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Major Article

National survey of practices to prevent health care-associated infections in Thailand: The role of prevention bundles

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Background: We evaluated the practices used in Thai hospitals to prevent catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), and ventilator-associated pneumonia (VAP).

Methods: From January 1, 2014-November 30, 2014, we surveyed all Thai hospitals with an intensive care unit and at least 250 beds. The use of prevention practices for CAUTI, CLABSI, and VAP was assessed. High compliance (≥75%) with all components of the CLABSI and VAP prevention bundles were determined. CAUTI, CLABSI, and VAP infection rates before and after implementing infection control practices are reported. Multivariable regression was used to examine associations between infection prevention bundle compliance and infection rate changes.

Results: Out of 245 eligible hospitals, 212 (86.5%) responded. A total of 120 (56.6%) and 115 hospitals (54.2%) reported ≥75% compliance for all components of the CLABSI and VAP prevention bundles, respectively, and 91 hospitals (42.9%) reported using ≥ 4 recommended CAUTI-prevention practices. High compliance with all of the CLABSI and VAP bundle components was associated with significant infection rate reductions (CLABSI, 38.3%; $P < .001$; VAP, 32.0%; $P < .001$). Hospitals regularly using ≥ 4 CAUTI-prevention practices did not have greater reductions in CAUTI (0.02%; $P = .99$).

Conclusions: Compliance with practices to prevent hospital infections was suboptimal. Policies and interventions promoting bundled approaches may help reduce hospital infections for Thai hospitals.

In Southeast Asia, the risk of health care-associated infection (HAI) is higher than in developed countries with infection related to invasive medical devices remaining a major challenge.[1] Several factors are associated with a high incidence of hospital infection in Southeast Asian countries, including limited resources in most hospitals, lack of support for infection control from administration, inadequate nurse to patient ratios, limited spending on HAI prevention, as well as limited national policies to help prevent infection.[1-3]

The need to increase awareness of HAI prevention has been recognized among Thai health care professionals since 2007.[1] Commitment to the World Health Organization Patient Safety Campaign has led to several hospital initiatives to prevent hospital infections throughout the country.[4-8] Despite these efforts, there are potential gaps in translating the existing knowledge of implementing bundles of care for HAI prevention into clinical practice in a majority of Thai hospitals. In 2010, we conducted an initial national survey of practices to prevent HAI in hospitals across Thailand.[9] Although many infection-prevention practices for HAI were used infrequently, hospitals participation in an HAI collaborative network was associated with more frequent use of certain recommended HAI-prevention practices from the previous Thai national survey.[9] To understand the current practices used to prevent HAI and develop further insights into the potential benefits of bundled prevention approaches, we conducted a follow-up national survey. We were

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especially curious to examine the extent to which compliance with prevention bundles influence common infections.

METHODS

Survey instrument

From January 1, 2014-November 30, 2014, we surveyed all hospitals in Thailand that had an intensive care unit and at least 250 hospitals beds (N = 245). The list of included hospitals was obtained from the Thai Ministry of Public Health. The survey instrument was first developed by Krein, et al[10,11] and has undergone multiple recent revisions. The survey was translated into Thai by an experienced hospital epidemiologist (AA). The survey assessed general hospital, personnel, and infection control program characteristics, as well as the practices used by Thai hospitals to prevent common hospital infections, including catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), and ventilator-associated pneumonia (VAP).

The lead infection preventionist (IP) for each hospital was interviewed to determine various hospital characteristics, as well as the frequency of numerous infection-prevention practices being used. IPs were asked about how often their hospital used specific prevention practices (1 = never to 5 = always) for CAUTI, CLABSI, and VAP. Responses of 4 or 5 were coded as "regular use" and the dichotomized variables were used in all analyses. The level of compliance with bundled approaches for CLABSI and VAP prevention were also assessed. Hospitals were asked how often they complied with the given bundled practices (1 = 100% to 6 = no monitoring of compliance). Responses of 1 or 2 (75%-100%) were coded as frequent compliance for all analyses. The CLABSI bundle consisted of hand hygiene, maximum sterile barrier precautions, use of chlorhexidine gluconate for antisepsis of the insertion site, choosing optimal site for line insertion, and daily review of line necessity. The VAP bundle consisted of hand hygiene, semirecumbent positioning of the patient, avoidance of frequent ventilator circuit changes, use of antimicrobial mouth rinse, feeding content check, and cross-contamination prevention. Because a specific CAUTI bundle was not yet promulgated in Thailand, we examined the influence of regularly using at least 4 of 6 evidence-based CAUTI-prevention practices: portable bladder ultrasound, urinary catheter reminder/stop order or nurse-initiated urinary catheter discontinuation, condom catheters in men, aseptic technique during indwelling urethral catheter insertion and maintenance, intermittent catheterization, and maintaining a closed urinary catheter system. In addition to prevention practices, IPs were also asked about their specific hospital HAI infection rates. Data on hospital CAUTI, CLABSI, and VAP infection rates both 12 months before and 12 months after implementing infection control practices to prevent each infection type were collected based on the existing infection control data maintained at each hospital.

In-person interviews were administered by research nurses who used the survey instrument to interview each of the lead IPs. Three training sessions were held to instruct the 5 research nurses on the survey and data collection procedures. The survey instrument was pilot tested in 10 hospitals to ensure the validity, reliability, and acceptability of the survey results by 5 research nurses; 100% agreement in the responses captured was observed in the pilot test. This study was approved by the Institutional Review Board of the Faculty of Medicine, Thammasat University.

Statistical analysis

Descriptive statistics were calculated for all relevant survey questions. Multivariable logistic regression was used to determine significant associations between hospital characteristics and regular use of each infection-prevention practice. The hospital characteristics considered were type of ownership, number of acute care beds, affiliation with medical school, whether or not the hospital has hospitalists, involvement in a collaborative to reduce HAI, support for an infection control program from leadership, whether or not the hospital has a hospital epidemiologist, total full-time equivalent of all IPs, and whether the lead IP is certified in infection control. Additionally, whether or not the hospital has an infectious diseases specialist, environmental cleaning service, facilities maintenance department, or microbiology lab were also included if they were statistically significant in a bivariable model. One CAUTI practice (ie, portable bladder ultrasound) was excluded from the logistic regression analyses due to low use (<5% regular use).

Linear regression models were used to look at relative reductions in HAI rates. The primary exposure variables were regular use of 4 of 6 recommended CAUTI practices (for the CAUTI model), at least 75% compliance with practicing all components of the bundle for CLABSI (for the CLABSI model), and at least 75% compliance with practicing all components of the bundle for VAP (for the VAP model). In addition to the covariates mentioned above in the logistic regression analyses, the relative reduction models were additionally adjusted for whether or not the hospital has an established surveillance system for monitoring infection rates. All statistical analyses were performed using SAS version 9.4 (SAS Institute Inc, Cary, NC).

RESULTS

Of the 245 eligible hospitals, 212 (86.5%) responded to our survey. General and infection-specific characteristics of the hospitals are in Table 1. Nearly 97% of hospitals reported having hospitalists, 94.8% have a microbiology lab, and 92.5% have a lead IP who is certified in infection control. Approximately half of all hospitals were affiliated with a medical school (52.4%), have infectious disease specialists (50.9%), and are involved in a collaborative to reduce HAIs (49.5%). For CAUTI, more than 90% of responding hospitals have a system to monitor which patients have a urinary catheter placed (92.9%), routinely monitor duration/discontinuation of urinary catheters (90.6%), have an established surveillance system for monitoring CAUTI rates (96.7%), and report CAUTI rates to direct care providers (93.9%). Similarly, for CLABSI and VAP, the vast majority of hospitals have an established surveillance system for monitoring rates (91.5% for both) and report rates to direct care providers (87.7% and 90.1%, respectively).

The percentage of hospitals that regularly use key prevention practices for CAUTI, CLABSI, and VAP are listed in Figure 1. The most frequently used CAUTI prevention practices among Thai hospitals were using a closed urinary catheter system (90.1% regular use) and aseptic technique during indwelling urethral catheter insertion and maintenance (89.6%). For CLABSI, chlorhexidine gluconate for antisepsis of the insertion site (73.6%) and maximum sterile barrier precautions during catheter insertion (63.2%) were the most common prevention practices. For VAP, semirecumbent positioning (86.8%) and antimicrobial mouth rinse (78.3%) were most frequently used. A total of 120 (56.6%) hospitals reported ≥75% compliance rate for all components of the CLABSI prevention bundle and 115 hospitals (54.2%) reported ≥75% compliance rate for all components of the VAP prevention bundle. Although a specific CAUTI prevention bundle was not yet recommended, 91 hospitals (42.9%) reported using ≥ 4 CAUTI-prevention practices.

Significant associations between hospital characteristics and regular use of various HAI prevention practices use can be found in Table 2. Hospitals with strong leadership support for infection control were more likely to use semirecumbent positioning of the patient, antimicrobial mouth rinse, and oscillating/kinetic beds for