Original Research

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The Relationship Between Knowledge, Attitudes, and Practices Regarding Ventilator-Associated Pneumonia Prevention Among ICU Nurses at Khmer-Soviet Friendship Hospital, Cambodia

Dalic Chhoy[1], Chandara I[2]

National Pediatric Hospital, Phnom Penh, Cambodia[1]
Woo Jeong Cambodia Nursing College, Phnom Penh, Cambodia[2]

Corresponding Author:
Name: Dalic Chhoy
Address: National Pediatric Hospital, Phnom Penh, Cambodia
E-mail: dalicchhoy6@gmail.com

Article Info:
https://doi.org/10.70848/cnj.v3i2.113
pISSN 3063-9247
eISSN 3063-9255

Article History:
Received: March 31st, 2026
Revised: June 11th, 2026
Accepted: June 15th, 2026

Abstract

Introduction: Ventilator-associated pneumonia is a serious healthcare-associated infection that increases mortality, hospital stay, and healthcare costs. Nurses play an essential role in prevention; however, evidence on their knowledge, attitudes, and practices in Cambodian critical care settings remains limited. Objective: This study assessed knowledge, attitudes, and practices regarding ventilator-associated pneumonia prevention and examined their relationships among intensive care unit nurses at Khmer-Soviet Friendship Hospital, Phnom Penh, Cambodia. Methods: A cross-sectional study was conducted among nurses in three intensive care units. Data were collected using a 47-item self-administered questionnaire adapted from previously validated instruments. Of 80 eligible nurses, 73 participated, yielding a 91.3% response rate. Results: The mean knowledge score was 14.2 (*SD* = 2.4), indicating a moderate level. The mean attitude score was 15.2 (*SD* = 3.1), indicating a positive attitude, while the mean self-reported practice score was 31.6 (*SD* = 2.1), indicating a high level. Knowledge and practice were weakly correlated (r = .26, p = .02). Knowledge and attitude (r = .10, p = .37) and attitude and practice (r = .09, p = .44) were not significantly correlated. Demographic characteristics were not significantly associated with KAP scores. Conclusion: Nurses reported positive attitudes and high preventive practices, although knowledge remained moderate. Targeted education and professional training may strengthen knowledge and support evidence-based ventilator-associated pneumonia prevention in routine clinical practice. Findings should be interpreted cautiously because of the instrument's modest internal consistency.

Keywords:
Intensive Care Units, Nurses, Prevention, Ventilator-Associated Pneumonia

INTRODUCTION

Ventilator-associated pneumonia (VAP) is a serious lung infection that develops in patients who rely on mechanical ventilation (Centers for Disease Control and Prevention, 2024; Kohbodi et al., 2023). After 48 hours of mechanical ventilation, harmful microorganisms may gain access to the lower respiratory tract, causing VAP, a leading complication associated with serious illness and death, longer hospital stays, and increased healthcare costs (Li et al., 2024; Ochoa et al., 2025). The prevention of VAP requires multidisciplinary collaboration; however, nurses play a key role in preventing this complication through the correct implementation of evidence-based preventive measures (Alreshidi et al., 2024; Ismail et al., 2024). Evidence-based preventive measures, such as maintaining head-of-bed elevation, oral care with antiseptic solutions, hand hygiene, subglottic secretion management, and adherence to VAP prevention bundles, depend heavily on nurses' compliance and clinical practices (Mastrogianni et al., 2023; Mohammad et al., 2024). Previous studies on European nurses' knowledge of VAP prevention have suggested that inadequate knowledge of VAP guidelines among ICU nurses may contribute to inconsistencies in preventive practice and reduced adherence to evidence-based recommendations (Labeau et al., 2008).

Although many studies have investigated nurses' knowledge, attitudes, and practices regarding VAP prevention in some countries such as Saudi Arabia, Indonesia and European settings, evidence from Cambodia remains scarce. There are no prior peer-reviewed studies related to VAP prevention in Cambodian healthcare settings. Existing international findings may not be fully generalizable because healthcare systems are not the same in clinical environments, institutional resources, infection-control compliance, and staffing patterns. Therefore, this study aimed to assess the levels of knowledge, attitudes, and practices (KAP) and the relationships among these variables among nurses in the intensive care units (ICU) at the Khmer Soviet Friendship Hospital in Phnom Penh, Cambodia.

VAP is still a major problem, especially in low- and middle-income countries where resources are limited and training might influence the infection prevention and control (Albariqi et al., 2024). In critical care environments, preventive practices are often influenced not only by nurses' knowledge but also by contextual factors such as institutional support, workload, training opportunities, and access to evidence-based protocols. Similar challenges have also been reported in Cambodia, where evidence regarding infection prevention and control practices remains limited and gaps in implementation have been identified across healthcare settings (An & Yang, 2020). According to a study conducted in 2024 in Indonesia, it has also shown inconsistencies between nurses' level of knowledge, attitudes, and actual practices. This study reported that nurses often demonstrate average knowledge and attitudes but have good preventive practices. This suggests that factors beyond knowledge alone may influence clinical performance (Trifianingsih et al., 2024). Such variations highlight the importance of investigating these relationships within specific healthcare contexts, particularly in tertiary-care settings where critically ill patients require highly specialized care.

This study is adapted from the Knowledge, Attitude, and Practice (KAP) model, which proposes that knowledge and attitudes may influence health-related behaviors and clinical practices (Launiala, 2009; Rosenstock, 1974). However, the KAP framework should not be interpreted as a strictly linear or determined process because nurses' practices are often influenced by multiple contextual and organizational factors. In clinical settings, factors such as hospital protocols, supervision, workload, ICU culture, staffing adequacy, and resource availability may affect adherence to preventive practices (Stone et al., 2014). Previous evidence has suggested that greater knowledge may contribute to improved attitudes and preventive behaviors; however, the relationship among these variables may vary across healthcare settings (Wahyuni et al., 2025). Therefore, this study applies the KAP model as a conceptual framework while recognizing that clinical practice may also be shaped by contextual influences within the healthcare environment.

Given the limited baseline evidence on ICU nurses' knowledge, attitude, and practices (KAP) regarding VAP prevention in Cambodian tertiary healthcare settings, a significant research gap remains. Therefore, this study aimed to assess ICU nurses' KAP related to VAP prevention and explore the relationships among these variables at Khmer Soviet Friendship Hospital in Phnom Penh, Cambodia. The hypothesis of this study is that higher levels of knowledge and more positive attitudes would be positively associated with better preventive practices among nurses.

METHODS

1. Design

A hospital-based quantitative cross-sectional design was used to assess nurses' knowledge, attitudes, and practices regarding VAP prevention. Data were collected using a structured, self-administered online questionnaire distributed via Google Forms. The study was conducted at Khmer-Soviet Friendship Hospital (KSFH), Phnom Penh, Cambodia, from October to December 2025. Data collection was carried out over one month during November 2025.

2. Sample Size and Sampling Technique

The inclusion criteria used were all registered nurses who work in all ICU Departments at KSFH. The exclusion criteria were health care providers who were not registered nurses and nurses who were

unwilling to participate voluntarily in the study. During the period of study, there were a total of 80 ICU registered nurses, distributed across three specialized units: Pulmonary ICU (18 nurses), Surgical ICU (30 nurses), and Medical ICU (32 nurses). Total population sampling was used because the target population was small and accessible (Creswell, 2014), meaning every nurse was invited to take part. All 80 nurses were invited to participate, but only 73 nurses responded during the study period, yielding a response rate of 91.3%. While seven eligible nurses declined to participate, the remarkably high response rate may have reduced the potential for non-response bias. However, the characteristics of the non-respondents were not formally compared with those of the participating nurses. All participating nurses received study information and provided informed consent before completing the questionnaire.

3. Instruments

The study used a structured self-administered questionnaire which consisted of 47 questions divided into 4 sections. The questionnaire was adapted from instruments developed by Albariqi et al. (2024) and Getahun et al. (2022). The first part consisted of six questions regarding demographic characteristics of the respondents such as gender, age, educational level, position, and experience of working as an ICU nurse. The second part initially included 20 Yes/No/Don't know questions in order to assess the level of knowledge on VAP prevention. The third part of the questionnaire included four statements in form of five-points Likert scale ranging from strongly disagree, disagree, neutral, agree, and strongly agree. This part was used to test the level of attitudes of nurses towards VAP prevention. The last part of the questionnaire consisted of 17 Always/Sometimes/Never questions. This part included three dimensions such as: hand washing which consisted of five questions; suctioning from the endotracheal tube (ETT) / tracheotomy which consisted of seven questions and oral care consisted of five questions. This last part was used to test the level of practice by checking how frequently the ICU nurses follow the preventive practice towards VAP prevention.

To ensure the instrument was professionally and linguistically appropriate for the Cambodian context, a multi-step adaptation and validation process was conducted. First, the researcher translated the original English version of the Questionnaire into Khmer Language. The translation was reviewed by the research advisor for semantic equivalence. Then, the questionnaire was evaluated by three academic examiners, who assessed each item for clinical relevance and clarity within the local ICU settings. After this expert review, the adopted questions were conducted with a sample of 17 participants, including practicing ICU nurses, university lecturers, and nursing peers. Feedback from the pilot test regarding confusing terminology and survey flow was used to finalize the wording. While formal quantitative validation measures such as a Content Validity Index (CVI) assessment and independent back-translation were not conducted due to the exploratory nature of the study and the limited availability of prior context-specific validation studies, the instrument was adapted from previously published questionnaires and underwent translation, expert review, contextual adaptation, and pilot testing to enhance its suitability for the Cambodian ICU setting. Nevertheless, the absence of formal validation procedures should be considered a methodological limitation. Despite this limitation, the instrument was retained because it was adapted from previously validated questionnaires and ensured coverage of key knowledge, attitude, and practice domains relevant to VAP prevention in ICU settings.

Reliability analysis was conducted using Cronbach's alpha in SPSS version 27 separately for the knowledge, attitude, and practice sections. The results showed Cronbach's alpha coefficients of 0.511 for the knowledge section, 0.541 for the attitude section, and 0.573 for the practice section. These values suggest relatively low to moderate internal consistency and should be considered when interpreting the study findings. To further assess internal consistency, item-total statistics were examined for each domain. Within the knowledge section, four items (K5, K10, K18, and K19) demonstrated negative corrected item-total correlations, indicating potential issues with item clarity or interpretation; however, all 20 items were retained in the final knowledge scale to preserve the original structure and content coverage of the instrument. Further examination suggested that these items may have contained wording ambiguity, reverse phrasing, or context-dependent interpretations that could have reduced response consistency. The attitude and practice sections yielded Cronbach's alpha coefficients of 0.541 and 0.573 respectively. The relatively lower reliability coefficients in these sections may be attributed to several factors. The attitude section consisted of only four items, which may have limited internal consistency. In addition, the practice section measured multiple preventive behaviors, including hand hygiene, suctioning procedures, and oral care practices, which may represent distinct dimensions rather than a single homogeneous construct.

Despite the instrument undergoing translation, expert review, contextual adaptation, and pilot testing, the relatively modest reliability coefficients suggest that measurement limitations remain. Therefore, findings related to all KAP domains should be interpreted with caution, as measurement error may have led to underestimation of true KAP levels and attenuation of the observed association between variables, resulting in reduced precision of the study estimates. Future studies are recommended to further refine item wording, expand pilot testing, and conduct additional psychometric evaluation procedures to strengthen measurement reliability.

4. Data Collection Process

Data was collected after obtaining informed consent. The study used Google Forms questionnaires for collecting data from participants. The link of Google Form was sent directly to each participant, and all respondents were informed about the purpose of the study and how to answer the questionnaire in the first section of Google Form. Then, participants had time to finish the questionnaire at their own pace. After that, we expressed our gratitude at the end of questionnaires. The data was collected over a period of one month in November 2025.

5. Data Analysis

After data collection via Google Form, data was exported to Excel from Google Sheets. Data was cleaned, coded, and imported into SPSS version 27. Descriptive statistics were used to report participants' demographics using frequencies and percentages. For knowledge, attitude, and Practice (KAP) scores, the data was categorized as Poor level (<50%), Moderate level (50%–75%), and Good/Positive (>75%) based on (Albariqi et al., 2024; Getahun et al., 2022). Means and standard deviations were reported for each KAP domain. Prior to inferential analyses, assumptions relevant to statistical procedures were assessed. Normality was examined using the Shapiro-Wilk test and visual inspection of distributions. Due to extremely small subgroup sizes, categories with sparse frequencies were merged before analysis to improve analytical stability. Specifically, participants aged >40 years were combined with the 31–40 years category, and MSc educational level participant was merged with the BSN category. one-way ANOVA was used to compare mean KAP scores across subgroups such as age, sex, educational level, or experience. Although sex consisted of two categories and could alternatively be analyzed using an independent samples t-test, one-way ANOVA was retained because it produces mathematically equivalent results for two-group comparisons and allowed a consistent analytical framework across all demographic variables. Pearson's correlation was also used to assess associations among KAP domains. Statistical significance was set at $p < .05$.

6. Research Ethics

This study was approved by the National Ethics Committee for Health Research (NECHR), Ministry of Health, Cambodia (Approval No: 554, Date: October 14, 2025). Before data collection at the research location, the researcher had secured an official support letter from the hospital itself to give permission to conduct the study. Informed consent was obtained from all participating nurses by informing the study's purpose, their voluntary participation, and their right to withdraw at any time without any negative consequence. Data was collected through Google Forms, and confidentiality and data security were maintained by restricting access to the responses to the researcher only. No personally identifiable information was collected, and all responses were kept confidential and used only for research purposes. Results were reported anonymously to ensure that none of the participants is identified.

RESULTS

As shown in Table 1, there were a total of 73 nurses who participated in the study. Most respondents were female (56.2%) and the majority were aged 25–30 years (47.9%), followed by 31–40 years (39.7%). Most of the respondents held a diploma/associate degree (64.4%) and worked as junior nurses (56.2%). Regarding work experience, the largest proportion of participants had more than six years of ICU experience (42.5%), followed by 3–6 years (35.6%).

As shown in Table 2, the mean knowledge score was 14.2 ± 2.4, corresponding to 71% of the maximum possible score, indicating an overall moderate level of knowledge. Among all participants, 65.8% had moderate knowledge on VAP prevention while 32.9% of them demonstrated good knowledge and only 1.4% had poor knowledge. The mean attitude score was 15.2 ± 3.1, equivalent to 76% of the maximum possible score, indicating an overall positive attitude among participants. The mean practice score was 31.6 ± 2.1, overall equivalent to 93% of the maximum possible score, reflecting a high level of self-reported practice towards VAP prevention among participants. Nearly all respondents (98.6%) were categorized as having good practice.

Before conducting the inferential analysis, categories with very small subgroup sizes were merged to improve analytical stability. Specifically, respondents aged >40 years were combined with the 31–40 years group, and the MSc category was merged with the BSN group for ANOVA analysis. As shown in Table 3, one-way ANOVA demonstrated no statistically significant associations between demographic variables and knowledge, attitude, or practice scores (all $p > .05$).

As shown in Table 4, Pearson correlation analysis between KAP showed a significant weak positive relationship between knowledge and practice ($r = .26$, $p = .02$), which indicates that higher knowledge levels were associated with better VAP prevention practices. However, no statistically significant correlations were observed between knowledge and attitude ($r = .10$, $p = .37$) or between attitude and practice ($r = .09$, $p = .44$).

Table 1. Characteristics of Respondents (*N* = 73)

Variables	Category	Frequency (*n*)	Percentage (%)
Sex	Male	32	43.8
	Female	41	56.2
Age	< 25 years	7	9.6
	25–30 years	35	47.9
	31–40 years	29	39.7
	> 40 years	2	2.7
Education	Diploma/AND	47	64.4
	Bachelor (BSN)	25	34.2
	Master (MSc)	1	1.4
Position	Junior nurse	41	56.2
	Senior nurse	24	32.9
	Head nurse	8	11.0
Experience	< 3 years	16	21.9
	3–6 years	26	35.6
	> 6 years	31	42.5

Table 2. Overall levels of Knowledge, Attitudes, and Practices (*N* = 73)

Dimension	Mean ± *SD*	Level	Score Range	Frequency (*n*)	Percentage (%)
Knowledge	14.2 ± 2.4	Poor	0–9 (<50%)	1	1.4
		Moderate	10–15 (50–75%)	48	65.8
		Good	16–20 (>75%)	24	32.9
Attitude	15.2 ± 3.1	Negative	4–9 (<50%)	2	2.7
		Moderate	10–15 (50–75%)	33	45.2
		Positive	16–20 (>75%)	38	52.1
Practice	31.6 ± 2.1	Poor	0–17 (<50%)	–	–
		Moderate	18–26 (50–75%)	1	1.4
		Good	27–34 (>75%)	72	98.6

Note. Higher scores indicate better knowledge, more positive attitudes, and stronger adherence to VAP prevention practices.

Table 3. One-Way ANOVA Analysis Between Demographic Variables and KAP Scores (*N* = 73)

Variables	Knowledge (*p*)	Attitude (*p*)	Practice (*p*)
Sex	.14	.93	.51
Age	.47	.41	.47
Education	.26	.85	.89
Position	.60	.93	.60
Experience	.21	.42	.47

Note. All *p*-values were generated using one-way ANOVA. Statistical significance was set at $p < .05$.

Table 4. Correlation Among Knowledge, Attitude, and Practice (*N* = 73)

Variables	Knowledge	Attitude	Practice
Knowledge	1	–	–
Attitude	.10	1	–
Practice	.26*	.09	1

Note. Values are Pearson correlation coefficients. *$p < .05$.

DISCUSSION

Overall, the findings of this study showed that there were moderate knowledge, generally positive attitudes, and high self-reported levels of practice regarding VAP prevention among ICU nurses. Overall, ICU nurses demonstrated moderate knowledge, generally positive attitudes, and high levels of self-reported VAP prevention practice. Knowledge was weakly but significantly correlated with practice, whereas knowledge was not significantly correlated with attitude and attitude was not significantly correlated with practice.

The results in this study also showed that most nurses (65.8%) had moderate knowledge. This aligns with findings from previous studies reporting moderate or inadequate knowledge regarding VAP prevention among ICU nurses (Alreshidi et al., 2024;

El-Kass et al., 2024). Similar findings have been reported in Southeast Asian healthcare settings. In Indonesia, Trifianingsih et al. (2024) found that ICU nurses generally demonstrated moderate levels of knowledge regarding VAP prevention (Trifianingsih et al., 2024). Moreover, a study conducted among critical care nurses in Malaysia found considerable knowledge gaps regarding VAP prevention, despite the availability of training opportunities, suggesting that challenges in translating evidence-based recommendations into clinical practice may be common across the region (Selamat et al., 2021). Furthermore, a more recent Malaysian study reported that 66.8% of critical care nurses demonstrated poor knowledge of VAP prevention, highlighting the continued need for educational interventions in Southeast Asian intensive care settings (Tan et al., 2025).

Previous research has shown that nurses in critical care units often face differences in how much they are exposed to evidence-based guidelines for preventing ventilator-associated pneumonia, as well as in the professional development opportunities available to them (Ahmad Al-Nawaja'a et al., 2024; Labeau et al., 2008; Pokhrel et al., 2023). Even though nurses play a critical role in infection control, knowledge gaps remain, suggesting the need for continued education and training. VAP is associated with significant morbidity and mortality (Li et al., 2024; Ochoa et al., 2025), and improving nurses' knowledge is essential to support evidence-based practice and optimize patient outcomes. These findings suggest the need for continuing education and regular competency-based training programs, which have been shown to improve VAP-related knowledge and preventive practice (Mohammed et al., 2025).

On the other hand, respondents demonstrated a generally positive attitude, with 52.1% of them classified at a positive level, although a substantial proportion showed moderate attitudes. This partially aligns with the assumptions of the KAP model, which suggests that knowledge may influence attitudes (Launiala, 2009; Rosenstock, 1974). However, moderate attitude levels should be interpreted cautiously and do not necessarily indicate poor understanding regarding VAP prevention. Instead, they may reflect variations in perceptions, individual beliefs, workplace experiences, or limitations in attitude measurement instruments. Since attitudes can be influenced by multiple contextual factors, future studies may benefit from incorporating qualitative approaches to explore nurses' perceptions and beliefs in greater depth.

Regarding practice, the study found that self-reported practice levels were overwhelmingly high with nearly all respondents classified as having good practice (98.6%). This pattern is consistent with studies showing that nurses may report good preventive practices despite moderate knowledge levels (Albariqi et al., 2024; Trifianingsih et al., 2024). Similar patterns have also been observed in Malaysia, where critical care nurses reported relatively high levels of VAP preventive practices despite substantial knowledge deficits. Tan et al. (2025) found a significant association between knowledge and self-reported practice, although knowledge contributed only modestly to practice performance, suggesting that institutional factors and workplace systems may also influence adherence to VAP prevention measures (Tan et al., 2025). However, this finding should be interpreted cautiously because practice was assessed using self-reported responses rather than direct observation. Therefore, the high scores may not necessarily represent actual clinical adherence and may be influenced by social desirability or reporting bias. Previous literature has suggested that institutional protocols, nursing care bundles, routine supervision, and workplace systems may contribute to consistent VAP preventive behaviors independently of individual knowledge levels (Jassim, 2024; Rehmani et al., 2024; Villagracia et al., 2025). However, these factors were not specifically examined in the present study and therefore should be interpreted as possible explanations rather than definitive conclusions.

In terms of the relationships among variables, the study identified a weak but significant positive correlation between knowledge and practice ($r = .26$, $p < .05$). This supports the hypothesis of the study reporting that knowledge was associated with better preventive practice (Shrestha et al., 2025; Wahyuni et al., 2025). However, the strength of the association was small, suggesting that knowledge alone may explain only a limited proportion of clinical behavior. Previous studies have highlighted the influence of organizational factors such as institutional support, guideline accessibility, supervision, and barriers to implementation (Rehmani et al., 2024; Villagracia et al., 2025).

Regarding knowledge and attitude, the findings showed a weak positive relationship although it was not statistically significant ($r = .10$, $p = .37$). The KAP framework suggests that knowledge may contribute to shaping attitudes (Launiala, 2009; Rosenstock, 1974). Nevertheless, the weak association observed in this study suggests that attitudes may be influenced by factors beyond knowledge alone. Individual experiences, workplace environments, and contextual influences may contribute to nurses' attitudes toward VAP prevention. Nevertheless, these factors were not specifically examined in the present study and therefore should be considered as possible explanations rather than definitive conclusions.

Regarding attitude and practice, a very weak positive relationship was observed although it was not statistically significant ($r = .09$, $p = .44$). This finding does not necessarily indicate that attitudes are unimportant in clinical settings; rather, it may reflect limited sensitivity of the instrument, insufficient sample size, or the influence of unmeasured factors.

This study contributes to the limited literature on VAP prevention in Cambodia and adds to emerging evidence from other Southeast Asian countries, including Indonesia and Malaysia, regarding nurses' knowledge, attitudes, and practices

toward VAP prevention and the limited strength of the relationships among these variables. The findings of this study highlight the importance of strengthening knowledge through targeted training programs while maintaining and reinforcing existing good practices.

Implications for Practice and Future Research

This study has several implications for clinical practice, policy, and some recommendations for future research.

For clinical practice, the moderate level of knowledge among ICU nurses regarding VAP prevention suggests a need to strengthen continuing education programs, competency-based training, and regular refresher sessions related to evidence-based VAP prevention strategies. Despite high self-reported practice levels, supportive organizational environments remain essential to ensure consistency between reported and actual behaviors and enhance the quality of ICU nursing care.

For policy, hospital administrators may consider strengthening institutional infection prevention and control systems through standardized VAP prevention protocols and ongoing staff development programs. In Cambodia where healthcare resources are limited, ensuring access to evidence-based training and supportive clinical infrastructures is important to improving patient safety and reducing VAP-related complications.

For future research, larger sample sizes and multi-center studies are recommended to improve generalizability. Observational methods should be used to better evaluate actual clinical practices and minimize self-reporting bias. Further refinement of the instruments is recommended to strengthen measurement reliability. In addition, qualitative or mixed-methods studies may help explore nurses' experiences, barriers, and perceptions of VAP prevention in greater depth.

Limitations

This study has several limitations that should be acknowledged. First, the use of total population sampling from a single hospital may limit the generalizability of the findings. Second, the cross-sectional design prevents causal inference. Third, the study was conducted in a single tertiary hospital in Cambodia, which may limit the generalizability of our findings to other healthcare settings. Differences in training systems, staffing patterns, or institutional protocols across hospitals may lead to different KAP outcomes. Fourth, the questionnaire measured practice based on perceived behavior rather than direct observation. This may have introduced social desirability and recall bias. Some respondents may have overestimated their adherence to preventive measures, leading to inflated practice scores. The very high practice scores and limited variability may also have produced a ceiling effect, reducing the ability to distinguish differences among participants and potentially weakening the observed correlations. Lastly, the questionnaire demonstrated relatively low internal consistency reliability, with Cronbach's alpha values below the commonly accepted threshold of 0.70 in some domains. Therefore, the findings should be interpreted with caution. Despite these limitations, the study offers important baseline evidence on nurses' KAP regarding VAP prevention among ICU nurses and serves as a foundation for future research.

CONCLUSION

The purpose of this study was to assess the levels of knowledge, attitudes, and practices (KAP) and the relationships among these variables among intensive care unit nurses. The findings revealed that nurses had moderate knowledge, generally positive attitudes, and a high level of practice. A weak but statistically significant positive relationship between knowledge and practice was found, while no statistically significant relationships were found between attitude and practice or between attitude and knowledge. These findings suggest that knowledge may be associated with preventive practice; however, the observed relationship was weak and should be interpreted cautiously considering the cross-sectional design and measurement limitations of the study. These results emphasize the importance of continuous education to strengthen evidence-based care. In the Cambodian context, these findings provide preliminary baseline evidence that may inform targeted educational programs, refinement of VAP prevention protocols, and further evaluation of infection-prevention practices in intensive care settings.

Author Contributions

Conceptualization: Dalic Chhoy, Chandara I; Methodology: Dalic Chhoy, Chandara I; Data Collection: Dalic Chhoy; Analysis: Dalic Chhoy; Writing–Original Draft: Dalic Chhoy; Writing–Review & Editing: Dalic Chhoy, Chandara I.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors declares no conflicts of interest.

Acknowledgments

We would like to express our sincere gratitude to the Khmer–Soviet Friendship Hospital for granting permission to conduct this study. We are also deeply

grateful to the nursing staff of the Intensive Care Units, including the Pulmonary ICU, Surgical ICU, and Medical ICU, for their voluntary participation and valuable time. Our appreciation is extended to the research advisor and the University of Health Sciences for their continuous guidance, administrative support, and valuable input throughout the data collection and data analysis processes. Finally, we acknowledge the approval provided by the National Ethics Committee for Health Research (NECHR), Ministry of Health, Cambodia.

Funding

The research did not received no external funding.

Declaration of Use of AI in Scientific Writing

The authors used ChatGPT solely to assist with language editing and grammar checking. The authors reviewed and edited the generated output and take full responsibility for the final content of the manuscript.

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