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Housestaff Knowledge Related to Urinary Catheter Utilization and Catheter-Associated Urinary Tract Infections (CAUTIs)

Molly L. Paras, MD*,

Department of Medicine, Division of Infectious Diseases, Massachusetts General Hospital; Harvard Medical School; Cox 5, 55 Fruit Street, Boston, MA, USA, 02114;

Erica S. Shenoy, MD, PhD,

Division of Infectious Diseases, Infection Control Unit and Medical Practice Evaluation Center, Massachusetts General Hospital; Harvard Medical School; Boston, MA, USA

Heather E. Hsu, MD, MPH,

Department of Medicine, Boston Children's Hospital, Harvard Medical School; Boston, MA, USA

Rochelle P. Walensky, MD, MPH, and

Divisions of Infectious Diseases, Massachusetts General and Brigham and Women's Hospital; Medical Practice Evaluation Center, Massachusetts General Hospital; Harvard Medical School; Boston, MA, USA

David C. Hooper, MD

Division of Infectious Diseases, Infection Control Unit, Massachusetts General Hospital; Harvard Medical School; 55 Fruit Street, GRJ 504, Boston, MA, USA, 02114; dhooper@partners.org

Abstract

Despite published catheter-associated urinary tract infection (CAUTI) prevention guidelines, inappropriate catheter use is common. We surveyed housestaff about their knowledge of CAUTIs at a teaching hospital and found the majority is aware of prevention guidelines; however, their application to clinical scenarios and catheter practices fall short of national goals.

Keywords

catheter-associated urinary tract infection; healthcare-associated infection; medical education; survey; infection control; practice guidelines

*Corresponding author t. 617-724-9248, f. 617-726-7653; mparas@partners.org.

CONFLICTS OF INTEREST

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INTRODUCTION

Catheter-associated urinary tract infections (CAUTIs) are a major cause of healthcare-associated infections and contribute to increased morbidity and mortality.¹⁻³ Prevention guidelines recommend limiting catheter placement and duration, but inappropriate utilization is well-described.^{1,4-7}

In many teaching hospitals, housestaff are responsible for ordering catheter placement and discontinuation. We implemented a survey to assess housestaff's knowledge of CAUTIs and catheter practices, with the goal to identify knowledge deficits to allow for targeted education.

METHODS

Recruitment—We surveyed housestaff in medicine, surgery, medicine-pediatrics, and anesthesiology at Massachusetts General Hospital (MGH) in Boston, Massachusetts. Emergency medicine housestaff who train in a combined residency with MGH and Brigham and Women's Hospital were also included. The study was approved by the Partners Human Research Committee (#2012P001078). Subjects were notified of the survey via email from their program director. Next they were emailed an invitation to participate on June 26, 2012 with a reminder email sent on July 1, 2012. Entry into a lottery for a twenty dollar gift card was provided to encourage participation.

Survey Design—An anonymous electronic survey was designed in REDCap, a web-based survey tool.⁸ Although numerous CAUTI-prevention guidelines exist, we used The Society for Healthcare Epidemiology of America guidelines for survey development.⁴ Subjects were asked to provide demographic information, including post-graduate year (PGY) of training, program, and site of most recent inpatient experience (intensive care unit or floor). Respondents were asked questions regarding knowledge of prevention guidelines and CAUTI risk factors. They were asked to estimate the frequency with which they re-assessed the need for catheter placement in patients under their care. They were instructed to select appropriate indications for catheter placement from clinical scenarios and to identify appropriate timing of catheter removal post-operatively. The complete Survey Instrument is provided (Supplementary Material), including correct responses to questions where appropriate.

Scoring—Only surveys in which respondents answered all questions were included for analysis. For questions with a discrete "correct" response (Questions 2, 3, 7, 9), answers were scored as "correct" if they reflected common knowledge and adhered to consistent guidelines.⁴ Scoring for question 7, related to catheter placement indications, was determined by adding the number of appropriate indications selected (total possible: 9) with the number of inappropriate indications left unselected (total possible: 6), dividing by the number of scenarios (15) and multiplying by 100.

Statistical Analysis

Comparisons of responses were evaluated for statistical significance using the N-1 two proportion test with a two-tailed p-value.

RESULTS

Response Rate and Respondent Characteristics

A total of 403 subjects -- of which 175 were medicine, 75 surgery, 16 medicine-pediatrics, 81 anesthesia and 56 emergency medicine housestaff -- were invited to participate from June 26-July 3, 2012. One-hundred-and-sixty responses were received and 158 were complete, forming the sample for analysis. Respondent-reported level of training was: PGY1 43/158 (27%); PGY2 51/158 (32%); and PGY3+ 64/158 (41%). Respondent breakdown by training program was: medicine 72/158 (46%); surgery 30/158 (19%); medicine-pediatrics 5/158 (3%); anesthesiology 24/158 (15%); and emergency medicine 27/158 (17%).

Guideline and CAUTI Risk Factor Knowledge

Ninety-five subjects (60%) reported awareness of CAUTI prevention guidelines. When analyzed by PGY level, 44% of PGY 1 subjects reported awareness, compared to 70% of PGY 3+ subjects ($p = 0.007$). One-hundred-and-forty (89%) responded correctly that duration of catheter placement is the greatest predictor of CAUTI development. Eighty-five respondents (54%) could correctly identify the daily risk of CAUTI per catheter day and analysis by PGY level showed no statistical difference.

Inpatient Urinary Catheter Practices

Seventeen (11%) respondents reported it was easy to find documentation of the presence of a urinary catheter whereas 46 (29%) reported that it was difficult or very difficult. Nursing notes were identified by 83 (52%) as the most likely place to find documentation of a catheter.

Seventy-two (46%) respondents reported at least daily reassessment of the need for catheter placement in patients under their care during their last rotation. Analysis by PGY level was not statistically different. When responses were considered by most recent inpatient experience, intensive care unit or floor, 31/57 (54%) and 41/101 (41%) reassessed catheter need at least daily, respectively.

Knowledge of Appropriate and Inappropriate Catheter Indications

Only 5 (3%) respondents correctly identified the appropriate or inappropriate nature of every clinical scenario for catheter placement, scoring 100%. The majority of subjects, 102 (64%), scored between 75-99% on these 15 clinical scenarios (data not shown). Recognizing an epidural catheter as an indication for urinary catheter placement was the scenario most commonly missed. Of the inappropriate catheter placement scenarios, placing a catheter for a stage II bedsore with incontinence was the most common error. Respondents most reliably recognized that not all surgical patients required catheter placement, and patient preference was not an appropriate indication for catheter placement (Table 1).

Fifty-four respondents (34%) correctly identified when to remove a catheter post-operatively when other indications for catheterization were absent. When only anesthesia responses were considered, 7/24 (29%) answered correctly ($p=0.63$); when only the surgical responses were considered, 17/30 (57%) respondents answered correctly ($p=0.02$).

DISCUSSION

We found that a small majority of housestaff respondents reported awareness of CAUTI prevention guidelines, which increased with training, and the vast majority correctly identified catheter duration as the greatest risk factor for CAUTI development. Despite the high visibility of efforts aimed at CAUTI prevention, only a minority of respondents could correctly identify all appropriate/inappropriate indications for catheterization in common clinical scenarios.¹⁻³ This finding highlights the need to develop and implement educational tools targeting housestaff who frequently manage inpatient catheter orders.

Although published guidelines recommend frequent reassessment, less than half of respondents reported daily reassessment of catheter necessity in their patients.¹ Due to the anonymous nature of the survey, the frequency of reassessment cannot be independently verified, however, we believe it is unlikely that respondents would underestimate their practice. While knowledge deficits related to CAUTIs may contribute to infrequent reassessment of catheterization, this deficiency may also reflect the lack of a systems-based approach to recognize the presence of an indwelling catheter, and reassess its necessity.⁹

As noted above, when comparing surgery and anesthesia housestaff, the two groups most likely to care for the post-operative patient, surgery housestaff identified appropriate timing for post-operative catheter removal more frequently than anesthesia. This finding highlights the importance of educational initiatives that target specific patient populations most relevant to providers.

This study has several limitations. While the survey response rate was low, thus limiting the generalizability of results, it was similar to those of published surveys regarding other medical topics in this population.¹⁰ This was a single site study, again limiting generalizability. Due to the nature of self-reporting, we cannot verify the information provided by respondents, and the results may be subject to social desirability bias. If this bias were present, however, respondents would likely overestimate their CAUTI awareness and positive practices in reassessing urinary catheter placement. Thus, the deficits reported are likely minimum estimates, providing further support for the need for targeted education about guidelines and catheter practices.

We found that housestaff knowledge of CAUTI guidelines, application to clinical scenarios and catheter practices fall short of national goals. As reducing CAUTIs is a healthcare priority, targeted interventions, including educational initiatives, need to be developed and aimed at housestaff who can play a major role in decreasing catheter use and duration.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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REFERENCES

1. Hooton TM, Bradley SF, Cardenas DD, et al. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. *Clin Infect Dis.* 2010; 50:625–63. [PubMed: 20175247]
2. National Nosocomial Infections Surveillance System. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004. *Am J Infect Control.* 2004; 32:470–85. [PubMed: 15573054]
3. Saint S, Meddings JA, Calfee D, et al. Catheter-associated urinary tract infection and the Medicare rule changes. *Ann Intern Med.* 2009; 150:877–84. [PubMed: 19528567]
4. Gould CV, Umscheid CA, Agarwal RK, et al. Guideline for prevention of catheter-associated urinary tract infections 2009. *Infect Control Hosp Epidemiol.* 2010; 31:319–26. [PubMed: 20156062]
5. Tiwari MM, Charlton ME, Anderson JR, et al. Inappropriate use of urinary catheters: a prospective observational study. *Am J Infect Control.* 2012; 40:51–4. [PubMed: 21802780]
6. Saint S, Wiese J, Amory JK, et al. Are physicians aware of which of their patients have indwelling urinary catheters? *Am J Med.* 2000; 109:476–80. [PubMed: 11042237]
7. Meddings J, Rogers MA, Macy M, et al. Systematic review and meta-analysis: reminder systems to reduce catheter-associated urinary tract infections and urinary catheter use in hospitalized patients. *Clin Infect Dis.* 2010; 51:550–60. [PubMed: 20673003]
8. Harris PA, Taylor R, Thielke R, et al. Research electronic data capture (REDCap) - a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009; 42:377–81. [PubMed: 18929686]
9. Meddings J, Rogers MA, Krein SL, et al. Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. *BMJ Qual Saf.* 2014; 23:277–89.
10. Grava-Gubins I, Scott S. Effects of various methodologic strategies: survey response rates among Canadian physicians and physicians-in-training. *Can Fam Physician.* 2008; 54:1424–30. [PubMed: 18854472]

Table 1

Respondents' ability to identify appropriate or inappropriate indications for urinary catheter use (N= 158)

Clinical Scenario	N answered correctly (%)
Appropriate Indication	
Monitoring Urine Output in Critically Ill Patients	152 (96%)
Comfort Measures in Terminally Ill Patients	116 (73%)
Stage III Bedsore with Incontinence	95 (60%)
Stage IV Bedsore with Incontinence	120 (76%)
Urethral Trauma or Post-Radical Prostatectomy	119 (75%)
Epidural Catheter in Place	75 (47%)
Gross Hematuria	103 (65%)
Acute Urinary Retention	140 (89%)
Chronic Urinary Retention and No Alternative	121 (76%)
Inappropriate Indication	
Incontinence	132 (84%)
Stage I Bedsore with Incontinence	147 (93%)
Stage II Bedsore with Incontinence	125 (79%)
Limited Mobility	142 (90%)
All Surgical Patients	154 (97%)
Patient Preference	153 (97%)