

# Exploring the Relationship between Knowledge and Attitudes, Adherence and Confidence on Hand Hygiene Practices Among Thai Nursing Students

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## Abstract

**Background:** Hand hygiene plays a crucial role in infection control in healthcare settings, but there is a concerning gap in compliance rates among healthcare workers globally. Nursing students, who will form a substantial part of the future healthcare workforce, are key to effective hand hygiene practices. A significant educational gap in hand hygiene exists globally, especially in Asia, including Thailand. Research on nursing students' knowledge, attitude, adherence to, and confidence in hand hygiene is still limited, despite their frequent non-compliance with standard protocols. Therefore, this study aimed to examine the correlations and associated factors between knowledge, attitudes, adherence to, and confidence in hand hygiene practices among first-year nursing students at a Thai nursing college.

**Methods:** A cross-sectional study was conducted with all 116 first-year nursing students from Boromarajonani College of Nursing, Thailand. Data were collected through a self-administered questionnaire and analyzed using Pearson's correlation and multiple logistic regression analysis.

**Results:** The results show that only 46.6% of students demonstrated good knowledge of hand hygiene, but a higher percentage showed positive attitudes (51.7%) and adherence (55.2%). A majority (76.7%) had good confidence in their hand hygiene practices. Positive correlations were observed between knowledge and attitude, attitude and adherence, and adherence and confidence. Male students generally had better knowledge, while those with lower GPAs tended to have higher confidence in hand hygiene. The findings of this study are in line with previous studies, indicating that knowledge does not always lead to positive attitudes or adherence to hand hygiene. Also, confidence is necessary for effective hand hygiene practices.

**Conclusions:** This study highlights the factors related to hand hygiene practices among Thai nursing students and emphasizes the need for comprehensive, culturally sensitive educational strategies. Future research should consider various contextual factors, such as gender differences and academic performance, to enhance hand hygiene practices among nursing students.

**Keywords:** Hand hygiene, healthcare-associated infections, KAP, nursing students, Thailand

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## Introduction

Hand hygiene is a critical element in controlling infections in healthcare environments. Nonetheless, it remains a significant issue worldwide due to alarmingly low compliance rates among healthcare workers, estimated at around 40%.<sup>1</sup> The importance of effective hand hygiene is underscored by its significant role in reducing healthcare-associated infections (HAIs), which not only benefits patients and healthcare workers but also alleviates financial pressures.<sup>2-4</sup> Nurses, who comprise the largest segment of the healthcare workforce and are considered the backbone of the system due to their extensive interactions with patients, play a vital role in preventing the transmission of HAIs. Their commitment to and compliance with hand washing protocols are essential in preventing the spread of infections.<sup>5</sup> Nursing students, as future healthcare professionals, are one of the crucial keys to overcoming the challenges in HAIs control. Their commitment to hand hygiene is critical in minimizing infection transmission.<sup>6,7</sup> The effectiveness of hand hygiene practices is significantly influenced by the confidence in performing these tasks. Nursing students with confidence in their hand hygiene abilities are more likely to follow these protocols and actively promote these practices among their colleagues and patients.<sup>7</sup>

However, an obvious gap exists in hand hygiene education across various healthcare disciplines globally. A systematic review revealed that the hand hygiene training provided to healthcare students, covering both theory and practice, is inadequate. While there have been improvements in some educational programs, the variability in research methodologies and the lack of comprehensive approaches pose challenges in pinpointing the most effective teaching methods.<sup>8,9</sup> Furthermore, it is critical to strengthen the focus on both adherence to and confidence in hand hygiene practices among nursing students. This involves enhancing individual motivation, deepening knowledge levels, fostering a commitment to infection control, and taking inspiration from the practices of peers.<sup>10,11</sup> As a result, hand hygiene education in nursing education may promote hand hygiene compliance and confidence, aligning with the wider public health goals of disease prevention and health promotion.<sup>1</sup>

Despite the failure to meet the standard protocols of hand hygiene practices among nursing students in Asia, including Thailand, there is still a research gap in understanding their knowledge, adherence, and confidence in these practices.<sup>5</sup> Therefore, this study focuses on examining the correlations and associated factors between knowledge, attitudes, adherence to, and confidence in hand hygiene practices among first-year nursing students at a leading Thai nursing college. The findings will be helpful in formulating effective educational strategies to enhance adherence and compliance with hand hygiene practices among the future backbone of the healthcare system.

## Materials and Methods

### *Study Design, Setting, and Population*

A cross-sectional survey was conducted at Boromarajonani College of Nursing, Thailand, in February 2023 among all 116 first-year nursing students of Thai nationality who had access to information technology (IT) devices such as smartphones, tablets, netbooks, laptop computers, and/or desktop computer. Students were explained about the purpose of the study and signed a consent form to participate in the study. These students are a suitable representative of Thailand's nursing undergraduates due to similar course structures nationwide.

### *Study Instrument and Data Collection*

All participants completed a self-administered questionnaire, modified from the World Health Organization's (WHO) 2009 hand hygiene guidelines<sup>12,13</sup> through Google Forms, which took approximately 15 to 20 minutes. The questionnaire was validated by five public health experts and tested for reliability with a Cronbach's Alpha value of 0.86 in a pilot study involving 30 first-year nursing students from a nursing college in a different province. The questionnaire included five sections on general characteristics, and assessed knowledge, attitude, adherence to, and confidence in hand hygiene practices.

The knowledge section comprised of 40 questions, each scoring 1 for a correct answer and 0 for an incorrect answer, leading to a total possible score between 0 and 40. The attitude towards hand hygiene

practices was evaluated with 16 questions, adherence to hand hygiene practices with three questions, and confidence in hand hygiene practices with one question. These sections utilized a 5-point Likert scale for responses, ranging from “1 for strongly disagree” to “5 for strongly agree,” where higher scores indicated stronger agreement or confidence. The scores in knowledge, attitude, adherence to, and confidence in hand hygiene practices were categorized as either “good” or “poor” based on the mean score as the cut-off point. Scores above the mean were categorized as “good,” while scores equal to or below the mean were considered “poor.”

### Statistical Analysis

Data analysis was conducted using the SPSS software (version 28, Chicago, IL, USA). We utilized descriptive statistics, presenting the results as frequencies and percentages. Pearson’s correlation analysis was applied to determine the correlations between knowledge, attitudes, adherence to, and confidence in hand hygiene practices, with a statistical significance of a  $p$ -value < 0.05. Additionally, multiple logistic regression was used to explore the associations between students’ general characteristics and their knowledge, attitudes, adherence to, and confidence in hand hygiene practices. The association was reported with adjusted odds ratios (AOR), 95% confidence intervals (CIs), and a statistical significance of a  $p$ -value < 0.05.

### Ethical Consideration

Ethical approvals were granted from the Ethics Committees Board of Chulalongkorn University, Thailand (COA No. 064/66) and Boromarajonani College of Nursing Phra Phutthabat, Saraburi Province, Thailand (COA No. BCNPB 001/2566).

## Results and Discussion

All 116 first-year students from Boromarajonani College of Nursing Phra Phutthabat, Thailand, participated in the study, giving a 100% response rate. The demographic characteristics showed that the average age of participants was 19 years, ranging from 18 to 21 years. As shown in Table 1, over half of the students (55.2%) had a grade point average (GPA) above 2.70, and a significant majority (91.4%) were female. In addition, 76.7% of the participants had

no previous experience working in healthcare, and 52.6% had never received any hand hygiene training. Markedly, over half of the students felt that their nursing college did not strictly enforce hand hygiene regulations and perceived inadequate hand hygiene service stations.

Table 1 indicates that only 46.6% of the students had good hand hygiene knowledge. However, a higher percentage showed positive attitudes (51.7%) and adherence (55.2%) towards hand hygiene practices. Significantly, a large majority (76.7%) showed good confidence in their hand hygiene practices. These results contrast with a prior study conducted in Vietnam, where a significant number of nursing students demonstrated good knowledge and a positive attitude toward hand hygiene, yet their adherence levels were found to be lacking.<sup>14</sup>

**Table 1. General characteristics, knowledge, attitudes, adherence to, and confidence in hand hygiene practices of participants (n=116).**

Variables	Frequency (n)	Percentages (%)
Age (years)		
18-19	103	88.8
20-21	13	11.2
Gender		
Male	10	8.6
Female	106	91.4
Grade point average (GPA)		
Less than or equal to 2.70	64	55.2
More than 2.70	52	44.8
Working experience in healthcare settings before enrolling in the nursing program		
No	89	76.7
Yes	27	23.3
Had experience in hand hygiene training		
No	61	52.6
Yes	55	47.4
Known about hand hygiene regulations		

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No	59	50.9
Yes	57	49.1
Adequate hand hygiene stations are provided by the nursing college		
No	66	56.9
Yes	50	43.1
Knowledge of hand hygiene practices		
Good	54	46.6
Poor	62	53.4
Mean ± SD scores	27.24 ± 2.97	
Attitude in hand hygiene practices		
Good	60	51.7
Poor	56	48.3
Mean ± SDscores	69.66 ± 5.19	
Adherence to hand hygiene practices		
Good	64	55.2
Poor	52	44.8
Mean ± SDscores	12.70 ± 1.80	
Confidence in hand hygiene practices		
Good	89	76.7

Poor	27	23.3
Mean ± SDscores	4.73 ± 0.53	

Pearson's correlation analysis highlighted significant relationships between knowledge and attitude ( $r = 0.185$ ;  $p < 0.05$ ), attitude and adherence ( $r = 0.374$ ;  $p < 0.01$ ), and adherence and confidence ( $r = 0.223$ ;  $p < 0.05$ ) as shown in Table 2. However, no significant correlations were found between knowledge and adherence, knowledge and confidence, or attitude and confidence. These results indicate that while knowledge about hand hygiene is crucial, it does not directly translate to positive attitudes or adherence to hand hygiene practices. This aligns with previous research suggesting that knowledge alone is insufficient to foster proactive hand hygiene attitudes.<sup>15,16</sup> The strong link between attitude and adherence highlights the need for interventions focused on attitude improvement to support hand hygiene practices. This approach is supported by studies suggesting that prioritizing attitude enhancement is key to advancing hand hygiene.<sup>7,17-19</sup> Furthermore, the relationship between adherence and confidence points to the importance of self-efficacy, behavioral factors, and confidence building in hand hygiene compliance.<sup>20-22</sup> This underscores the necessity for thorough training programs for Thai nursing students, emphasizing these aspects.

**Table 2. Result of Pearson's correlation between knowledge, attitude, adherence, and confidence to hand hygiene practices of the Thai first-year nursing students (n=116)**

Variables	Knowledge	Attitude	Adherence	Confidence
Knowledge	1.000			
Attitude	0.185*	1.000		
Adherence	0.166	0.374**	1.000	
Confidence	0.025	0.120	0.223*	1.000

\* $p < 0.05$  significant correlation; \*\* $p < 0.01$  significant correlation

In addition, multiple logistic regression analysis, as shown in Table 3, indicated the gender differences in hand hygiene knowledge, with male students being more likely than female students to have good knowledge (AOR = 5.39; 95% CI = 1.06-28.65,  $p = 0.048$ ), which contrast to the previous finding among healthcare workers.<sup>23</sup>

Another finding of our study was that students

with lower GPAs tended to exhibit higher confidence in hand hygiene practices compared to their higher GPA counterparts (AOR = 3.02; 95% CI = 1.17-7.78,  $p = 0.022$ ) (see Table 3). This may reflect the Dunning-Kruger effect, where less skilled individuals misjudge their abilities, emphasizing the necessity for educational interventions that effectively evaluate and improve the practical skills and knowledge of

students.<sup>24</sup> This discrepancy suggests that factors such as the educational environment and cultural norms might significantly impact hand hygiene knowledge. The association between lower GPA and higher hand hygiene confidence challenges the typical notion that higher academic achievement correlates with greater confidence.<sup>25</sup> This adds a new dimension to our understanding of hand hygiene practice, highlighting its multifaceted nature influenced by cultural norms and individual confidence levels.<sup>26</sup>

The absence of significant correlations between factors like knowledge and adherence, or attitude and confidence indicate that other variables may also play a role in shaping hand hygiene practices. This aligns with other research suggesting that enhancing hand hygiene knowledge and attitudes could broadly benefit educational practices,<sup>27-29</sup> pointing to the need for more comprehensive research models to fully grasp the complexities influencing hand hygiene practice.

**Table 3. Multiple logistic regression analysis of the associated factors of knowledge, attitude, adherence, and confidence in hand hygiene practices among Thai first-year nursing students (n =116).**

Variables	Knowledge		Attitude		Adherence		Confidence	
	AOR (95%CI)	p-value	AOR (95%CI)	p-value	AOR (95%CI)	p-value	AOR (95%CI)	p-value
Age								
18-19	0.98 (.29-3.32)	0.979	0.94 (0.28-3.13)	0.932	2.21 (0.62-7.84)	0.216	0.79 (0.19-3.27)	0.748
20-21	Ref.		Ref.		Ref.		Ref.	
Gender								
Male	5.39 (1.06-28.65)	0.048*	0.78 (0.18-3.23)	0.733	0.75 (0.17-3.22)	0.704	0.71 (0.15-3.33)	0.673
Female	Ref.		Ref.		Ref.		Ref.	
GPA								
≤ 2.70	0.79 (0.36-1.74)	0.569	0.66 (0.30-1.45)	0.306	2.19 (0.98-4.89)	0.053	3.02 (1.17-7.78)	0.022*
>2.70	Ref.		Ref.		Ref.		Ref.	
Working experience in healthcare before a nursing program.								
No	0.71 (0.36-1.74)	0.478	0.50 (0.18-1.26)	0.143	0.60 (0.23-1.57)	0.307	1.31 (0.53-3.27)	0.991
Yes	Ref.		Ref.		Ref.		Ref.	
Had experience with hand hygiene training								
No	0.85 (0.39-1.84)	0.680	1.22 (0.57-2.61)	0.599	1.88 (0.85-4.11)	0.114	0.65 (0.25-1.65)	0.551
Yes	Ref.		Ref.		Ref.		Ref.	
Presence of hand hygiene regulations								
No		0.162	0.82 (0.37-1.77)	0.616	0.66 (0.30-1.47)	0.316	2.10 (0.81-5.40)	0.122
Yes	Ref.		Ref.		Ref.		Ref.	
Adequate hand hygiene stations provided								
No	1.39 (0.64-3.05)	0.399	1.29 (0.60-2.78)	0.507	1.16 (0.52-2.54)	0.711	0.65 (0.25-1.65)	0.365
Yes	Ref.		Ref.		Ref.		Ref.	

\* $p < 0.05$  significant difference

This study is exposed to certain limitations. Since this study was conducted using a cross-sectional

study, a causal relationship could not be assessed. Additionally, the increased confidence in hand

hygiene practices among Thai nursing students may be influenced by the precaution from the COVID-19 pandemic. Moreover, as the research was confined to a single nursing college, the findings may not accurately reflect the perspectives of all Thai nursing students.

### Conclusion

In conclusion, this study adds valuable insights to the current research related to hand hygiene practices among Thai nursing students. It highlights the importance of educational approaches that are all-encompassing, targeting not just knowledge acquisition but also attitude shaping and confidence enhancement in hand hygiene practices. The findings related to gender differences and the correlation between GPA and confidence in hand hygiene practices reveal the requirement for more detailed and contextually sensitive research in this area, considering diverse cultural and environmental factors.

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