

Effectiveness of a Simple Intervention for Prevention of Catheter-Associated Urinary Tract Infections on a Medical Hospital Unit.

Anita Au, MD, FRCPC Sabin Shurraw, MD, FRCPC Holly Hoang, MD, FRCPC

Department of Internal Medicine, Grey Nuns Hospital, Edmonton, Alberta

Background:

Urinary tract infections are the most common nosocomial infection, constituting approximately 40% of all hospital-acquired infections.¹ Of these urinary tract infections, 80% are as a result of urinary catheterization, defined as catheter associated urinary tract infections (CA-UTIs).² These infections lead to increased length of hospital stay, morbidity, and cost of care. In the United States, nosocomial UTIs increase the length of hospital stay by 1 to 4 days and a hospital-acquired UTI adds approximately \$676 to the cost of hospitalization.³

Current guidelines suggest that prevention of CA-UTI involves limiting catheter use to situations where appropriate clinical indications are met, and prompt removal of catheters once no longer required.^{4,5}

This quality improvement study was undertaken to examine the impact of the use of a simple intervention consisting of a daily reminder on the patient's medical binder in patients with indwelling urinary catheters on the duration of indwelling urinary catheters use and the incidence of CA-UTIs.

METHODS:

The trial used a pretest-post test (pre-intervention/intervention) design with a control group and was conducted on 2 medicine units (Units 51 and 53) of the Grey Nuns Community Hospital, a community teaching hospital located in Edmonton, Alberta.

During the pre-intervention phase, active surveillance was carried out on both medicine units over a three month period (June to August 2016) to determine the baseline rate of urinary catheterizations and rate of CA-UTIs. Patients with an in-dwelling urinary catheter (IUC) placed prior to arrival to emergency department (i.e. prior to hospitalization) were excluded.

Following the 3 month surveillance period, the intervention was implemented on the intervention unit, Unit 51. The intervention consisted of a reminder sticker placed daily in the order section of the chart of identified patients with IUCs (Figure 1). The sticker asked physicians whether he/she wanted to continue or discontinue the IUC.

OUTCOME MEASURES:

The primary outcome was the rate of inappropriately retained urinary catheters during the pre and post intervention period and the rate of CA-UTI.

CA-UTI was defined according to National Healthcare Safety Network criteria.⁵ (Figure 2.)

Figure 1. Reminder Sticker

****URINARY CATHETER REMINDER****

Date / /
 Indwelling Urinary Catheter in place since / /

Please indicate below EITHER (1) that the catheter should be removed OR (2) that the catheter should be retained. If catheter should be retained, please state ALL of the reasons that apply.

Please discontinue indwelling urethral catheter, OR
 Please continue indwelling urethral catheter because the patient requires it for the following reasons (please check all that apply):

Urinary retention
 Very close monitoring of urine output and patient unable to use urinal or bedpan
 Open wound in sacral or perineal area and patient has urinary incontinence
 Patient too ill to use any other type of urinary collection strategy
 Patient had recent surgery
 Other - please specify

Figure 2.

Definition of a catheter-associated UTI

The patient has an indwelling urinary catheter in place at the time or within 48 hours before urine collection, plus one of the following criteria:

i) at least one of the following signs or symptoms with no other recognized cause: fever (>38C), suprapubic tenderness, or costovertebral tenderness, and a positive urine culture of $\geq 10^5$ colony forming unit (CFU)/mL with no more than two species of microorganisms

ii) at least one of the following signs or symptoms with no other recognized cause: fever (>38C), suprapubic tenderness, or costovertebral tenderness; and a positive urine culture of $\geq 10^3$ and $\leq 10^5$ CFU/mL with no more than two species of microorganisms and a positive urinalysis, demonstrated by at least 1 of the following findings:

- i) Positive dipstick for leukocyte esterase and/or nitrite
- ii) Pyuria (urine specimen with >10 WBC/mm³/high-power field of unspun urine)
- iii) Microorganisms seen on Gram stain of unspun urine

Table 1. Baseline Characteristics

Variables	Total	Unit 53	Unit 51	p-value
No. of patients with catheterizations	195	112	83	
Age				
Mean (SD)	76.21 (13.73)	75.92 (13.37)	76.62 (14.31)	
Median (IQR)	79 (68-87)	78 (70-86)	80 (66-89)	0.49
Male, Freq (%)	96 (50.53)	55 (49.55)	41 (51.90)	0.11
Most responsible diagnoses, Freq (%)				
UTI	27 (13.85)	16 (14.29)	11 (13.25)	0.16
Respiratory	23 (11.79)	9 (8.04)	14 (16.87)	0.03
Metabolic	14 (7.18)	12 (10.71)	2 (2.41)	0.02
Cancer	22 (11.28)	11 (9.82)	11 (13.25)	0.14
Infection	24 (12.31)	16 (14.29)	8 (9.64)	0.11
CHF	16 (8.21)	9 (8.04)	7 (8.43)	0.21
No. of patients with prolonged hospitalization as a result of CAUTI (%)	2 (1.06)	1 (0.90)	1 (1.28)	0.49

Table 2. Results

Catheter Days, Mean (sd)	PRE-INTERVENTION	POST-INTERVENTION	p-value
Control	7.39 (8.15)	7.32 (10.09)	0.4102
Intervention	11.68 (10.26)	7.46 (6.95)	0.0028
Catheterization, Freq (%)			
Control	72 (53.73)	62 (46.27)	0.3877
Intervention	40 (45.45)	48 (54.55)	0.3938
CA-UTI, Freq (%)			
Control	8 (11.94)	3 (4.92)	0.1568
Intervention	7 (17.50)	2 (4.55)	0.0552
Inappropriate catheterization, Freq (%)			
Control	33 (49.25)	25 (40.98)	0.3479
Intervention	11 (27.50)	15 (34.09)	0.514
Patients with repeated catheter placement, Freq (%)			
Control	12 (16.67)	10 (16.13)	0.9332
Intervention	4 (10.00)	1 (2.08)	0.1102
No. of patients with prolonged hospitalisation as a result of CAUTI, Freq (%)			
Control	1 (1.49)	0 (0.00)	0.3421
Intervention	1 (2.50)	0 (0.00)	0.3025
Length of Stay, Median (IQR)			
Control	18.00 (9.00-42.00)	12.50 (7.00-30.00)	0.034
Intervention	16.50 (8.00-28.50)	12.50 (6.00-22.50)	0.1605
Length of Stay, Mean (sd)			
Control	32.23 (36.97)	24.73 (35.30)	0.0340
Intervention	22.33 (26.30)	19.07 (19.66)	0.1605

STATISTICAL ANALYSIS:

The frequency of CA-UTI among catheterized patients was defined as the number of CA-UTIs per 100 catheterized patients. A catheter day is defined as a 24 hour period in which an IUC is in place. The rate of inappropriate catheterizations was calculated by the number of inappropriate catheterizations over the total number of catheterized patients during the study interval.

RESULTS:

• A total of 195 patients participated in this study with 112 on the control unit and 83 on the intervention unit. (Table 1).

• Duration of indwelling catheter use: There was a decrease in the duration of indwelling catheter use on the intervention unit from 11.7 days down to 7.5 days (p=0.0028).

• Frequency of catheter-associated UTIs: There was a decrease in the frequency of catheter-associated UTIs 17.5% to 4.6% but this was not statistically significant (p=0.0552).

CONCLUSION:

The implementation of a daily indwelling-urinary catheter reminder sticker in patient charts was associated with a significant reduction in the mean duration of indwelling catheter use with a trend towards a significant reduction in the rate of CA-UTIs.

FUTURE DIRECTIONS:

- Implementation of the sticker reminder into regular clinical practice.
- Eventual implementation of the sticker reminder onto non-medical units.
- ER education session to try to reduce the frequency of catheterization.

Special Thanks to Renee Schmitz and Celia Beltran for helping with the chart reviews. We would also like to acknowledge the expertise of Xiaoming Wang and Sukun Wang for their help with statistical analysis.

References:
 1. Haley RW, Culver DH, White JW, Morgan WM, Emori TG. The nationwide nosocomial infection rate. A new need for vital statistics. Am J Epidemiol. 1985 Feb;121(2):159-67.
 2. Lu E, Nicole L, Classen D, Arias KM, Podgorny K, Anderson DJ, Burstin H, Calfee DP, Coffin SE, Dublerke ER, Fraser V, Gerding DN, Griffin FA, Gross P, Kaye KS, Klompas M, Marshall J, Mermel LA, Pegues DA, Perl TM, Saint S, Salgado CD, Weinstein RA, Wise R, Yokoe DS. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals. Infect Control Hosp Epidemiol. 2008 Oct;29 Suppl 1:S41-50.
 3. Saint S. Clinical and economic consequences of nosocomial catheter-related bacteriuria. Am J Infect Control. 2000 Feb;28(1):68-75.
 4. Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, Saint S, Schaeffer AJ, Tambayh PA, Tenke P, Nicolle LE. Infectious Diseases Society of America. 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 Mar 1;50(5):625-63.
 5. Healthcare Infection Control Practices Advisory Committee (HICPAC). Guidelines for prevention of catheter-associated urinary tract infections 2009. Available from: http://www.cdc.gov/hicpac/CAUTI/001_cauti.html. Accessed October 31, 2015.