

## LETTERS TO THE EDITOR

## Long-Term Outcome of an Intervention to Remove Unnecessary Urinary Catheters, With and Without a Quality Improvement Team, in a Thai Tertiary Care Center

*To the Editor*—Several studies about reducing the rate of catheter-associated urinary tract infections have reported the success of interventions that were not device-based.<sup>1-5</sup> Two previous studies reported successful outcomes of quality improvement programs featuring interventions to remind physicians to remove unnecessary catheters.<sup>4,5</sup> These programs subsequently reduced the number of unnecessary urinary catheter-days and decreased the rates of catheter-associated urinary tract infection. However, such interventions are labor intensive and require a long-term commitment from nursing and physician staff. In addition, the long-term effects of these programs have not been adequately explored. Whether interventions can be successful without the involvement of a quality improvement team deserves further investigation. In this letter, we report 2 years of follow-up data from a hospital-wide quality improvement program featuring an intervention to remind physicians to remove unnecessary urinary catheters, with and without the involvement of a quality improvement team, at one university-based hospital.<sup>5</sup>

From July 1, 2005 through June 30, 2006 (period 1), we implemented a hospital-wide quality improvement program featuring physician reminders to remove unnecessary urinary catheters. During this period, the nursing staff identified patients who had had a urinary catheter in place for at least 3 days by reviewing orders keyed into a computer terminal linked to the hospital central workstation, and they notified investigators of these patients. If urinary catheterization was deemed inappropriate, daily bedside discussions occurred among treating physicians and physicians from the intervention team regarding the reasons for urinary catheterization and the possibility of discontinuing it. Treating physicians then made a decision to maintain or remove the patient's catheter. The nursing staff continually monitored patients for any systemic or local sign of catheter-associated urinary tract infection, and an infectious diseases physician confirmed the appropriateness of the indication for urinary catheterization and determined whether there was a urinary tract infection. This intervention was also promoted at a monthly staff meeting held to discuss problems and identify possible risk factors for patients who had developed urinary tract infections in the previous month.

From July 1, 2006 through June 30, 2007 (period 2), all

activities related to the quality improvement team (ie, physicians' bedside discussion and monthly staff meeting) were discontinued, except for a simple reminder by nurses to physicians to remove unnecessary catheters from patients who had inappropriate urinary catheterization. From July 1, 2007 through June 30, 2008 (period 3), all interventions related to the quality improvement team were again implemented. Data on patient demographic characteristics, underlying diseases, severity of illness, admission diagnosis, indication for urinary catheterization, appropriateness of urinary catheterization, and the occurrence of catheter-associated urinary tract infection were compared during the 3 study periods.

Data on patient demographic and clinical characteristics and on catheterization and urinary tract infections are shown in the Table. There was an absolute increase of 7% in the rate of inappropriate urinary catheterization in period 2, compared with period 1 (from 11% to 18%;  $P < .001$ ). In period 2, significantly more patients developed catheter-associated urinary tract infection, and some patterns of inappropriate catheterization also changed (Table). However, during period 3, there was an absolute decrease of 10% in the rate of inappropriate catheterization, compared with period 2 (from 18% to 8%;  $P < .001$ ). There was also a significant reduction in the rate of and the number of reasons for inappropriate urinary catheterization, and fewer patients developed catheter-associated urinary tract infection, in period 3 compared with period 2 (Table).

This study suggests that simple reminders from nurses did not reduce the rate of inappropriate catheterization in a resource-limited setting, and it emphasizes the important role of the activities of the quality improvement team (ie, physicians' bedside discussion and monthly staff meetings) in helping to reduce the rate of inappropriate urinary catheterization. These findings imply that physicians were more receptive to a change in practices if the recommendation came from other physicians than if it came from the nursing staff. To sustain these results, both commitment for the intervention team and repeated efforts appear to be needed. Nevertheless, this intervention was inexpensive and effective and did not require the purchase of expensive equipment, and use of this nondevice intervention should be considered initially to reduce the rate of catheter-associated urinary tract infection in hospitals in developing countries.

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TABLE. Patient Characteristics and Rates of Inappropriate Urinary Catheterization and Associated Urinary Tract Infections (UTIs) in the 3 Study Periods

Variable	Period 1	Period 2	Period 3
<b>Patient characteristics</b>			
No. of patients	1,307	1,415	1,363
Age, mean $\pm$ SD, years	52 $\pm$ 7.9	51 $\pm$ 6.5	51 $\pm$ 6.7
Female sex	640 (49)	714 (50)	668 (49)
<b>Principal diagnosis*</b>			
Cardiovascular disease	301 (23)	283 (20)	286 (21)
Gastrointestinal disease	288 (22)	325 (23)	286 (21)
Diabetes	274 (21)	311 (22)	313 (23)
Cerebrovascular or other neurological disease	222 (17)	226 (16)	204 (15)
Pulmonary disease	170 (13)	212 (15)	177 (13)
Immunocompromised state	91 (7)	99 (7)	109 (8)
Malignancy	39 (3)	28 (2)	40 (3)
Other	196 (15)	198 (14)	204 (15)
APACHE II score, mean $\pm$ SD	15 $\pm$ 8.6	16 $\pm$ 7.8	15 $\pm$ 8.3
<b>Urinary catheter use</b>			
Inappropriate use	144 (11)	255 (18) <sup>b</sup>	109 (8) <sup>c</sup>
<b>Reason use was inappropriate<sup>d</sup></b>			
No more need to monitor urine output	27 (19)	65 (25) <sup>b</sup>	20 (18) <sup>c</sup>
Unclear indication (no useful purpose)	29 (20)	56 (22)	23 (21)
Urinary incontinence without significant skin breakdown	24 (16)	36 (14)	15 (14)
Neurogenic bladder where intermittent self-catheterization is possible	17 (12)	25 (10)	14 (13)
Use for convenience of care	17 (12)	25 (10)	14 (13)
Insertion for amphotericin B bladder irrigation	14 (10)	20 (8)	11 (10)
Staff too busy to remove	9 (6)	12 (4)	6 (6)
Staff forgot to remove	7 (5)	13 (5)	6 (6)
Total no. of urinary catheter-days	3,920	4,005	3,963
No. of inappropriate urinary catheter-days	823 (21)	1,410 (35) <sup>b</sup>	753 (19) <sup>c</sup>
No. of CA-UTIs per 1,000 urinary catheter-days, mean $\pm$ SD	5.2 $\pm$ 2.1	10.5 $\pm$ 4.6 <sup>b</sup>	4.2 $\pm$ 2.0 <sup>c</sup>

NOTE. Data are no. (%) of patients, unless otherwise indicated. Interrupted time series analysis with segmented regression analysis was used to evaluate the trend of CA-UTI in the entire study periods. APACHE, Acute Physiology and Chronic Health Evaluation; CA-UTI, catheter-associated urinary tract infection; period 1, July 1, 2005 through June 30, 2006; period 2, July 1, 2006 through June 30, 2007; period 3, July 1, 2007 through June 30, 2008; SD, standard deviation.

\* Categorical variables were compared using  $\chi^2$  or Fisher exact test, as appropriate; the 2-tailed Student *t* test was used to compare continuous variables.

<sup>b</sup> *P* < .05, compared with period 1.

<sup>c</sup> *P* < .05, compared with period 2.

<sup>d</sup> Reason per episode of inappropriate use of urinary catheter during each period.

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