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Concise Communication

Prevalence survey on catheter-associated urinary tract infection (CAUTI) in public hospitals in Hong Kong 2018

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Abstract

We conducted a survey of 16,914 patients to determine the point prevalence of healthcare-associated catheter-associated urinary tract infection (HA-CAUTI) and urinary catheter care in public hospitals in Hong Kong. Overall HA-CAUTI prevalence was 0.27%. Compliance was generally good, except for documenting the date of planned removal and securing the catheter properly.

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Catheter-associated urinary tract infection (CAUTI) is one of the most common hospital-associated infections (HAIs). We conducted a prevalence survey of healthcare-associated CAUTI (HA-CAUTI) in public hospitals of the Hong Kong Hospital Authority. We aimed to understand the local situation of HA-CAUTI using a survey with 3 parts. In part 1, we aimed to determine the point prevalence of HA-CAUTI and its associated risk factors. In part 2, we aimed to understand the policy of urinary catheter care. In part 3, we aimed to assess the compliance to recommendation of urinary catheter care.

Method

This cross-sectional prevalence survey was conducted from June 4 to 15, 2018. From these dates, each hospital selected 1 day as their survey day. Public hospitals in Hong Kong, acute care or convalescent, were eligible. All in-patient wards, regardless of size, were included in the survey, except observation wards of the accident and emergency department, pediatric wards, psychiatric wards, mental and infirmary wards. All inpatients hospitalized in these wards at 08:30 A.M. on the survey day were included.

For this survey, we adopted the case definition of the surveillance system of the National Healthcare Safety Network (NHSN) of the Centers for Disease Control and Prevention (CDC)[1] with modification to include prevalent cases. Thus, we used the following case definition for this study: Patients who fulfilled the CDC/NHSN surveillance definition for CAUTI at the time of survey, including those who were receiving antimicrobial treatment for the current episode of CAUTI, were considered cases.

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The survey team in each hospital identified cases of HA-CAUTI by screening urine culture results on an electronic platform and reviewing medical records. Data collected included patient demographic information, admission date, symptoms of infection, information of urinary catheter, urine culture results, and antimicrobial use. External validation was conducted for 50% of the cases.

The policy of urinary catheter care was surveyed using a questionnaire. The survey team visited all wards under the scope of the study. The number of patients with a urinary catheter was recorded. Patients with a urinary catheter were selected by systematic sampling and were assessed regarding the compliance with urinary catheter care policies.

A pilot survey was conducted, and interrater reliability (IRR) was assessed. The point prevalence of HA-CAUTI was calculated using 2 denominators with 95% confidence intervals (CIs): (1) all patients and (2) patients with length of stay >2 days. Risk factors were assessed using univariate and multivariate logistic regression. All analyses were performed using R version 3.6.0 software (R Foundation for Statistical Computing, Vienna, Austria).

Results

Of 37 public hospitals in Hong Kong, 30 participated in the study (1 eye hospital, 3 psychiatric hospitals, and 3 infirmary hospitals were excluded). In total, 16,914 patients was surveyed and included in the analysis. Among them, 46 cases of HA-CAUTI were identified, placing the prevalence at 0.27% (95% CI, 0.20%–0.36%). Prevalence of HA-CAUTI for hospitals ranged from 0% to 2.59%. The number of patients with length of stay >2 days, and thus at risk for developing HAIs, was 13,583. The prevalence of HA-CAUTI among these patients was 0.34% (95% CI, 0.25%–0.45%). The prevalence of HA-CAUTI for hospitals ranged from 0% to 2.8%.

Patients in the neurosurgery unit and the intensive care unit or high-dependency unit (ICU/HDU) had a higher prevalence

Table 1. Prevalence and Odds Ratio of Associating Factors for Healthcare-Associated Catheter-associated Urinary Tract Infection (HA-CAUTI)

	Prevalence among patients with LOS > 2 days (N = 13,583)		Univariate Logistic Regression		Multivariate Logistic Regression	
Characteristic	n	Prevalence (95% CI)	OR (95% CI)	*P* Value	OR (95% CI)	*P* Value
Overall	46	0.34 (0.25–0.45)				
Male	7,033	0.31 (0.20–0.47)	Reference group			
Female	6,550	0.37 (0.23–0.54)	1.14 (0.64–2.03)	.661		
Age, y						
<40	917	0 (0–0.40)	NA	NA		
40–49	739	0.68 (0.22–1.57)	Reference group			
50–59	1,480	0.54 (0.23–1.06)	0.83 (0.27–2.54)	.745		
60–69	2,546	0.24 (0.09–0.51)	0.38 (0.12–1.25)	.111		
70–79	2,654	0.45 (0.23–0.79)	0.76 (0.27–2.15)	.599		
80–89	3,702	0.30 (0.15–0.53)	0.51 (0.18–1.47)	.211		
90+	1,545	0.26 (0.07–0.66)	0.45 (0.12–1.69)	.239		
Ward type						
Acute	8,816	0.34 (0.23–0.49)	Reference group			
Convalescent	3,929	0.36 (0.19–0.60)	1.31 (0.69–2.47)	.409		
Mixed	838	0.24 (0.03–0.86)	0.74 (0.18–3.10)	.681		
Specialty						
MED	7,422	0.23 (0.13–0.37)	Reference group		Reference group	
SUR	1,712	0.35 (0.13–0.76)	1.34 (0.53–3.40)	.537	1.70 (0.67–4.33)	.265
ORT	1,921	0.31 (0.11–0.68)	1.37 (0.54–3.49)	.504	1.16 (0.46–2.95)	.755
REH	790	0.38 (0.08–1.11)	1.95 (0.57–6.68)	.285	1.02 (0.30–3.51)	.978
O&G	399	0 (0–0.92)	NA	NA	NA	NA
ONC	309	0.65 (0.08–2.32)	2.76 (0.64–12.01)	.175	3.11 (0.71–13.60)	.131
NS	329	1.82 (0.67–3.93)	9.18 (3.60–23.43)	<.001	5.97 (2.30–15.51)	<.001
Hospice	311	0.64 (0.08–2.30)	3.22 (0.74–13.99)	.119	1.75 (0.40–7.65)	.460
ICU/HDU	182	1.65 (0.34–4.74)	7.32 (2.13–25.16)	.002	6.61 (1.91–22.92)	.003
OPH/ENT/Dental	96	0 (0–3.77)	NA	NA	NA	NA
CTS	112	0.89 (0.02–4.87)	3.92 (0.52–29.68)	.186	3.72 (0.49–28.39)	.205
Length of stay, d						
>2–7	6,452	0.08 (0.03–0.18)	Reference group		Reference group	
8–14	2,718	0.37 (0.18–0.68)	4.76 (1.63–13.94)	.004	4.62 (1.57–13.58)	.005
15–28	2,123	0.52 (0.26–0.93)	6.71 (2.33–19.34)	<.001	6.53 (2.25–18.93)	.001
29–365	2,182	0.92 (0.56–1.41)	11.93 (4.47–31.82)	<.001	10.45 (3.84–28.19)	<.001

Note. LOS, length of stay; OR, odds ratio; CI, confidence interval; NA, not applicable due to no cases; MED, medicine; SUR, surgery; ort, orthopedics and traumatology; REH, rehabilitation; O&G, obstetrics and gynecology; ONC, clinical oncology; NS, neurosurgery; ICU, intensive care unit; HDU, high dependency unit; OPH, ophthalmology; ENT, ear, nose, and throat; CTS, cardiothoracic surgery.

of HA-CAUTI. Compared to the medical specialty, the odds ratios (ORs) of these 2 specialties were 5.97 (95% CI, 2.30–15.51; $P < .001$) and 6.61 (95% CI, 1.91–22.92; $P = .003$), respectively (Table 1).

The prevalence of HA-CAUTI was also associated with length of hospital stay and increased with longer hospital stay. For patients staying >29 days, the prevalence of HA-CAUTI was 10 times greater than that of those staying for 7 days or less (OR, 10.45; 95% CI, 3.84–28.19; $P < .001$) (Table 1).

All 46 case patients had symptoms with fever, and 13 case patients (28.3%) were on long-term (ie, >30 days) urinary catheter. The most commonly identified organisms were *Escherichia coli* (34.6%), *Enterococcus* spp (21.2%), and *Pseudomonas aeruginosa* (11.5%).

Regarding recommendations for urinary catheter care, 124 responses from various clinical departments in the 30 hospitals were received. Nearly all hospitals had major components in place in all or some of the departments: standard operation procedures (100%), policy of indications for urinary catheter use (90%), policy of daily review of indication (93.3%), reminder system for catheter removal (96.7%), and standard of care for insertion and maintenance of urinary catheter (100%). However, 14 hospitals

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Table 2. Comparison of Catheter-Associated Urinary Tract Infection (CAUTI) Prevalence With Other Countries and Areas

Country	Year of Survey	Year of Publication	Setting	Sample Size	CAUTI Prevalence, %
Australia[2]	2015	2016	82 acute-care facilities	1,320	0.20
Australia[3]	2013	2014	3 public and 3 private hospitals	1,109	0.90
29 EU/EEA Member States and Croatia[4]	2011–2012	2013	1,149 acute-care hospitals	231,459	0.73
England[5]	2011	2012	98 NHS acute trusts and 5 independent-sector organizations	52,443	0.50
United States[6]	2011	2014	183 acute-care hospitals from 10 states	11,282	0.22
United Kingdom[7]	2006	2008	270 hospitals on adult wards	75,694	0.93

(46.7%) reported having no routine surveillance system for monitoring CAUTI.

We also assessed compliance with recommendations on catheter care. At the time of ward visits during the live runs of the survey, there were 16,949 patients overall. A urinary catheter had been placed in 2,517 patients (14.9%), of whom 709 (28.2%) were sampled for compliance assessment. Among these 709 catheter observations, 223 (31.5%) were of long-term catheters. The vast majority (96.3%) had the indication for insertion documented in the patient record. Moreover, compliance was higher for non–long-term catheters (98.5%) than for long-term catheters (91.1%). For non–long-term catheters, compliance with daily review of indication was 71.0%, but compliance with documenting the date of planned removal was 27.6%. Inspection of the catheter showed that compliance with proper securement was lowest among the assessment items (51.1%). Among the noncompliant observations, catheters in the majority of patients had had the securement loosened, and some had no securement at all. The overall IRR was 91%.

Discussion

This study was the third prevalence survey of infections in Hong Kong public hospitals since 2007 and 2010, but it is the first to document the prevalence of HA-CAUTI. Compared to other countries and areas, the local HA-CAUTI prevalence was relatively low (Table 2). The authors visited the 3 hospitals with highest HA-CAUTI rates, and an improvement plan was formulated.

The following risk factors were statistically significant: being in a neurosurgery specialty unit, being in an ICU/HDU, and longer length of stay. These findings were consistent with current literature.[8,9] Among HA-CAUTI patients, 28.3% had long-term urinary catheters. Among all patients with urinary catheters, 31.5% had long-term urinary catheters. We did not observe an overrepresentation of long-term urinary catheters among patients with HA-CAUTI.

As for recommendations for urinary catheter care, close to half of the hospitals did not have routine CAUTI surveillance, and 47.1% of wards had 2 or more reminder systems in place. The combined reminders approach has been shown to decrease rates of CAUTI, to decrease duration of catheter, to decrease inappropriate catheter use, and to reduce cost.[10]

Compliance with urinary catheter care recommendations was generally good, except for documentation of the date of planned removal and proper securement of the catheter. Improper securement might cause urethral tension and meatal erosion; in-and-out movement of the catheter could possibly introduce infection.

This study has some limitations. Due to resource constraints, detailed clinical data were only available for CAUTI cases and not for noncases. Only limited demographic variables were available for risk-factor analysis. In addition, with frequent transfer between acute-care and convalescent hospitals and between hospitals and residential institutions, CAUTIs acquired in another hospital or facility could not be captured.

In conclusion, it is worthwhile to promulgate measures that minimize the duration of catheterization, including the use of reminder system and documentation of date of planned removal at the time of insertion, setting up surveillance of CAUTI, and catheter use, especially in high-risk specialties. Securement of catheter needs to be reinforced, and compliance should be resurveyed regularly.

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