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Concise Communication

Reducing unnecessary urethral catheter use in Japanese intensive care units: A multicenter interventional study

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Abstract

We conducted a preintervention–postintervention study to assess the effectiveness of a multimodal approach to reduce unnecessary urethral catheters in 5 Japanese intensive care units. After the intervention urethral catheter point prevalence decreased by 18%, from 79% preintervention to 61% postintervention, and catheter appropriateness increased by 28%, from 57% preintervention to 85% postintervention.

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Indwelling urethral catheters (ie, Foley catheters) provide an essential service for many patients; however, catheter use is associated with both infectious and noninfectious complications,[1] and increased morbidity and healthcare costs.[2] One of the most effective methods of preventing complications is to ensure that catheters are used appropriately and are removed promptly when no longer necessary.[3] In the United States, ~60% of ICU patients have a urethral catheter, with 94% meeting appropriate indications.[4] In Japanese ICUs, we found increased catheter prevalence at 76%, with only 54% of meeting an appropriate indication.[5] To reduce unnecessary urethral catheter use in Japanese ICUs, we conducted a multimodal interventional study to facilitate daily assessment of catheter need and to promote prompt removal when no longer appropriate.

Materials and Methods

This interventional study using a before-versus-after design was conducted in 5 ICUs from 4 Japanese community-based, tertiary-care hospitals. During the pre- and postintervention phases, we assessed urethral catheter point prevalence in adult patients and the proportion of catheters with an appropriate indication. Hospital physicians or research nurses served as the study observers. Daily urethral catheter presence was assessed for each patient on each unit for 1 week per month. The indications for use as determined by both the observer and the patient's nurse were also collected. The *2009 Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines*[6] provided the list of indications considered appropriate for urethral catheter use. This study occurred in 3 phases: the preintervention phase (August 2015–March 2016), the intervention phase (April 2016–June 2016), and the postintervention phase (July 2016–March 2017). Specific months of participation varied by unit.

The intervention used a multimodal approach including education on published guidelines[6,7] and use of tools to promote appropriate catheter use. Unit nurses were required to attend a lecture about appropriate use of urethral catheters. Measuring hourly fluid balance in the critically ill is a commonly overused indication due to varied interpretations of being critically ill.[5] The Ann Arbor Criteria for Appropriate Urinary Catheter Use provides a clearer definition of urethral catheter use in critically ill patients, highlighting appropriateness when hourly measurement of urine volume is required to inform treatment.[7] Previously, we found that "immobility" was confused with immobilization required as part of treatment.[5] Thus, we emphasized differentiating between immobilization required as part of treatment and immobility. Alternatives to indwelling urethral catheters were promoted. Posters listing appropriate indications for urethral catheter use were placed in each ICU, and staff were encouraged to use a published checklist[8] during team rounds or at the patient's bedside to discuss whether the indication for the indwelling urethral catheter was still considered appropriate. When no longer indicated, the ICU team recommended catheter removal to the primary physician caring for the patient.

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Table 1. Characteristics of the Participating Intensive Care Units

Variable	Hospital A ICU	Hospital B CCU/EICU	Hospital C ICU	Hospital C EICU	Hospital D ICU
No. of beds	8	6/8	12	8	6
No. of resident ICU physicians	2	1/ 4	2	4	1
No. of patients in 2016	1645	456/973	982	610	944
Hospital volume, beds	401	768	1,131	1,131	561
Urban or rural	Urban	Urban	Rural	Rural	Rural
University-affiliated or community-based	University-affiliated	Community-based	Community-based	Community-based	University-affiliated
Open or closed	Open	Open or semi-closed	Semi-closed	Semi-closed	Semi-closed
Type of ICU	Mixed	Medical	Mixed	Mixed	Mixed
Most common patient type	Medical	Medical	Elective surgery	Trauma	Medical
Most common admission site	Emergency room	Emergency room	Operation room	Emergency room	Misc.
Level of care	Tertiary	Tertiary	Tertiary	Tertiary	Tertiary

Note. ICU, intensive care unit; CCU, coronary care unit; EICU, emergency intensive care unit.
[a]Hospital B ICU was a combined unit that included both coronary care ICU beds and EICU beds using shared nursing staff.

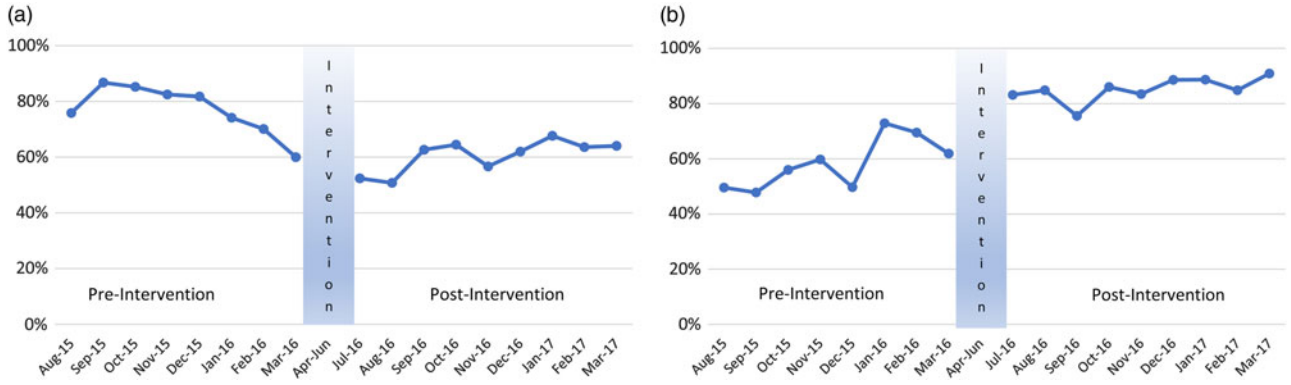


Fig. 1. (a) Indwelling urethral catheter point prevalence all units by month before and after intervention. (b) Proportion of appropriate indwelling urethral catheters all units by month before and after the intervention.

The study protocol was approved by the institutional review board of each participating hospital.

Statistical analysis

Primary outcomes were (1) the proportion of patient days during which a urethral catheter was placed and (2) the proportion of catheter days with an appropriate indication. Descriptive statistics were calculated for all variables. We used χ^2 tests to assess differences in the outcome variables in the preintervention phase compared to the postintervention phase. A 2-sided P value <.05 was considered statistically significant. The data analysis was performed with SAS version 9.4 software (SAS Institute, Cary, NC).

Results

Descriptive information about each participating ICU is listed in Table 1. In total, 1,306 patient days were assessed for indwelling urethral catheter prevalence before the intervention, and 1,871 patient days were assessed during the postintervention phase. Prevalence over time is displayed in Fig. 1a. The urethral catheter point prevalence rate significantly decreased by 18% (95% confidence interval [CI], 15%–21%; $P < .001$) from 79% before the intervention (1,034 catheter days and 1,306 patient days) to 61% after the intervention (1,141 catheter days and 1,871 patient days) (Appendix Table 1 online).

Urethral catheter appropriateness increased after the intervention (Fig. 1b). In total, 57% of the preintervention catheter days were deemed appropriate (589 of 1,034 catheter days). Appropriateness increased by 28% (95% CI, 24%–32%; $P < .001$) to 85% postintervention (973 of 1,141 catheter days) (Appendix Table 2 online). The effect of the intervention in individual hospital units varied (Appendix Fig. 1 online).

The most commonly cited appropriate indication for catheter use was the need for accurate input and output monitoring in critically ill patients (by 61.7% of nurses and 59.9% of observers), which increased from the preintervention phase (ie, 45.7% of nurses and 37.0% of observers). Monitoring input and output for non–critically ill patients was the most frequently cited inappropriate indication (by 6.0% of nurses and 9.1% of observers); however, this proportion decreased compared to the preintervention phase (ie, 14.8% of nurses and 21.0% of observers).

Discussion

We found that after implementation of a multimodal approach focusing on appropriate use of urethral catheters, urethral catheter

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use decreased by 18%, while appropriate use of urethral catheters increased by 28%.

Avoiding unnecessary urinary catheter use is key to catheter-associated urinary tract infection (CAUTI) prevention as highlighted by the conceptual model of the "lifecycle of the urinary catheter."[3] CAUTI prevention programs that prompt urinary catheter removal have proven effective inside and outside the ICU.[9,10] Our intervention targeted 2 phases of the urinary catheter lifecycle: raising awareness of existing urinary catheters (step 2); and prompting catheter removal (step 3). This led to the reduction of unnecessary urinary catheter use in our study, which is consistent with previous studies.[3] Our multimodal intervention included 2 additional aspects specific to ICU settings. First, we used a more specific definition for appropriate use of a urethral catheter to monitor input and output of critically ill patients.[7] By using this more specific definition, the use of urethral catheters in the critically ill was optimized, resulting in greater consistency between nurses and observers in identifying critically ill patients. Second, we emphasized the difference between appropriate use of catheters for prolonged immobilization required for treatment versus inappropriate use for immobility. Consequently, the inappropriate use of urethral catheters for patient immobility decreased by 7.6%.

We previously found that urethral catheter use was higher and appropriate use was lower in Japanese ICUs compared to US ICUs.[4,5] After the intervention, the prevalence of urethral catheters (61%) and proportion used for appropriate indications (85%) was similar to rates found in US ICUs. Unlike the United States, healthcare worker awareness of nosocomial infection prevention practices in Asia is low.[5,9] Our findings demonstrate that a simple multimodal intervention is feasible to improve urinary catheter use in Japanese ICUs.

Our study had several limitations. First, all participating ICUs were teaching, tertiary-care hospitals and might have included higher-acuity patients requiring more urethral catheter use than patients found in nonteaching hospitals. Second, the definition of being critically ill was not clearly set in the preintervention phase, which might have resulted in an overestimation of the proportion of urethral catheters with an appropriate indication. Third, the Hawthrone effect, with the presence of the observer, may have impacted the healthcare workers' behavior. Fourth, we did not measure CAUTI rates in our study.

In conclusion, we implemented a multimodal intervention in Japanese ICUs that included education about the appropriate use of urethral catheters and the use of a checklist during rounds to promote daily assessment of catheter need. Our multimodal approach successfully reduced the prevalence of indwelling urethral catheters while facilitating more appropriate use of urethral catheters.

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Conflicts of interest. The authors declare no conflicts of interest related to this article.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/ice.2019.258

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