Catheter-Associated Urinary Tract Infection Prevention in the Oncology Population: An Evidence-Based Approach

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Urinary catheters have been attributed to almost half of all healthcare-associated infections. Many catheter-associated urinary tract infections (CAUTIs) may be prevented by following recommended guidelines, which would save lives. This article illustrates the use of known guidelines for the prevention of CAUTIs in the oncology population.

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One of the greatest threats to patient safety is the acquisition of healthcare-associated infections (HAIs) (Centers for Disease Control and Prevention [CDC], 2010). A urinary tract infection (UTI) is an infection of the kidney, ureter, bladder, or urethra (Balentine, 2013). UTIs account for 40% of all HAIs (Klevens et al, 2007). Among UTIs acquired in the hospital, about 80% are associated with an indwelling urinary catheter (Saint & Chenoweth, 2003). An estimated 12%–25% of hospitalized patients receive this type of catheter at some point during their hospital stay (Saint et al., 2000). A direct positive relationship has been established between length of catheterization and the risk of developing a UTI. Therefore, catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed (Lo et al., 2008).

Starting in 2008, the Centers for Medicare and Medicaid Services (2007) listed catheter-associated UTIs (CAUTIs) as a preventable hospital-acquired complication. As part of the 2013 National Patient Safety Goals, the Joint Commission stated that organizations were to implement an evidence-based practice to prevent CAUTIs (Joint Commission, 2012). In March 2012, a task force at Memorial Sloan-Kettering Cancer Center (MSKCC) assembled to address that issue. The task force included clinical nurse specialists, infection control nurses, and front-line inpatient RNs to establish a program for the prevention of CAUTIs, tailoring it to the specific needs of the oncology population. The task force met on a monthly basis, with a roll-out date of October 2012 for the revised evidence-based policies and education initiative.

Background and Significance

A literature review including the search terms *CAUTI, indwelling Foley catheter*, and *healthcare-associated infections*, was conducted through PubMed, Cochrane, and CINAHL® to include research studies and guidelines from 2000 to present. The literature contained limited prospective studies on infections and indwelling catheters, but did reference the guidelines set forth by the CDC, the Society for Healthcare Epidemiology of America (SHEA), and the Institute for Healthcare Improvement ([IHI], 2011).

In a retrospective cohort study conducted by Wald, Ma, Bratzler, and Kramer (2008), Medicare inpatients (N = 35,904) undergoing major surgery (e.g., coronary bypass and other open-chest cardiac operations, vascular surgery, general abdominal colorectal surgery, hip or knee total joint arthroscopy) were analyzed from 2,965 acute care hospitals in the United States. The results of the study suggested an association between duration of catheterization and the development of a UTI. In the study, patients undergoing major operations with postoperative catheterizations for longer than two days were more likely to experience adverse outcomes (Wald et al., 2008).

- Perioperative use for a surgical procedure
- Surgical procedures within 24–48 hours
- Surgery of the pelvic structures in the immediate postoperative period
- Urine output monitoring in patients who are critically ill and/or hemodynamically unstable
- Management of acute urinary retention (as evidenced by bladder scan) and urinary obstruction
- Assistance in stage III or IV pressure ulcer healing if patient is incontinent
- Improving comfort when the patient's terminal condition has become advanced, progressive, and incurable
- If patient is experiencing sedation, paralysis, or a decreased level of consciousness
- If patient requires prolonged immobilization
- When long-term catheterization (more than 28 days) has already been initiated

FIGURE 1. Criteria for Urinary Catheter Insertion and Continued Need

Note. Based on information from Gould et al., 2010.

- Keep catheter properly secured to patient's thigh to prevent movement and urethral traction using a Cath Secure®.
- Keep collection bag below the level of the bladder at all times.
- Keep collection bag off the floor at all times.
- Label all collection containers with patient's name.
- Use a separate collecting container for each patient.
- Avoid allowing the drainage spigot to touch the collecting container, floor, or toilet.
- Use separate collecting containers for multiple drains.
- Routine daily hygeine (e.g., cleansing of the meatal surface) using soap and water is appropriate.

FIGURE 2. Urinary Catheter Maintenance Bundle

Note. Based on information from Gould et al., 2010.

In a prospective randomized trial, Alessandri, Mistrangelo, Lijol, Ferrero, and Ragni (2006) reported on the impact of the timing of indwelling catheter removal in women undergoing vaginal or abdominal hysterectomy on UTIs. Study groups compared the removal of the catheter in the operating room (Group A), six hours after surgery (Group B), and 12 hours after surgery (Group C). The study suggested that removing an indwelling catheter immediately after an uncomplicated hysterectomy reduced postoperative complications (Alessandri et al., 2006). Of note, no cancer-specific studies were reported in the current literature review.

The MSKCC task force's primary source for guidelines used was SHEA's *Strategies to Prevent CAUTI in Acute Care Hospitals* (Lo et al., 2008). The document focuses on prioritizing CAUTI prevention by using four components of care: (a) avoiding unnecessary urinary catheters, (b) inserting urinary catheters using sterile technique, (c) maintaining urinary catheters based on recommended guidelines, and (d) reviewing urinary catheter necessity daily and removing promptly. In addition, using the CDC's guidelines for the prevention of CAUTI (CDC, 2010), an updated version from the original published in 1981, offered more recommendations for implementing CAUTI prevention strategies within MSKCC's nursing practice, including insertion criteria, use of an insertion bundle, and the use of a maintenance bundle to ensure consistency in practice.

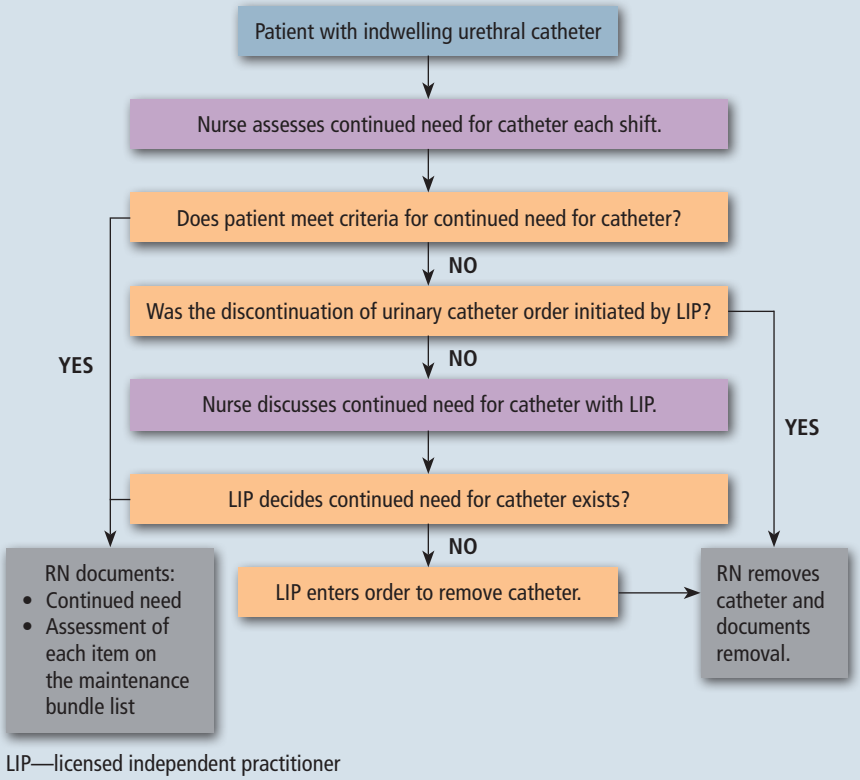
Another vital resource employed was the IHI's (2011) *How-to Guide: Prevent Catheter Associated Urinary Tract Infection*. That key document directed the task force's improvement efforts of insertion technique and routine maintenance care, in addition to implementing interventions and measuring these improvements.

Implementation of Evidence-Based Practice

In their article about evidence-based practice, Winter and Echeverri (2012) stated that role modeling and the integration of skills are important components in the development of clinical programs. The MSKCC CAUTI task force designed a hospital-wide education program focusing on CAUTI prevention to ensure all nursing staff received comprehensive evidence-based information on such care. The program included a didactic section as well as a practical skills return demonstration segment. Instructional as well as clinical scenarios and case studies were developed to illustrate main points.

In the lecture series, teaching strategies included background information on the four components of care, explicit criteria for appropriate catheter insertion (see Figure 1), alternatives to indwelling catheters, practice variations for male and female patients, catheter maintenance procedures (see Figure 2), and pediatric guidelines. Although pediatrics is not measured in CAUTI rates because the National Patient Safety Goal surrounding CAUTI is not applicable to the pediatric population, the task force felt strongly about including this group in the standard of care.

One of the greatest challenges faced in reviewing the evidence was the need to identify how to implement a daily review of catheter necessity and the prompt removal of unnecessary catheters. The process needed to be reliable and consistent if rate reduction was to be met. As chart reminders were historically unreliable, an electronic system seemed to be the solution. In collaboration with the Nursing Informatics department, an alternative workflow process was developed. The two unique processes created for the program included an electronic nursing assessment flow sheet document and a nursing algorithm (see Figure 3). The nursing



LIP—licensed independent practitioner

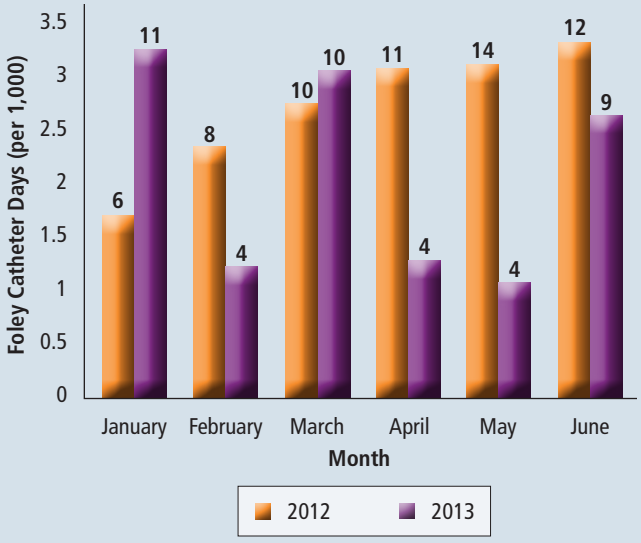
FIGURE 3. Discontinuation of Urinary Catheters

assessment flow sheet is a head-to-toe electronic assessment including genitourinary. When this section is marked for a urinary catheter, a required field must be filled in with the appropriate criteria for indwelling catheters. The nursing algorithm is a step-by-step decision tree approved by MSKCC's Medical Board, which consists of all medical and surgical physician department heads as well as the chief nursing officer and nursing directors. Approval was required because this was the first time a nurse-driven algorithm would allow a nurse to execute an order based on nursing judgement. The algorithm can be followed by nurses for all patients with indwelling urinary catheters. When the patient no longer meets one of the 10 valid criteria for continued need (e.g., on postoperative day 3, which is outside the second criterion in Figure 1, "Surgical procedures within 24–48 hours"), the nurse looks for the discontinuation of urinary catheter order. The order is placed by the licensed independent practitioner (LIP) (e.g., nurse practitioner, physician assistant, medical doctor) at the time of the Foley insertion, allowing for the nurse to automatically remove the catheter when it no longer is appropriate. These processes allowed for the efficient discontinuation of urinary catheters in a timely manner. During each shift, the nurse documents the presence of a urinary catheter on the ongoing or initial nursing assessment flow sheet and indicates that it meets one of the 10 approved inclusion criteria. When the patient no longer meets those criteria, the nurse follows the algorithm for automatic discontinuation of the catheter.

In addition, reformatted patient care plans, patient education documentation forms, electronic handoff notification, and new urinary catheter insertion order sets were created. All existing supplies were evaluated and updated to reflect current standards. Patient education materials were reviewed and revised to reflect new practices. A highly visible CAUTI prevention sticker was created for placement on the drainage bag to remind patients, families, and caregivers of these practice standards to improve compliance.

Discussion

Although a randomized, controlled trial to provide evidence for CAUTI prevention is a difficult undertaking, guidelines established for infection control do exist. Developing a program using the standards of practice from the CDC, SHEA, and IHI comprehensively provided the task force with the tools necessary to undertake this effort. The CAUTI prevention initiative provided the nursing staff with the best evidence for care of indwelling urinary catheters for the oncology patient population. Including the practical skills portion of the program ensured competency throughout the organization. The markers of success will include a decrease in CAUTI rates, decrease in catheter days, and compliance with the maintenance and insertion bundles.



Note. Bolded numbers indicate number of infections each month.

FIGURE 4. Catheter-Associated Urinary Tract Infection Rates Hospitalwide

Evaluating the outcomes of the CAUTI prevention program is an ongoing process. Comparing 2012 to 2013, in the first six months after the comprehensive program began, initial data indicated that CAUTIs were reduced by more than 30% (see Figure 4). Audits completed by MSKCC's Infection Control department indicated a significant improvement in the use of the maintenance bundle, as well. Keeping the oncology population in mind, with their compromised immune systems and susceptibility, a decrease in infection rates ultimately translates into a decrease in morbidity and mortality.

Lessons Learned

The authors noted a few lessons that may help others in developing their own CAUTI initiatives. Incorporating frontline care providers in any educational program will likely increase the buy-in from bedside nurses. By using MSKCC's existing nursing council structure, nurses from different departments (e.g., medicine, surgery, pediatrics, intensive care) were able to give real-life input and champion the process. From the beginning of this project, the task force included the Materials Management and Nursing Informatics departments to help with a realistic timeline for the implementation of appropriate supplies and electronic documentation. Products needed to be tested and approved by users and the departments involved. All products went through MSKCC's Products Evaluation Committee, which includes sanctioning by the urology, operating room, and intensive care departments. Order sets needed to be created, tested, and implemented for their success. The process took about 10 months to complete.

Because of their potential for severe complications, CAUTIs are a major health concern, particularly to the compromised oncology population. The CAUTI task force developed a comprehensive educational program focusing on CAUTI prevention strategies based on nationally recommended guidelines. The authors hope that by heightening awareness of the consequences and adherence to best practice, catheter days and infections will decrease. The committee will be performing monthly audits of the maintenance bundle usage, as well as continuing to collect data on CAUTI rates.

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