 40% of all hospital-acquired infections, and fully 80% of these infections are attributable to indwelling urethral catheter use. Twelve percent to 16% of hospital inpatients will have an indwelling catheter placed at some time during hospitalization. While the catheter remains in situ, 3%–7% of patients will acquire a urinary infection each day. Catheter-associated bacteriuria has harmful outcomes beyond infection, including catheter or stent obstruction caused by biofilm formation, which usually requires removal and reinsertion of the device [2] and provision of an environmental reservoir for drug-resistant organisms, which may be transferred between patients, occasionally causing outbreaks [3–5]; and life-threatening complications, such as bacteremia and sepsis syndrome [6]. There are also adverse effects of urethral catheters unrelated to infection, such as trauma to the bladder and urethral mucosa, immobility and discomfort for patients, and reactions to catheter materials, including hypersensitivity reactions to latex or inflammatory responses leading to urethral strictures [7–9].

The national survey reported by Saint et al. [10] suggests that many American hospitals are not paying attention to the substantial problems attributable to indwelling urethral catheter use. The insertion of a urethral catheter is an invasive procedure with negative consequences for patient safety, yet less than one-half of hospitals responding to the survey monitored whether patients had a urinary catheter in place. Only one-quarter of facilities documented the duration of catheterization. The most important strategies for prevention of catheter-related urinary infection are to avoid insertion of a catheter and, if a catheter must be used, to limit the duration to as short a time as possible. It is remarkable that so few facilities measure this risk exposure. The survey also reports no consistent approach in the use of other potential preventive strategies, such as use of antimicrobial-coated catheters, catheter reminders, or bladder scanners. Although the majority of hospitals reported that they had some program for surveillance for urinary infection, the methods used and the perceived efficacies are not addressed. The report also does not discuss the adherence of facilities to the Centers for Disease Control and Prevention’s guidelines for preventing health care–acquired urinary infection.

Why is there this apparent neglect of programs to prevent adverse effects attributable to the urethral catheter, given that use of such catheters is a common intervention with well-documented negative outcomes? Several considerations are likely relevant. There is limited morbidity attributable to hospital-acquired urinary tract infection relative to that reported for surgical site infections, pneumonia, and bacteremia [11]. Death directly attributable to hospital-acquired urinary tract infection is also uncommon. Catheter-acquired urinary infection is usually asymptomatic; if symptomatic infection occurs, treatment is generally straightforward. In addition, the estimated costs of hospital-acquired urinary tract infection are markedly lower than those for the other major health care–associated infections [12]. Thus, health care professionals
perceive an indwelling urethral catheter as less dangerous and of less concern than an endotracheal tube, surgical incision, or indwelling vascular line. In fact, physicians are often not aware of whether their patients have indwelling urinary catheters in place [13]!

The problem of hospital-acquired urinary tract infection also seems to have been neglected in guideline development and clinical research. The current guidelines for prevention of hospital-acquired urinary tract infection were published by the Centers for Disease Control and Prevention in 1981 and have not been subsequently updated [14]. United Kingdom guidelines, on the other hand, were initially published only in 2001 but were updated and revised in 2007 [15]. The surveillance definitions used by the National Healthcare Safety Network (formerly National Nosocomial Infection Surveillance) for identifying hospital-acquired urinary tract infection are problematic to apply in the identification of catheter-associated urinary infection [16]. Because most cases of hospital-acquired urinary tract infection are associated with an indwelling catheter, symptoms such as urgency, frequency, and dysuria are not relevant. In fact, these and other symptoms occur with equal frequency among patients who have catheters with or without bacteriuria [11]. The approach to distinguishing asymptomatic bacteriuria from symptomatic urinary infection in subjects with bacteriuria and without localizing genitourinary symptoms needs further refinement, especially if hospital-acquired urinary infection moves into the blinding light of public reporting. The Cochrane collaboration recently published a series of meta-analyses that review and summarize clinical research relevant to risks for and prevention of urinary tract infection and other adverse outcomes associated with use of both short-term and long-term indwelling urethral catheters [17–22]. A consistent theme of these reviews is the limited number of studies that address specific questions, the poor quality of many of the published studies, and the consistent use of bacteriuria rather than indices of morbidity as an outcome measure. Thus, the knowledge base is inadequate, and guidelines lack currency.

What can be done? If the holy grail of “getting to zero” is the goal for hospital-acquired urinary tract infection, then technology seems to be the only solution. Development of biofilm on the indwelling urinary catheter is the primary cause of catheter-associated urinary tract infection [2]. Development of catheter materials that do not support biofilm formation could, theoretically, eliminate most bacteriuria and, one assumes, symptomatic infection. Although there has been and continues to be intense interest in and investigation of potential biofilm-inhibiting catheter materials, the prize remains elusive. Catheters developed to date have virtually all been variations on the theme of antimicrobial coatings and have been a disappointment with respect to impact on infection [21, 23–25]. None of these catheters have been consistently documented to decrease symptomatic infection. Studies occasionally report a decrease in the incidence of bacteriuria, but differences observed may be attributable to differences in comparator catheter materials (latex vs. silicone) [24, 26]. Thus, biofilm-inhibiting catheters are unlikely to provide a solution for the near term.

While awaiting technological advances in catheter materials, facility programs must focus on rigorous application of recognized effective interventions. The Healthcare Infection Control Practices Advisory Committee has embarked on an update of the urinary catheter guidelines that, it is hoped, will be completed expeditiously. A considered reappraisal of surveillance definitions for symptomatic urinary tract infection relevant to the patient with a catheter in place also seems necessary. As Saint et al. [10] observe, there is good evidence that some practices effectively decrease use and duration of use of indwelling urethral catheters. Physician reminders to review the need for continued catheterization or guidelines facilitating nurse-initiated catheter removal (when predesignated criteria are met) are both effective [27–30]. These practices should be widely incorporated in patient care, but they are not feasible without timely, accurate means to identify patients with catheters and to monitor the duration of catheterization. To optimize patient safety, documentation of the use and duration of any invasive device that carries a risk to the patient is necessary. There seems no reasonable argument against expecting facilities to collect, distribute, and act on this information for indwelling urethral catheters.

Saint et al. [10] characterize inconsistent and inadequate application of recognized measures that are effective in decreasing patient exposure to urinary catheters and catheter-associated urinary infection. Although this problem has been relatively neglected to date, patient safety initiatives, such as the Michigan Keystone program, are now introducing programs that incorporate practices for urethral catheters and other strategies to prevent urinary tract infection. These initiatives will generate information that will advance our understanding of the feasibility and effectiveness of such programs. Clearly, much progress is needed.

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References


