

Status of Hospital Infection Prevention Practices in Thailand in the Era of COVID-19: Results from a National Survey

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HIGHLIGHTS

- Resurvey of infection prevention practices in Thai hospitals during COVID-19
- Only 31% of Thai hospitals report excellent leadership support for infection control
- Half (48%) of surveyed practices significantly increased for CLABSI, CAUTI and VAP
- Use of many other practices remains suboptimal
- Infection prevention practices in Thai hospitals need more national strategic support

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Status of Hospital Infection Prevention Practices in Thailand in the Era of COVID-19:

Results from a National Survey

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ABSTRACT

Background. A 2014 study assessed infection prevention (IP) practices in Thai hospitals for catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), and ventilator-associated pneumonia (VAP). This study compares current IP practices to results obtained in 2014.

Methods. Between 1 February and 31 August 2021, we resurveyed Thai hospitals regarding practices to prevent CAUTI, CLABSI, and VAP. We also assessed COVID-19 impact and healthcare worker burnout and coping strategies. We distributed 100 surveys to a convenience sample of infection preventionists.

Results. Response rate: 100%. One-third (31%) of hospitals reported excellent leadership support for infection control (i.e., responses of “good” or “excellent” to one survey question). Some prevention practices increased between 2014 vs. 2021 (CAUTI: catheter reminder/stop-order/nurse-initiated discontinuation [50.0% vs. 70.0, $p<0.001$]; condom catheters [36.3% vs. 51.0%, $p=0.01$]; ultrasound bladder scanner [4.7% vs. 12.0%, $p=0.03$]; CLABSI: chlorhexidine gluconate insertion site antiseptics [73.6% vs. 85.0%, $p=0.03$]; maximum sterile barrier precautions [63.2% vs. 80.0%, $p=0.003$]; VAP: selective digestive tract decontamination [26.9%

vs. 40.0%, $p=0.02$]). Antimicrobial catheter use decreased since 2014 (10.4% vs. 3.0%, $p<0.001$). Many other practices remain suboptimal. COVID-19 challenges: staff shortages (71%), financial hardships (67%). Only 46% of infection preventionists felt safe working during COVID-19.

Conclusions. More national strategic support is needed for IP programs to prevent CAUTI, CLABSI, VAP and healthcare worker well-being in Thailand during the COVID-19 pandemic.

Word count: 220

KEYWORDS: catheter-associated urinary tract infection; central line-associated bloodstream infection; ventilator-associated pneumonia; hospital-acquired infection; Thailand; prevalence survey

INTRODUCTION

Preventing healthcare-associated infection (HAI) poses a challenge to many hospitals globally.^{1,2} The World Health Organization (WHO) and others have developed initiatives to promote patient safety and infection control, including guidelines from the WHO Global Patient Safety Action Plan that can be adopted and utilized by various countries.³ Although such guidelines are widely accepted, their implementation among hospitals is variable, dependent upon factors such as the recognition and prioritization of HAI prevention programs in a given country.⁴

Thailand committed to improving patient safety by joining the WHO Global Patient Safety Challenge in 2007 and implemented evidence-based practices to prevent HAI. Since 2010, we have conducted national surveys to evaluate practices used by hospitals in Thailand to prevent HAI, including catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), and ventilator-associated pneumonia (VAP).⁵⁻⁹ These studies highlighted the role of establishing a strong institutional safety culture, collaboratives, and prevention bundles to increase adherence to prevention practices. However, these surveys were conducted prior to the COVID-19 pandemic, which struck worldwide in early 2020. The pandemic put a spotlight on infection prevention and forced many hospitals to take extra precautions. Healthcare workers on the frontlines have confronted many additional challenges in the workplace during this pandemic and those are likely to continue. Challenges of providing care during the pandemic have likely contributed to fatigue, depression, burnout, anxiety, and stress (all negative components of well-being). COVID-19 will likely continue to present unique challenges to healthcare systems and further degrade healthcare worker well-being. We thus conducted a follow-up national survey to understand current HAI prevention practices in

Thailand, hospital challenges brought on by the COVID-19 pandemic, and the current state of well-being among infection preventionists in Thai hospitals.

METHODS

Survey Instrument

From 1 February 2021 to 31 August 2021, we surveyed 100 hospitals in Thailand with at least 200 beds and 10 intensive care unit beds. We required that hospitals perform prospective surveillance of CAUTI, CLABSI, and/or VAP as defined by the United States Centers for Disease Control and Prevention for HAI and criteria for specific types of infections in the acute care setting¹⁰ to be included in the sample. We selected a convenience sample of 20 hospitals within each of the five broad geographic regions (North, South, East, West, and Northeastern) to achieve national representation.

The survey instrument, first developed by Krein, Saint, and colleagues,¹¹⁻¹⁴ has undergone multiple recent revisions. The survey was translated from English into Thai by an experienced hospital epidemiologist. We asked the lead infection preventionist at each hospital to respond to an online survey distributed in Google Forms. Two of our team members (AA, NK) followed-up via phone for 24 hospitals in cases of response ambiguity and to ensure data completeness. The survey assessed general hospital, personnel, and infection control program characteristics and examined the regular use of general infection practices and specific practices to prevent common hospital infections, including CAUTI, CLABSI, and VAP. We asked infection preventionists about how often their hospital used specific prevention practices (1 = never to 5 = always) for CAUTI, CLABSI, and VAP. The survey assessed how hospitals have responded to COVID-19 and the institutional challenges that the pandemic has imposed. Finally, the survey also assessed

measures of infection preventionist well-being (e.g., burnout, apathy) and approaches for promoting well-being (e.g., self-care practices, spirituality).

Statistical Analysis

We generated and examined descriptive statistics (proportions for categorical data and mean \pm standard deviation [SD] for continuous variables) for all hospital characteristics and specific infection prevention practices. We dichotomized responses about the use of specific infection prevention practices across CAUTI, CLABSI, and VAP domains, with responses of 4 or 5 (i.e., “almost always use” or “always use”) defined as regular use (coded as 1) and 0 otherwise. We then compared the proportions of hospitals regularly using specific practices assessed in both the current survey and our last national survey of infection preventionists in Thai hospitals in 2014⁷. Tests for comparing proportions were two-tailed and p-values of <0.05 were considered statistically significant. All statistical analyses were conducted in Stata MP 14.1 (StataCorp. College Station, TX).

RESULTS

General and Infection-Specific Hospital Characteristics

A total of 100 hospitals were surveyed; the response rate was 100%. Table 1 lists select hospital characteristics. Responding hospitals had an average of 593 beds (range 210-2100) and over half were affiliated with a medical school (58%). One-third (31%) of hospitals reported good or excellent support from hospital leadership for infection prevention. Most hospitals (86%) indicated that they had an antimicrobial stewardship program and that hand hygiene is very to extremely important (85%). The mean reported hand hygiene compliance was 66%.

Table 1. Select Hospital Characteristics

Characteristics	% or
------------------------	-------------

	mean \pm SD
<hr/>	
Hospital geographic region	
North	20%
South	20%
East	20%
West	20%
Northeast	20%
Mean number of acute care hospital beds (including ICU beds)	592.7 \pm 384.6
Mean reported hand hygiene compliance rate	66.1% \pm 18.1
Affiliated with a medical school	58%
Hospital epidemiologist on staff	58%
Lead infection preventionist is certified in infection control	72%
Good/excellent support from leadership for infection prevention	31%
Antimicrobial stewardship program	86%
Hand hygiene is very/extremely important priority	85%
Established surveillance system for monitoring CAUTI	96%
Established surveillance system for monitoring CLABSI	91%
Established surveillance system for monitoring VAP	92%

Abbreviations - ICU: intensive care unit; CAUTI: catheter-associated urinary tract infection; CLABSI: central line-associated bloodstream infection; VAP: ventilator-associated pneumonia

CAUTI, CLABSI and VAP Prevention Practices

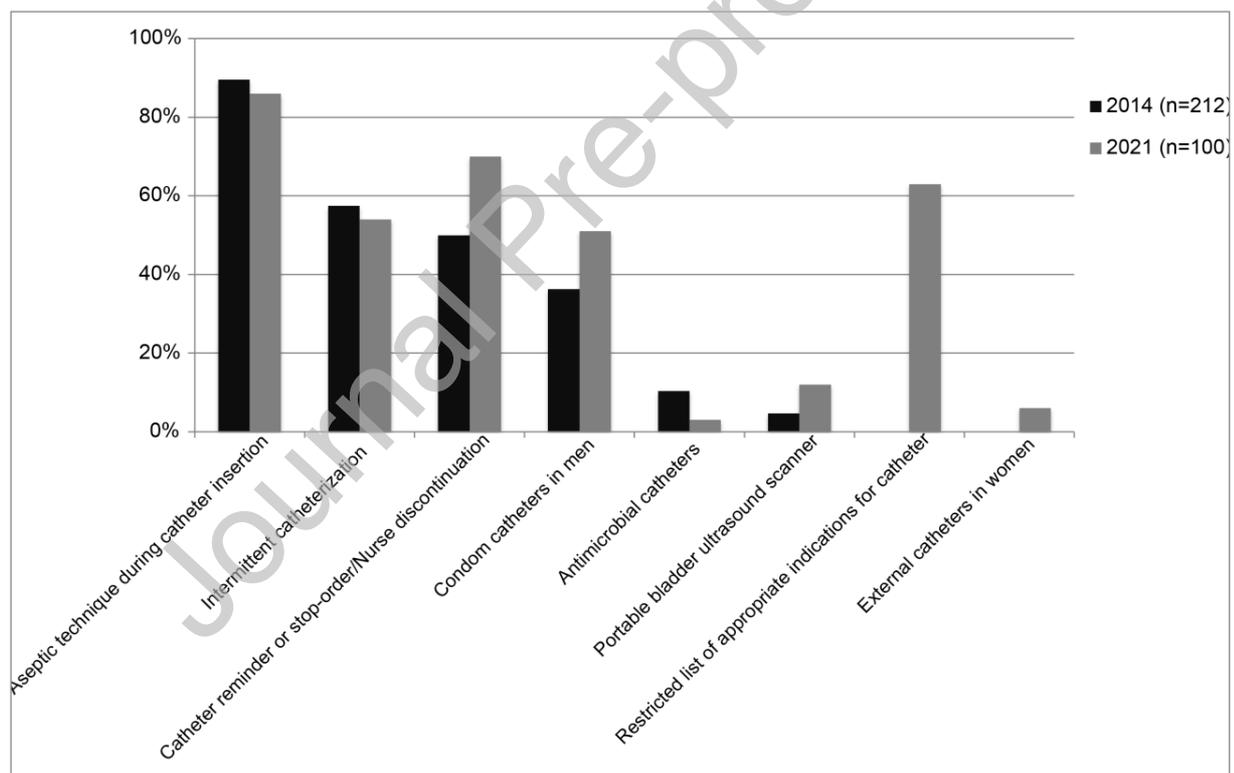
For CAUTI, 94% of hospitals had a system for monitoring which patients have urinary catheters placed, 89% routinely monitor duration and/or discontinuation of urinary catheters, and 81%

conduct daily rounds to assess the ongoing necessity of indwelling urinary catheters. For CLABSI, most hospitals (72%) have processes to determine appropriateness of central venous catheters prior to placement and strong perception of importance to hospital leadership to prevent catheter-related infections (77%). Two-thirds (68%) of hospitals used daily rounds to assess ongoing necessity of PICCs.

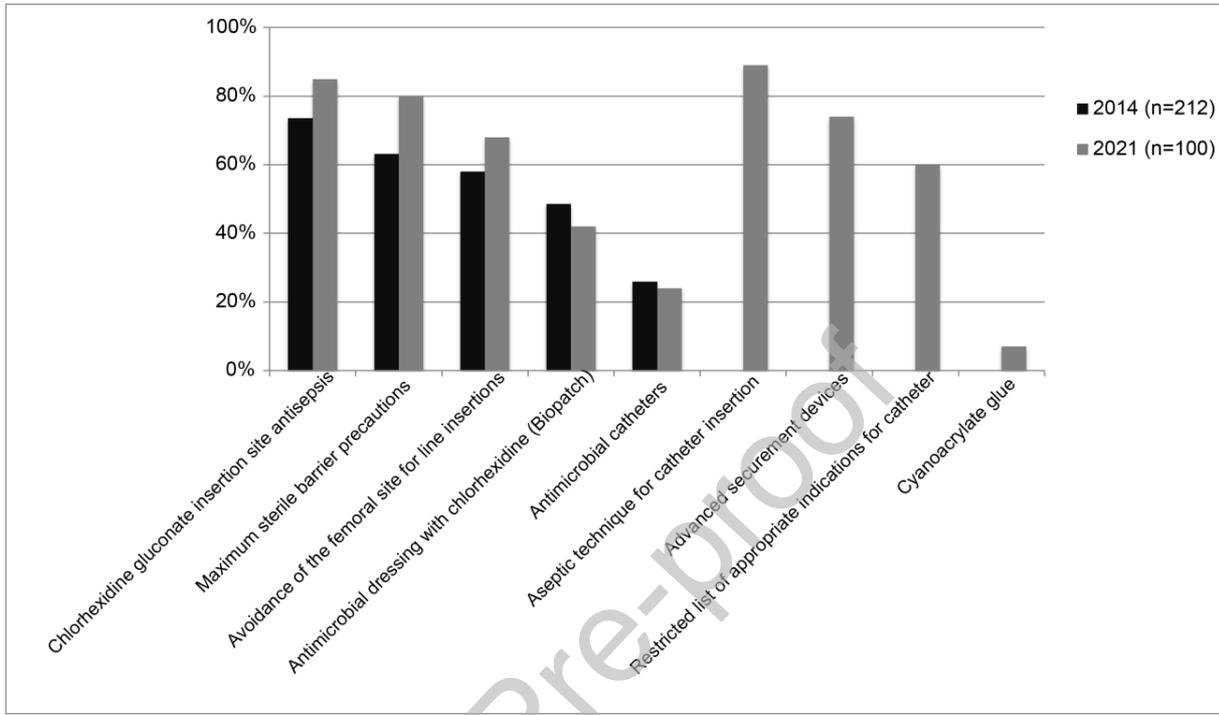
The regular use of CAUTI, CLABSI and VAP prevention practices in Thai hospitals in 2014 and 2021 is presented in Figures 1a-c.

Figure 1a. Regular Use of Catheter-Associated Urinary Tract Infection (CAUTI)

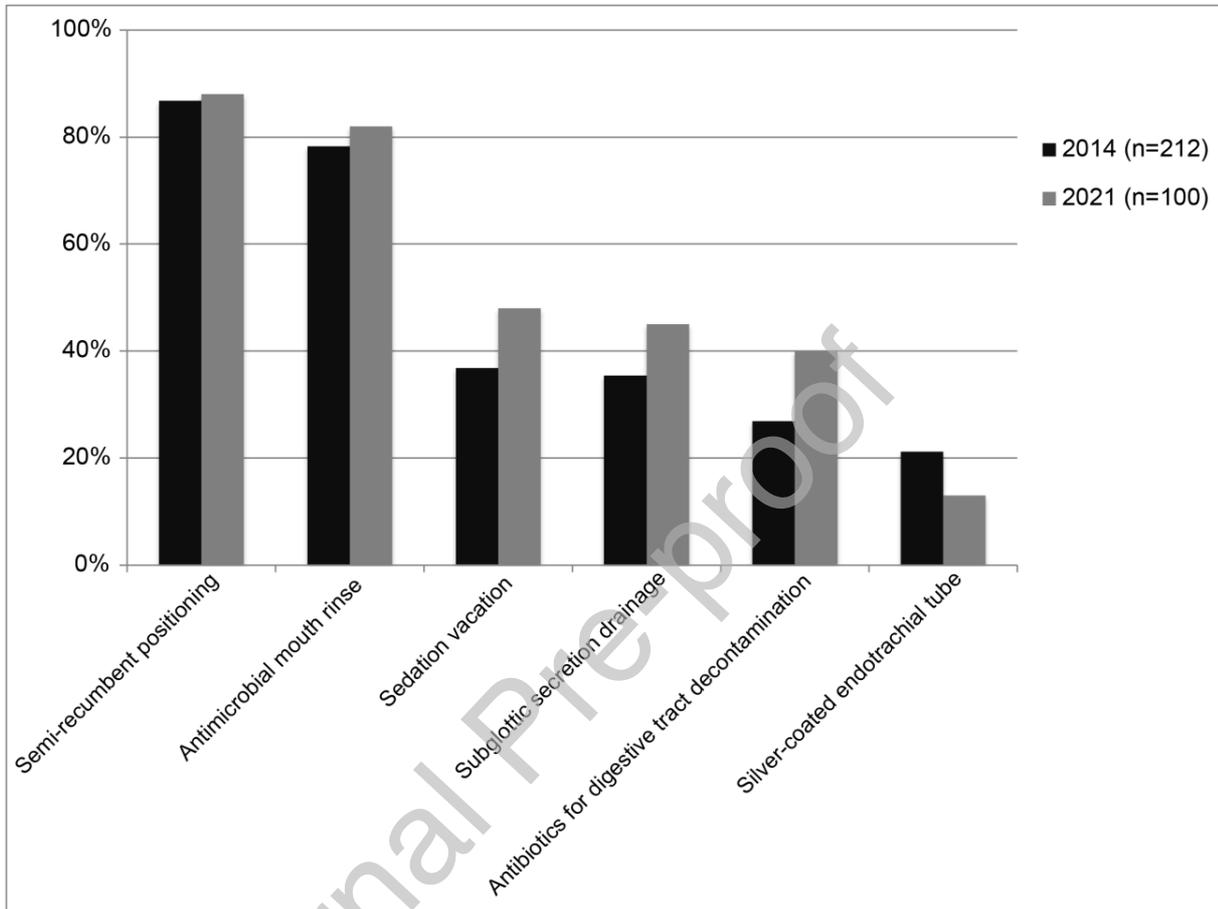
Prevention Practices



Note: Use of restricted list of appropriate indications for catheter placement and external catheters in women were not assessed in 2014.

Figure 1b. Regular Use of Central Line-Associated Bloodstream Infection (CLABSI)**Prevention Practices**

Note: Use of aseptic technique for catheter insertion, advanced securement devices, restricted list of appropriate indications for catheter placement, and cyanoacrylate glue were not assessed in 2014.

Figure 1c. Regular Use of Ventilator-Associated Pneumonia (VAP) VAP Prevention**Practices**

In 2021, for CAUTI, many hospitals regularly used aseptic insertion technique (86%), restricted list of appropriate indications for urinary catheter placement (63%), and urinary catheter reminders or stop orders (62%). For CLABSI, most hospitals regularly used aseptic insertion technique (89%), chlorhexidine gluconate site antisepsis (85%), and maximum sterile barrier precautions (80%). For VAP, most hospitals encouraged early mobilization of ventilated patients (87%) and used semi-recumbent positioning (88%) and antimicrobial mouth rinse (82%) practices.

We assessed the regular use of some of the infection prevention practices specific to CAUTI, CLABSI, and VAP in both the 2014⁷ and 2021 surveys. Since our 2014 survey⁷, we identified several notable changes in the use of specific infection prevention practices in Thailand. For CAUTI, we observed statistically significant increases in the use of bladder ultrasound scanners (5% to 12%, $P = 0.03$), urinary catheter reminders or stop-orders or nurse-initiated catheter discontinuation (50% to 70%, $P < .001$), and condom catheters for males (36% to 51%, $P = 0.01$). We further identified a significant decrease in the use of antimicrobial urinary catheters (10% to 3%, $P < 0.001$). For CLABSI, we saw significant increases in the use of maximum sterile barrier precautions during catheter insertion (63% to 80%, $P = 0.003$), and chlorhexidine gluconate for site insertion antiseptics (74% to 85%, $P = 0.03$). Finally, for VAP, we observed a significant increase in the use of topical and/or systemic antibiotics for selective digestive tract decontamination (27% to 40%, $P = 0.02$). The regular use of other CAUTI, CLABSI, and VAP practices assessed in both 2014 and 2021 remained relatively stable. We present the full comparisons of practices assessed in both the 2014 and 2021 surveys in a Supplemental Table.

Impact of COVID-19 Pandemic on Hospitals and Staff

COVID-19 related challenges on Thai hospitals and infection preventionists are shown in Tables 2a and 2b. Due to the global pandemic, nearly all hospitals (99%) reported using designated areas to care for COVID-19 patients separate from non-COVID patients, with 91% of hospitals opening new units to care for COVID-19 patients. In 91% of cases, hospitals reported shortages in personal protective equipment (PPE), including N95 masks, surgical masks, powered air-purifying respirators, gowns, gloves, and face shields. Almost three-quarters (71%) of hospitals indicated they had staff shortages due to absences or illness during the pandemic. Regarding vaccination rollout for hospital staff, 57% of respondents felt that their hospital's plans were very

or extremely effective. About 80% reported willingness to receive the vaccination even if their employer did not require it. Two-thirds (67%) of responding hospitals reported moderate to extreme institutional financial hardship due to the COVID-19 pandemic.

Table 2a. COVID-19 Response and Challenges Experienced in Thai Hospitals

Hospital response to COVID-19	%
Hospital has designated areas to care for COVID-19 patients that are separated from non-COVID patients	99%
Hospital has opened new units to care for COVID-19 patients	91%
Hospital has experienced staff shortages due to absences and/or illness during the COVID-19 pandemic	71%
Hospital pandemic response plan in addressing COVID-19 has been very/extremely effective	67%
Hospital has experienced moderate/extreme financial hardship resulting from the COVID-19 pandemic	67%
Hospital COVID-19 vaccination plan has been very/extremely successful in vaccinating staff	57%
Hospital has experienced an increase in loss of staff (e.g., resignations) in the midst of COVID-19	39%

Table 2b. COVID-19 Response and Challenges Experienced by Thai Infection

Preventionists

Personal response to COVID-19	%
Would (or already have) voluntarily receive COVID-19 vaccine, even if not	80%

required by employer

Moderately/very confident that a COVID-19 vaccine is safe and effective 50%

Agree/strongly agree with the statement: “I feel safe carrying out my work role during the COVID-19 pandemic.” 46%

Lead Infection Preventionist Well-Being

Approximately one-quarter of infection preventionists reported feeling burned out from work (29%) and becoming more uncaring towards people since taking their job as an infection preventionist (25%). A total of 79% of infection preventionists reported that individual self-care practices such as meditation, yoga, listening to music, exercising, and communing with nature were important. Two-thirds (67%) felt that religious and spiritual beliefs act as a source of comfort and strength during life’s ups and downs. Most infection preventionists (77%) felt that spiritual well-being was important for emotional well-being.

DISCUSSION

Successful implementation of recommended infection prevention practices relies on numerous factors including organizational structure and support, but ultimately requires hospitals to have the ability to prioritize such practices. The COVID-19 pandemic has placed numerous challenges on hospital systems globally,¹⁵⁻¹⁷ including throughout Thailand. Our current study aimed to follow-up prior surveys conducted among Thai hospitals⁵⁻⁷ to evaluate infection prevention practices while also determining the impact of the COVID-19 pandemic on infection prevention programs. Our findings highlight the added challenges faced by hospital systems and the need for continued focus on infection prevention among hospitals in Thailand.

Infection prevention programs have been promoted and prioritized in Thailand for over a decade. This focus, coupled with positive consequences of heightened and aggressive infection

prevention measures in response to the COVID-19 pandemic,¹⁸ has led to some improvements and sustained use of many of the recommended practices to prevent HAIs such as CAUTI, CLABSI, and VAP. Several practices had high rates of regular use, including use of urinary catheter reminders or stop orders for CAUTI prevention; chlorhexidine gluconate site antisepsis and maximum sterile barrier precautions for CLABSI; and subglottic secretion drainage and digestive tract antibiotic decontamination for VAP. Surveillance of common HAIs appears to also be universally adopted among hospitals, with high rates of surveillance for CAUTI, CLABSI, and VAP. While some improvements in the adoption and use of recommended infection prevention practices have occurred, there are still opportunities to increase the use of several practices that would require continued, if not greater, support from hospital administration for infection prevention programs.

The impact of the pandemic rippled through healthcare systems and placed immense burden on hospitals globally. In Thailand, specifically, most survey respondents noted shortages of PPE and staff. These shortages left a decreased workforce to manage mounting pressures to care for sick patients while less than half of respondents felt safe carrying out their roles. Additionally, our findings align with a recent survey of Thai physicians, nurses, and pharmacists¹⁹ suggesting that, while voluntary COVID vaccination was moderate to high, respondents expressed concerns over both effectiveness and safety. Thus, it's not surprising that our survey results demonstrate feelings of burnout or apathy. Furthermore, it should be noted that less than a third of respondents reported good or excellent support from hospital leadership for infection prevention. These findings highlight the impact of large-scale hospital challenges on staff well-being and how they may affect prioritization of infection prevention programs, reflecting recent findings on the impact of COVID-19 on healthcare worker well-being from hospitals across Asia.²⁰

One might reasonably hypothesize that healthcare worker burnout coupled with the unprecedented demands of the pandemic might adversely impact infection prevention efforts and common HAI rates. A previous study of US hospitals has shown that certain HAIs increased during the pandemic.²¹ Conversely, other work in Southeast Asian hospitals has shown that the pandemic has led to enhanced infection prevention efforts and stable HAI rates during the ongoing pandemic.¹⁸ Our findings suggest improvements in some HAI prevention processes in Thai hospitals, despite marked healthcare worker burnout and the impacts of COVID-19. Still, it is possible that the challenges faced by Thai hospitals and healthcare workers during the pandemic may have contributed to the slow improvements in certain infection prevention domains.

Based on our findings, several recommendations can be considered to prioritize infection prevention practices considering healthcare system strains. First, while no system is immune to the effects of a pandemic or other institutional shocks, there ideally should be safeguards in place to preserve infection prevention programs. Second, with respect to regular use of practices to prevent CAUTI, CLABSI, or VAP, hospitals should aim to improve upon practices currently used by less than half of hospitals (e.g., nurse-initiated urinary catheter discontinuation for CAUTI, sedation vacation for VAP). Third, hand hygiene is central to successful infection prevention and there are opportunities to improve hand hygiene compliance in Thai hospitals. Although the pandemic has likely heightened the awareness and practice of regular hand hygiene, increased vigilance must remain for hand hygiene throughout the pandemic and beyond. Finally, implementing national policies on HAI prevention in Thai hospitals may help increase the adoption and use of specific HAI prevention practices. Thailand is in the process of moving

towards HAI reporting in the next couple of years, which may also heighten awareness around HAI prevention.

Hospitals need to address staffing shortages and feelings of burnout to ensure that a healthy, functioning workforce can successfully carry out infection prevention practices. Several studies have highlighted the importance of identifying solutions to burnout through meaningful practices at both the personal and organizational levels.^{22,23} Prior studies have shown the benefits of self-care practices (such as mindfulness, yoga, and spirituality) on reducing healthcare worker burnout, stress, and anxiety.²⁴⁻³⁰ Our survey indicated that most infection preventionists find importance in both individual self-care practices and spirituality for promoting well-being. As such, organizational level changes which accommodate opportunities for healthcare workers to engage in self-care practices (even if briefly) throughout the course of work shifts may help to promote well-being, reduce burnout, and improve patient safety. One example would be using hand hygiene – which should occur many times a day for busy clinicians – as a moment of mindful practice.³¹ A pilot study using this approach reported positive findings.³² Hospitals should embrace an institutional culture of continual improvement to ensure that initiatives such as infection prevention programs do not suffer or deteriorate in the face of widespread hospital challenges.

Our study has several limitations. First, our investigation was limited to hospitals within Thailand and our findings may not be generalizable to other countries in the Southeast Asia region. Still, our findings highlight how COVID-19 has impacted HAI prevention and healthcare worker well-being in Thai hospitals, aligning with impacts in other Asian countries.²⁰ Second, our small sample size of 100 hospitals limited our ability to investigate associations between hospital characteristics and the use of various infection prevention practices. Additionally, the

100% response rate may indicate that these hospitals systematically differ from the hospitals we did not include in our convenience sample. Responding infection preventionists were from numerous hospitals, of various types (i.e., general, regional, military, university, and private), and from all parts of Thailand. Finally, although all 100 hospitals that participated in the 2021 survey also participated in 2014, we do not have the ability to link responses to observe longitudinal changes across specific hospitals. As such, the cross-sectional changes reported between 2014 and 2021 may simply reflect prevention practice patterns at different subsets of hospitals. However, as highlighted in the results above, some of the improvements in prevention practice use are substantial. These improvements likely reflect gradual changes over time prior to the pandemic, but it is possible that heightened vigilance stemming from COVID-19 has contributed to improvements in infection prevention.

In conclusion, we report our findings from a recent survey to assess infection prevention practices among hospitals in Thailand and evaluate the impact of the COVID-19 pandemic on such practices. We highlight that many hospitals faced staffing shortages and burnout or apathy as a result. Most importantly, while hospitals commonly practice certain infection prevention practices against HAIs at high rates – and these have improved slightly since our last national survey in 2014⁷ – there are still opportunities for improvement across these domains.

We have provided recommendations to address hospital-wide and worker-specific challenges that would result in improved use of infection prevention practices. To our knowledge, this is the first study to evaluate the impact of challenges placed on hospitals in Thailand during the COVID-19 pandemic with respect to infection prevention. Our findings highlight that now more than ever, especially in the face of an ongoing global pandemic, leadership in Thai hospitals

should prioritize and support improving and maintaining both infection prevention practices and healthcare worker well-being.

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Data availability. Data available upon reasonable request.

Patient Consent Statement. This study does not include factors necessitating patient consent. Survey respondents were anonymous hospital staff working as infection preventionists, hospital epidemiologists, or similar positions.

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