

Impact of Infection Prevention Programs on Catheter-Associated Urinary Tract Infections Analyzed in Multicenter Study

Sun Hee Na et.al . Korean Med Sci.2024 May 13;39(18)



General male ward 31 Jan 2025

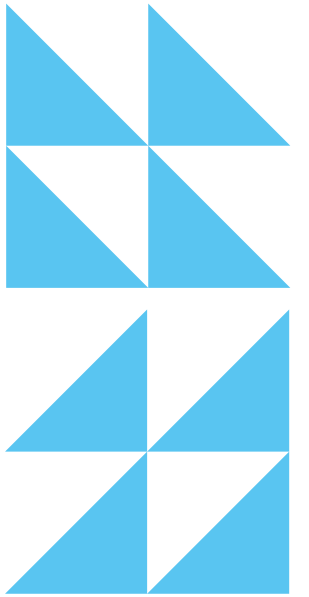


BACKGROUND

CAUTI are among the most common causes of healthcare-associated infections, with a high incidence in tertiary general hospitals and small- and medium-sized hospitals. Significant effect on morbidity, length of hospital stay, burden of antibiotic use, healthcare expenditure, and mortality.

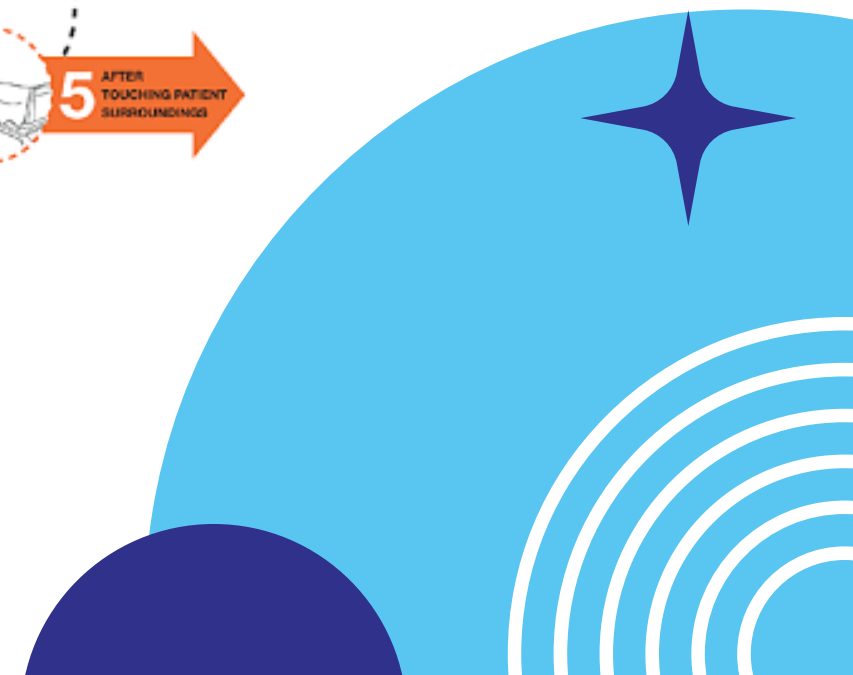
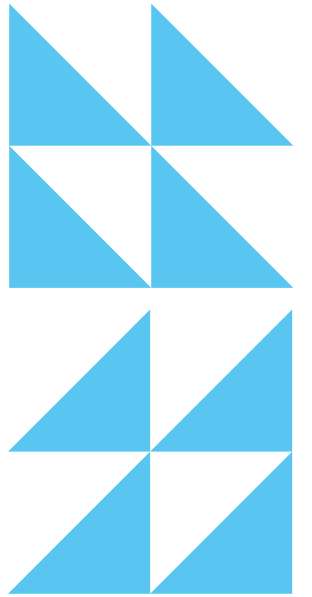
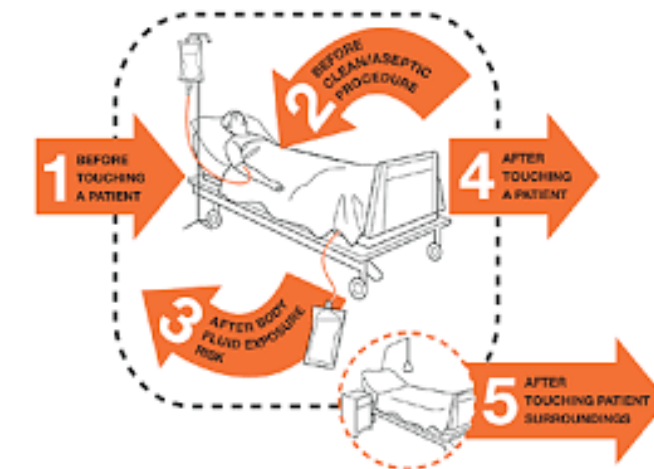
An observational study of 61 hospitals in Canada reported that 21% of nosocomial bloodstream infections were caused by UTI. Of these, 71% were associated with the use of indwelling catheters. The 30-day mortality rate was 15% (Tambyah et al)

Costs associated with CAUTI, which accounted for \$20,662 for diagnostic tests and \$35,872 for medication, with an average cost of \$589 per case.



BACKGROUND

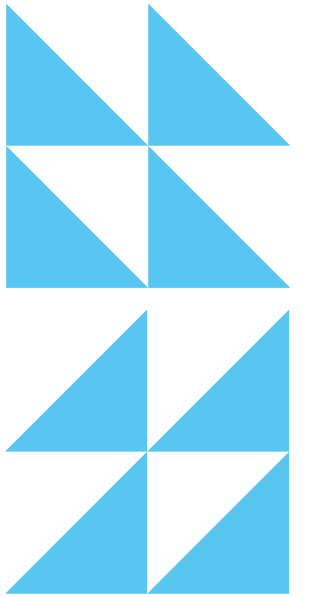
69% of CAUTIs can be reduced by following the recommended infection prevention practices. Guidelines for the prevention of CAUTI include the proper use of urinary catheters, aseptic insertion, assessment of maintenance and removal, and hand hygiene practices.



BACKGROUND

In Korea, the Korean National Healthcare-associated Infections Surveillance System (KONIS) includes CAUTI as a survey target. However, it has only been assessed in tertiary general hospitals and intensive care units. Therefore, it is necessary to study the status of CAUTI in hospitals, especially in small- and medium-sized hospitals and to develop a program to reduce its incidence.

This study was conducted to assess the characteristics of CAUTI, the interventions implemented to reduce its incidence, and the effectiveness of prevention programs in hospitals of different sizes.



METHODS

In April 2017, the researchers formed the CAUTI Prevention Guidelines Intervention Committee

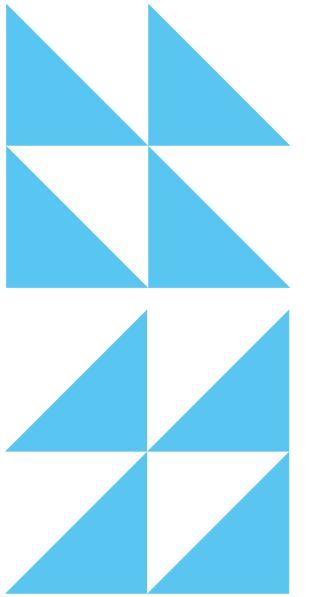


The committee comprises

- individual teams for training
- materials development
- infection prevention program development
- effectiveness evaluation criteria development
- network operations



30 participating hospitals with dedicated infection prevention control (IPC) staff.
Three months later, we initiated training and monitoring

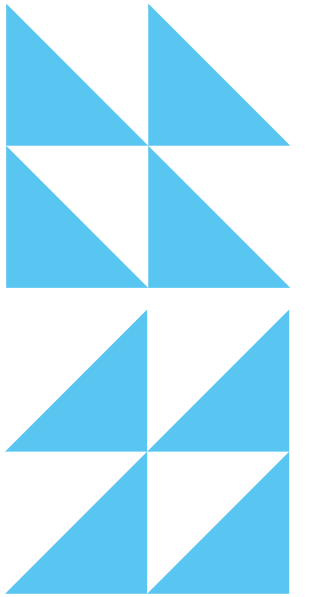


METHODS

In 2018, three hospitals dropped out, but another three hospitals joined the study

In April 2018, promotional materials to prevent CAUTI

- posters for hospitals
- stickers to be placed on urine bags
- memo boards to attach on monitors



METHODS

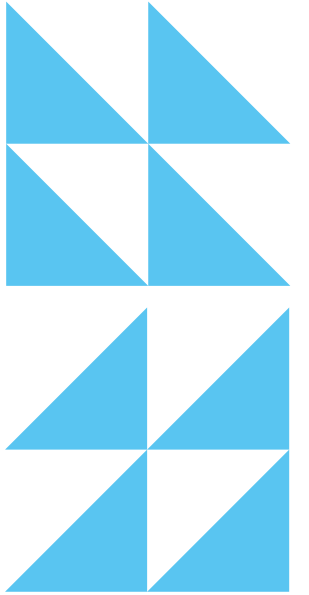
Table 1. Program details for catheter-associated UTIs

Program	Detail
In-person training program	<ul style="list-style-type: none">-Diagnostic criteria for urinary tract infections-A bundle approach to preventing urinary tract infections-Culture for diagnosis of urinary tract infection-How to make a UTI checklist
Video training program	<ul style="list-style-type: none">-How to prevent catheter-associated urinary tract infections
Promotional materials	<ul style="list-style-type: none">-Hand hygiene before contact-Be careful not to kink the catheter-Preventing backflow-Maintain some distance from the floor, Lock the urinary catheter before moving it-Check the fixation of the urinary catheter



METHODS

Training
Video



Ten in-person training sessions were held over a three-year period, and video training materials on CAUTI prevention were produced and shared.



A question-and-answer board was set up for participating hospitals to answer the questions.

From May to July 2018 and June to August 2019, the investigators visited all participating hospitals to perform on-site investigations.

Collected the medical data of hospitalized patients for three years, from 2017 to 2019 (Fig. 1)

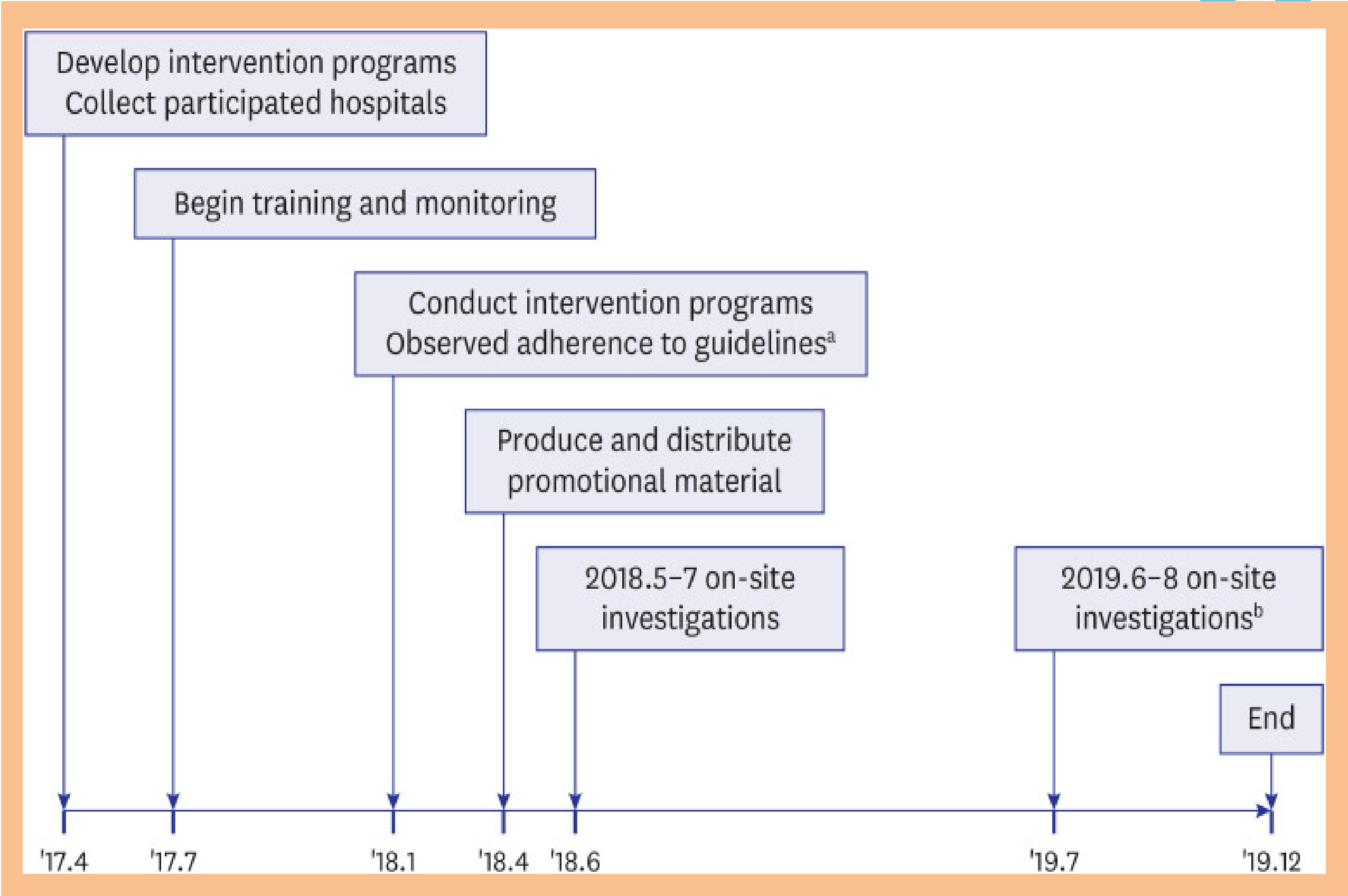
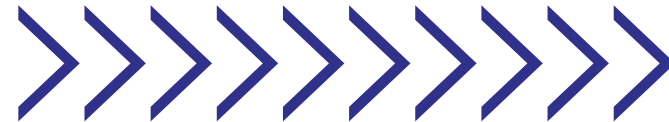


METHODS

Fig.1

- a**
- hand washing
 - use sterile globe
 - use sterile drapes
 - disinfect skin
 - use disposable lubricant
 - monitoring for urinary catheter kinking
 - maintaining a closed system
 - fixation
 - use separate collection containers for each patient
 - regular assessment of urethral catheterization

- b**
- assessment of the appropriateness of producing the checklist
 - evaluate the adequacy of monitoring methods
 - whether intervention activities had been carried out



METHODS

The indwelling catheterization process was monitored to determine the reason for insertion and adherence to standard urinary catheter insertion guidelines.

Checked for compliance with the maintenance instructions. The removal of unnecessarily inserted catheters was advised.

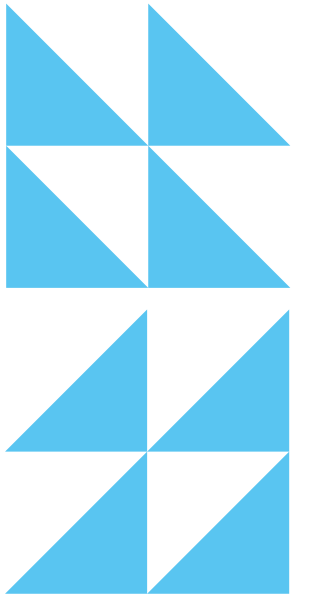
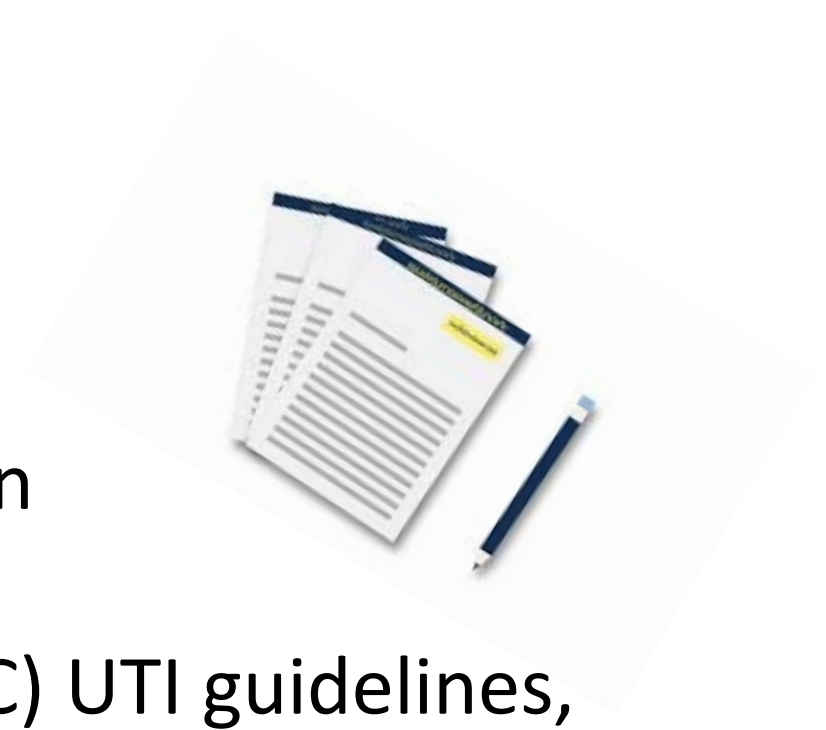
The CAUTI rate was investigated by completing a UTI registry containing clinical information of the patients. The effectiveness of the training and intervention was shared with the participating hospitals, and feedback.



METHODS

The prevention intervention indicator was based on

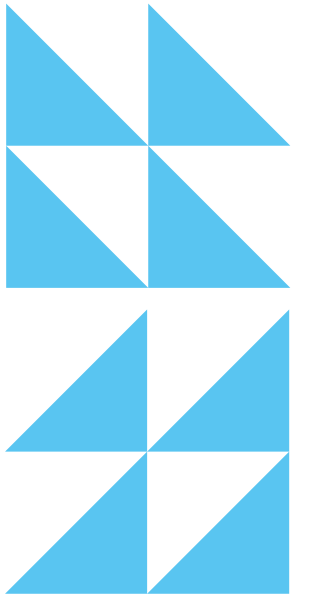
- Centers for Disease Control and Prevention (CDC) UTI guidelines, the 2017 KONIS,
- Korean Society for Healthcare-associated Infection Control (KOSHIC) guideline: Healthcare associated Infection Control and Prevention.
- CAUTI was defined in accordance with the KONIS manual. When the KONIS manual was changed during the study period, the standard of this study was also changed.



DATA COLLECTION AND ANALYSIS

Selected in where 15% of the patients had a urinary catheter of the total number of inpatients

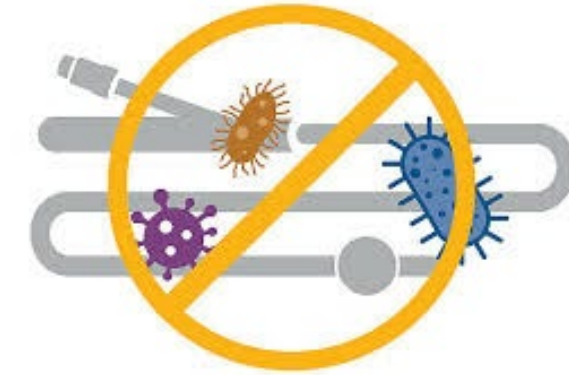
The responsible staff had made regular observations 1–2 times a week, to complete the checklist



DATA COLLECTION AND ANALYSIS

The urinary catheter utilization ratio (UCR)

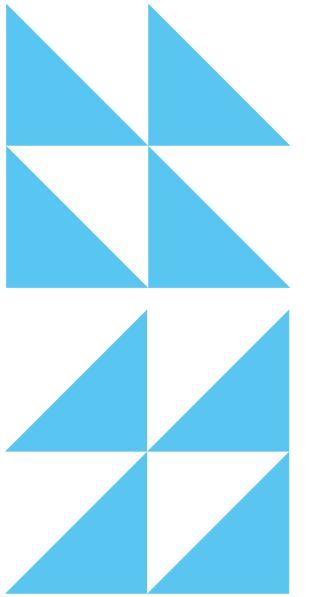
$$= \frac{\text{number of catheter days divided}}{\text{number of patient days}} \times 100$$



The rate of CAUTI per 1000 device-days

$$= \frac{\text{number of CAUTI}}{\text{number of catheter days}} \times 1000$$

according to the CDC's National Healthcare Safety Network

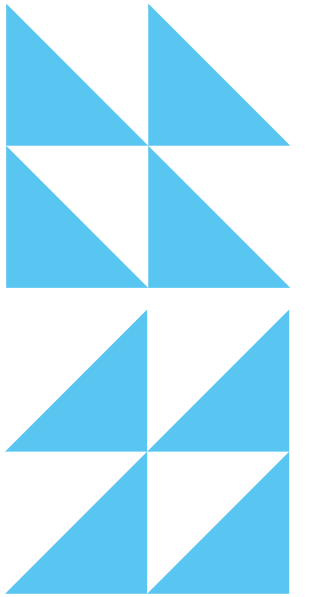
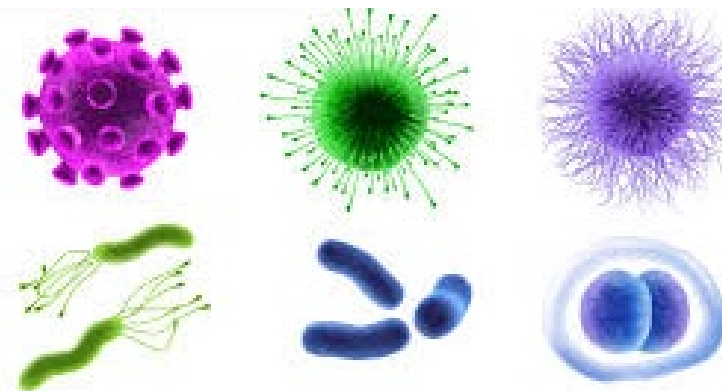


DATA COLLECTION AND ANALYSIS

Evaluated the microorganisms involved in CAUTI, UCR and factors affecting the insertion, maintenance, and infection of indwelling catheters.

Compared the incidence of CAUTI and related data between university hospitals and small- and medium-sized hospitals.

The microorganisms were identified using urine cultures



STATISTICAL ANALYSIS

Compared data from university hospitals with those from small and medium-sized hospitals

Student's ttest or Mann-Whitney U test
was used to compare quantitative data

Pearson's χ^2
was used to compare qualitative data

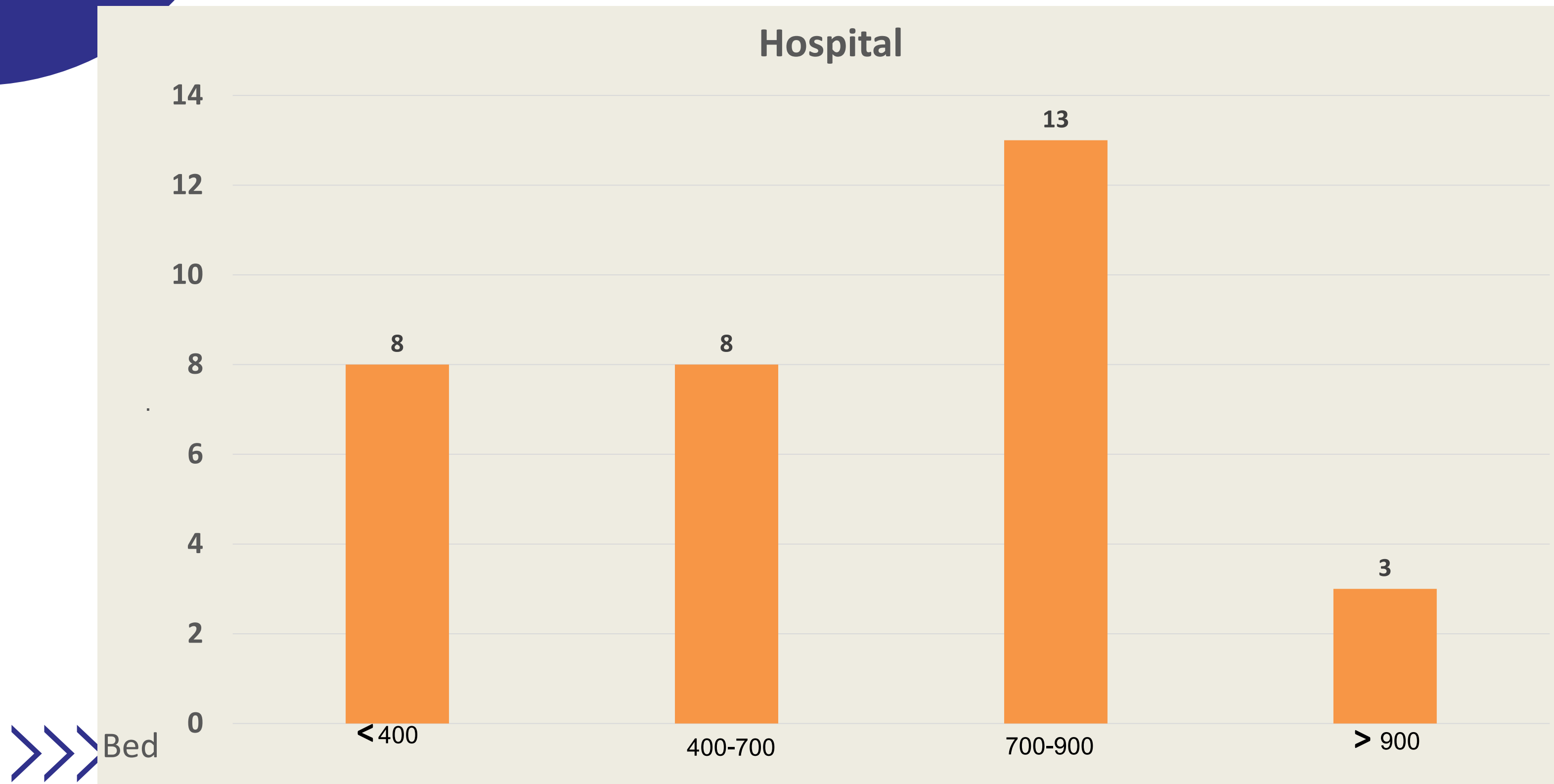


Statistical significance was set at P values < 0.05 . R (version 3.6.0)



RESULTS

Characteristics of participating hospitals (N=32)



RESULTS

Characteristics of participating hospitals

1 hospital decreased with 700–900 beds

1 hospitals decreased with < 400 bed

2 hospitals increased 400–700 beds.



In 2017

11 hospitals in Seoul, 8 hospitals in Gyeonggi, 5 hospitals in Chungcheong, 3 hospitals in Jeolla, 2 hospitals in Jeju, and 1 hospital each in Incheon, Gyeongsang and Gangwon.

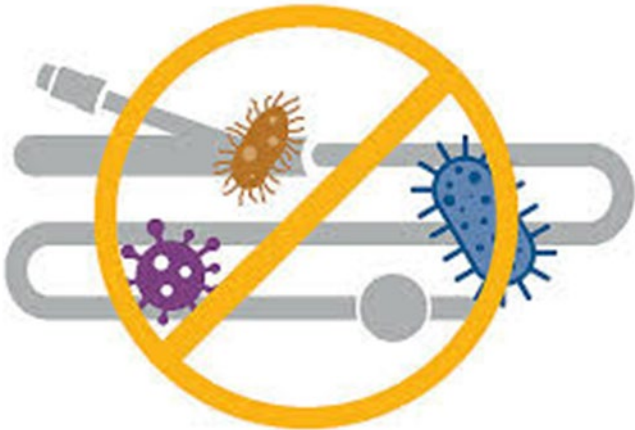
In 2018 and 2019

10 hospitals in Seoul, 7 hospitals in Gyeonggi, 6 hospitals in Chungcheong, 4 hospitals in Jeolla, 2 hospitals in Jeju, and 1 hospital each in Incheon,

Gyeongsang and Gangwon participated.



RESULT



Incidence of UCR

Hospital	Before	After
university hospitals (ICUs)	0.89	0.89
small- and medium-sized hospitals	0.79	0.84 0.91 (last quarter)

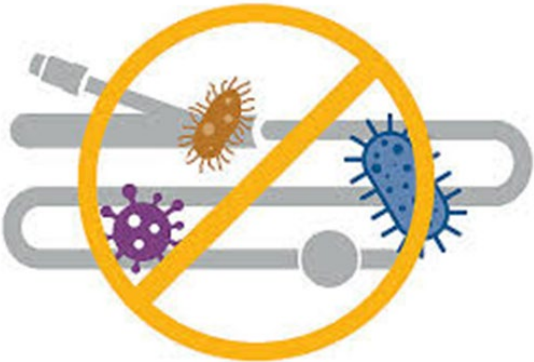
Throughout the study period, the UCR in the general wards of university hospitals remained 0.23. Small- and medium-sized hospitals initially had a lower UCR than university hospitals. However, it gradually increased, and by the end of the study, it was 0.2



RESULT

The incidence of CAUTI in the ICUs

Hospital	Before 2018	After 2019	End of study
university hospitals	2.05 infections/1,000 device-days	1.18 infections/1,000 device-days	1.74 infections/1,000 device-days
small- and medium-sized hospitals	1.44 infections/1,000 device-days	0.79 infections/1,000 device-days	1.80 infections/1,000 device-days

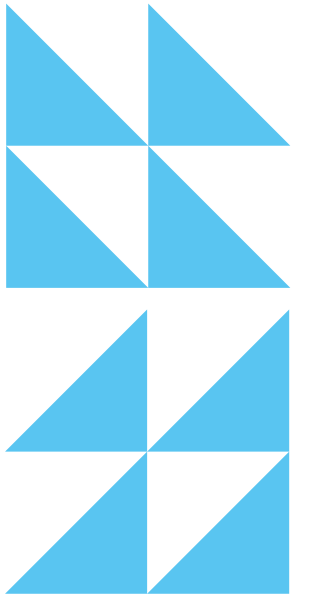
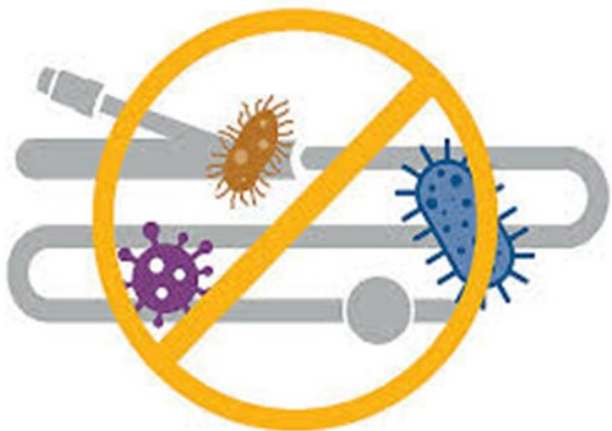


RESULT

The incidence of CAUTI in the general wards

The incidence of CAUTI in the general wards of university hospitals was similar to that in the ICUs.

Before the intervention, the infection rate in small- and medium-sized hospitals began to decrease in the third and fourth quarters of 2017, which subsequently stabilized at approximately 1 infections/1,000 device-days during the intervention period and increased sharply in the third quarter of 2019, reaching a peak of 2.04 infections/1,000 device-days.



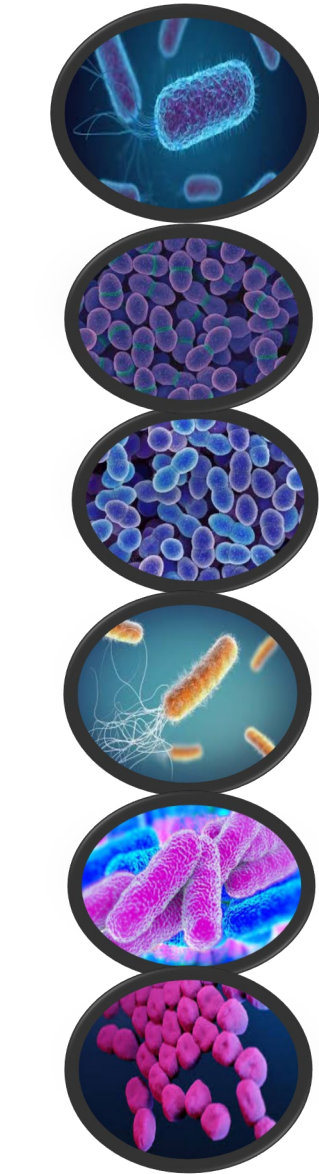
RESULT

Microorganisms causing CAUTIs

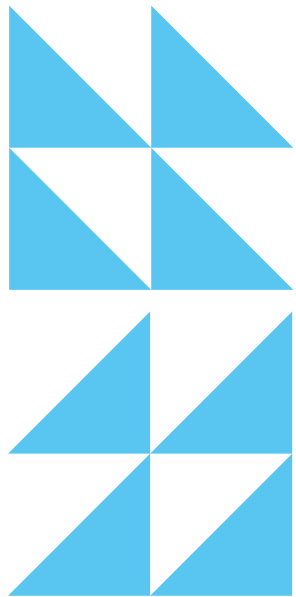
In 2017, the causative pathogens of CAUTI were identified

191 (73.18%) university hospitals
70 (26.82%) small- and medium-sized hospitals

Microorganisms	Percentage
Escherichia coli	26.05
Enterococcus faecium	14.56
Enterococcus faecalis	13.41
Pseudomonas aeruginosa	11.88
Klebsiella pneumoniae	9.58
Acinetobacter baumannii	5.75



The microorganisms causing CAUTI did not differ between the two groups.



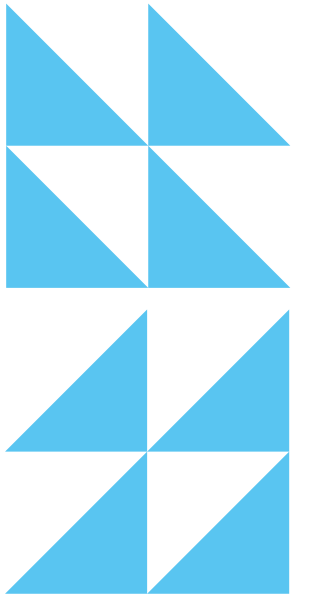
RESULT

Interventions for urinary catheterization

Interventions	university hospitals		small and medium-sized hospitals		During the study	the end of the study
	Before intervention	After intervention	Before intervention	After intervention		
hand washing during the insertion of the indwelling catheter	> 90%	-	> 90%	-	-	-
did not use sterile drapes	96%	-	87%	-	-	they were used in almost all the hospitals
fixation of the urinary catheter	90%	-	70%	80%	96%	79%
assessment of urethral catheterization	91.2%	100%	77.7%	100%	-	-
monitoring for urinary catheter kinking and maintaining a closed system remained	99% to mid-study			99% to mid-study		80%

DISCUSSION

This study evaluated the implementation of interventions to prevent CAUTI in hospitals of various sizes and collected data related to these interventions. University hospitals, which have good infection prevention and control systems, were compared with small- and medium-sized hospitals



DISCUSSION

The UCR were similar over the three years

38% of physicians are unaware that their patients have urinary catheters placed

The proportion of patients who were unaware of the reason for urethral catheterization

ICUs

38.9% in university hospitals and

34.5% in small- and medium-sized hospitals

general wards

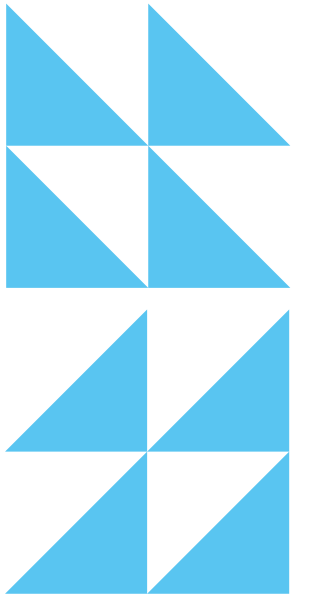
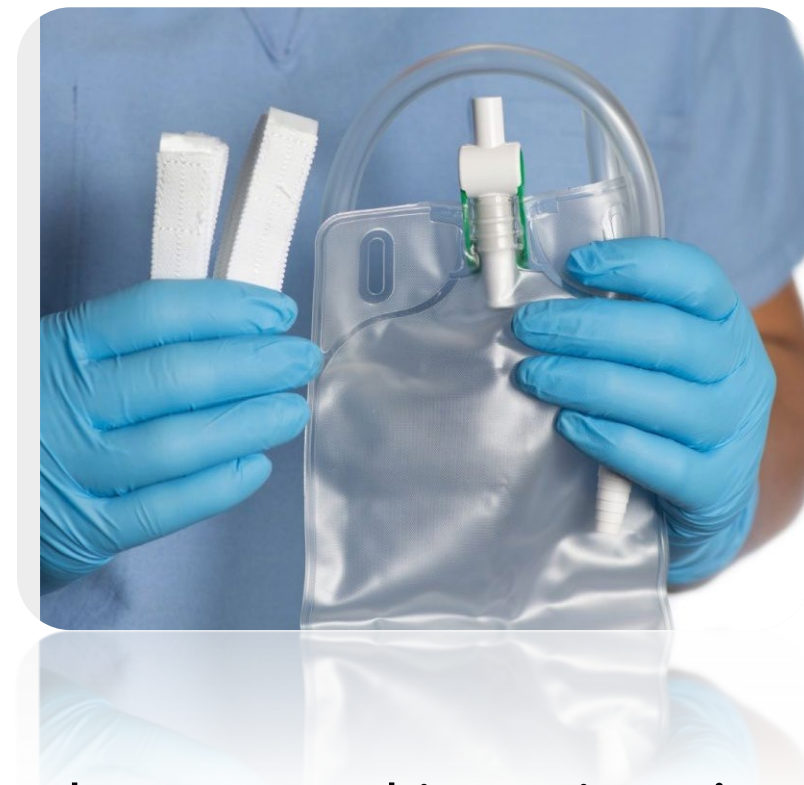
33.8% in university hospitals

47% in small- and medium-sized hospitals

The reason for indwelling catheterization is often not documented in patients' medical records, and this information is not effectively communicated among healthcare providers.

Because the reason is unknown, the decision to retain or remove urethral catheters is often

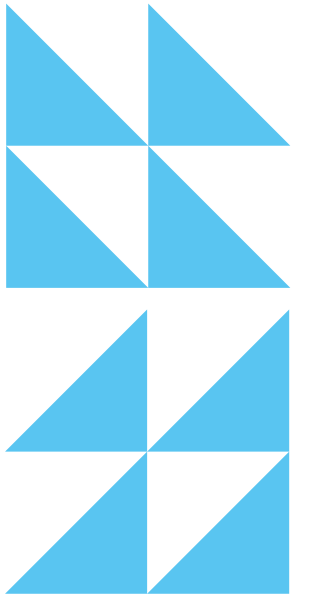
made without considering removal, resulting in no change in the UCR.



DISCUSSION

Changes in healthcare policy, such as the introduction of infection prevention and control payments, have increased the number of hospitals participating in existing surveillance activities.

As a result, in some of the hospitals in the study, participation in the new surveillance activities increased the workload of the IPC team, leading to fatigue among the limited IPC staff.



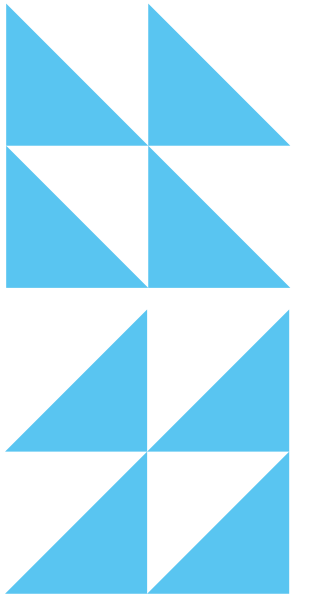
DISCUSSION

This study examined several factors that influence the incidence of CAUTI : including

- hand hygiene
- use of sterile drapes
- proper fixation of urethral catheters
- use of separate collection containers
- use of disposable lubricants
- skin disinfection, and assessment of the necessity of indwelling catheters



All hospitals observed hand hygiene practices before the intervention. However, there were increases in the use of sterile drapes, proper immobilization of urethral catheters, and use of separate collection containers after the intervention.

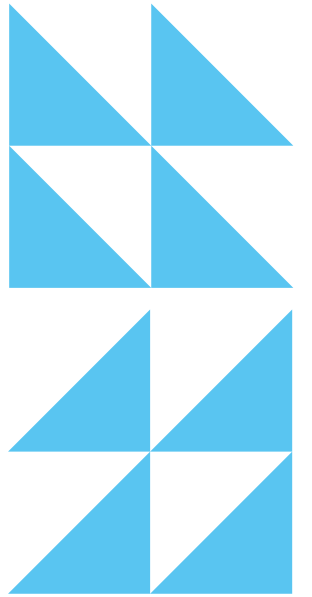


DISCUSSION

We found a reduction in the incidence of CAUTI in the initial stages of the intervention when active support and staffing were in place

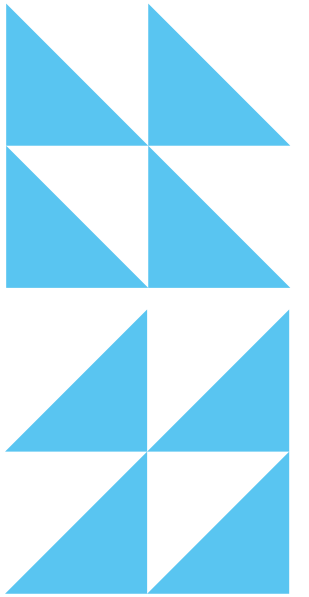
The incidence rate of CAUTI may be reduced through active interventions, including conducting of guidelines for the prevention of CAUTI

To achieve this, it is essential to have an adequate workforce to support the interventions



Limitations

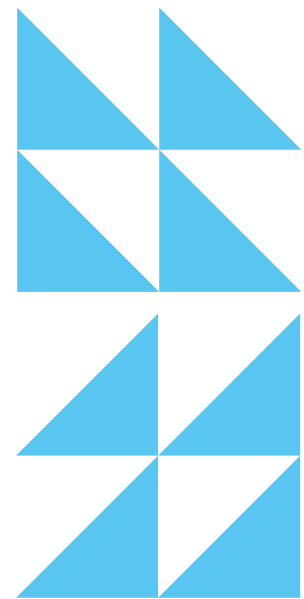
- difficulty with the number and complexity of items they had to enter during the computerized entry process
- some patients were transferred from outside departments or hospitals after unmonitored urethral catheterization
- included hospitals of different sizes and with different roles to ensure the diversity of the study subjects. This study included university, small- and medium-sized, long-term care, and burn hospitals. limitation in the smaller hospital (< 300 bed)



THANK YOU



General male ward





Scan full paper

