

Effects of an Interactive Handwashing Lecture on First-Year Thai Nursing Students: A Pretest-Posttest Study

Nachaphun Denijs¹, Wandee Sirichokchatchawan^{1,2}

¹College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand, ²Health and Social Sciences and Addiction Research Unit, Chulalongkorn University, Bangkok, Thailand.

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Abstract

Background: Hand hygiene is essential in healthcare to prevent infections and ensure patient safety. The World Health Organization highlights hand hygiene as a key measure to reduce healthcare-associated infections. However, adherence to hand hygiene protocols is often inadequate, with a low compliance rate. First-year nursing students are at a critical stage in developing foundational practices. Traditional teaching methods have shown limited success in achieving long-term adherence, necessitating the need for more interactive and engaging teaching methods. Therefore, this study aims to evaluate the effects of an interactive lecture on the handwashing knowledge of first-year nursing students.

Methods: This study employed a quasi-experimental one-group pretest-posttest design involving 60 first-year Thai nursing students at Boromarajonani College of Nursing. After four weeks of interactive lectures, participants completed a pretest and posttest to assess changes in hand hygiene knowledge and understanding of WHO Five Moments for Hand Hygiene. The intervention included visual demonstrations, hands-on practice, and real-time feedback. Data were analyzed using descriptive statistics and paired t-tests to determine the intervention's effectiveness.

Results: The study showed significant improvements in both handwashing knowledge and understanding of WHO Five Moments for Hand Hygiene post-intervention. The mean score for handwashing knowledge increased from 5.41 (SD = 1.06) to 6.62 (SD = 1.10) ($t(59) = 7.154, p < 0.001$). Similarly, the mean score for understanding WHO Five Moments for Hand Hygiene improved from 4.32 (SD = 0.68) to 4.97 (SD = 0.84) ($t(59) = 5.60, p < 0.001$). Correct responses to specific handwashing questions also increased significantly.

Conclusions: The interactive handwashing lecture intervention significantly improved nursing students' knowledge and understanding of hand hygiene practices. These findings support the integration of interactive educational strategies in nursing curricula to improve hand hygiene compliance and patient safety. Future research should address study limitations, such as sample size and long-term knowledge retention, to further validate these results.

Keywords: education, hand hygiene, handwashing, nursing students, Thailand

Corresponding Author: Mariah Hockin, Wandee Sirichokchatchawan, Health and Social Sciences and Addiction Research Unit, Chulalongkorn University, Bangkok, Thailand.

E-mail: wandee.s@chula.ac.th

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Introduction

Hand hygiene is a fundamental practice in healthcare settings. It is crucial for preventing the spread of infections and ensuring patient safety. The World Health Organization (WHO) emphasizes that hand hygiene is a key measure in reducing healthcare-associated infections (HAIs), which significantly contribute to morbidity and mortality worldwide¹. However, adherence to hand hygiene protocols among healthcare workers is often inadequate. Previous studies show that compliance rates were as low as 40%². This indicates the critical need for improved educational strategies to enhance compliance.

First-year nursing students are at a focal point in their education, where they develop foundational practices and attitudes toward patient care. Establishing a strong understanding of hand hygiene and its importance during this stage can significantly influence their future professional behaviors and positively impact patient outcomes³. Traditional methods of teaching hand hygiene, such as standard lectures and demonstrations, have shown limited success in achieving long-term adherence⁴. Therefore, incorporating more interactive and engaging teaching methods may be essential to instilling these vital practices effectively.

Interactive lectures, which integrate traditional didactic teaching with elements such as discussions, demonstrations, and practical exercises, have been shown to enhance learning and retention⁵. These methods actively engage students in the learning process, making the information more relevant and memorable⁶⁻⁷. For hand hygiene education, interactive lectures can provide students not only with the theoretical knowledge of when and why to perform hand hygiene but also with the practical skills needed to do so correctly⁹⁻¹⁰.

Therefore, this study aims to evaluate the effects of an interactive handwashing lecture on the knowledge of first-year nursing students. Using a quasi-experimental one-group pretest-posttest design, the study measures changes in students' knowledge of hand hygiene protocols before and after the intervention. The interactive lecture is based on WHO guidelines and includes components such

as visual demonstrations, hands-on practice, and peer feedback.

The significance of this study is in its potential to inform and enhance educational strategies within Thai nursing curricula. The findings could support the integration of similar approaches in nursing education programs in Thailand by demonstrating the effectiveness of interactive teaching methods in improving hand hygiene practices.

Materials and Methods

Study Design, Setting, and Population

A quasi-experimental one-group pretest-posttest design was employed and conducted on 60 first-year Thai nursing students at Boromarajonani College of Nursing, Thailand. Due to similar course structures nationwide, these students are suitable representatives of Thailand's nursing undergraduates. Students were recruited using voluntary sampling, the purpose of the research was explained to them, and their consent was given and signed.

All 60 nursing students were required to join the extracurricular course for one hour a week for four weeks. The pretest was assessed on Day 1, and the posttest was assessed at the end of the course.

Study Instrument and Data Collection

All participants completed a self-administered questionnaire, modified from the World Health Organization's (WHO) 2009 hand hygiene guidelines¹ through Google Forms, which took approximately 5 to 10 minutes. The questionnaire was validated by five public health experts and tested for reliability with a Cronbach's Alpha value of more than 0.80 in a pilot study involving 30 first-year nursing students from a nursing college in a different province. The questionnaire included three sections on general characteristics, assessed handwashing knowledge, and WHO Five Moments for Hand in healthcare settings.

The handwashing knowledge section comprised nine questions, each scoring 1 for a correct answer and 0 for an incorrect answer, leading to a total possible score between 0 and 9. The WHO Five Moments for Hand in healthcare settings comprised six questions, each scoring 1 for a correct answer and

0 for an incorrect answer, leading to a total possible score between 0 and 6.

The interactive lectures were delivered by the lecturer, who served as the regular assigned course at the Boromarajonani College of Nursing, Thailand. The lecture schedule includes week 1, which includes an introduction to hand hygiene and HAIs. The lecture also aimed to engage students in ice-breaking and reflecting on the importance of hand hygiene, followed by a short video of the real-world impact of HAIs. In week 2, students were lectured on the theoretical aspect of hand hygiene, with a detailed presentation of handwashing with soap and water versus using alcohol-based hand rubs, explaining the proper techniques and duration for each method. The WHO Five Moments for Hand Hygiene are also thoroughly explained in week 2. An interactive discussion allows students to share clinical examples, reinforcing the practical application of these moments. A quiz using an online platform and case studies highlighting the consequences of poor hand hygiene are incorporated to solidify their understanding. In week 3, the lecture focuses on hands-on training. Demonstrations of proper handwashing techniques and the use of alcohol-based hand rubs address common errors and highlight correct practices. Students practice these techniques and receive real-time feedback to refine their skills. Interactive scenarios and role-play exercises help students identify and apply the Five Moments in simulated patient interactions, enhancing their situational awareness and decision-making skills. The last week of the course is the conclusion session with the summary of key points, emphasizing the importance of integrating these practices into daily routines. An open Q&A session provides students the opportunity to address any lingering questions and share insights. At the end of the session, posttest was collected.

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. A paired t-test was applied to determine the effects of the interactive handwashing lectures between the pretest and posttest, with 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 60 first-year students from Boromarajonani College of Nursing Phra Phutthabat, Thailand, participated in the study with no drop-out. Table 1 shows the demographic characteristics of the nursing students in this study. The mean age of the students is 18.95 years (SD = 0.62). The gender distribution was predominantly female, with 53 (88.3%) female students and 7 (11.7%) male students. Regarding working experience in a healthcare setting prior to enrolling in the nursing program, 16 (26.7%) students reported having such experience, while 44 (73.3%) did not. Experience with hand hygiene training was evenly split, with 30 (50%) students indicating they had received training and 30 (50%) reporting they had not.

Table 1: Characteristics of the total recruited participants (n=60)

Variables	n (%)/ Mean($\pm$ SD)
Age (years)	18.95 $\pm$ 0.62
Gender	
Male	7(11.7%)
Female	53 (88.3%)
Working experience in a healthcare setting before enrolling in the nursing program.	
No	44(73.3%)
Yes	16(26.7%)
Had experience in hand hygiene training.	
Not received	30(50.0%)
Had received	30(50.0%)
Presence of nursing college rules on hand hygiene.	
No	31(51.7%)
Yes	29(48.3%)
Adequate hand hygiene stations are provided by the nursing college	
No	33(55%)
Yes	27(45%)

The current study assessed the effects of an interactive handwashing lecture intervention on nursing students' hand hygiene knowledge and their understanding of the WHO Five Moments for Hand Hygiene. The findings indicated significant improvements in both areas following the intervention. As shown in Table 2, the mean score for handwashing knowledge increased significantly from 5.41 (SD = 1.06) pre-intervention to 6.62 (SD = 1.10) post-intervention. The improvement was statistically significant, as indicated by the paired t-test results ($t(59) = 7.154$, 95% CI = 0.864-1.536, $p < 0.001$). This shows a substantial enhancement in the students' handwashing knowledge following the intervention.

Correct responses to specific handwashing knowledge questions also improved, as shown in Table 3. The percentage of students correctly identifying the best hand-cleaning process after accidental contact with blood without gloves increased from 4 (6.67%) pre-intervention to 18 (30.00%) post-intervention. Knowledge about the number of steps for handwashing using soap and alcohol gel, as recommended by WHO, improved from 35 (58.33%) to 49 (81.67%). The percentage of students correctly identifying where practitioners should wash their hands increased from 3 (5.00%) to 6 (10.00%). Moreover, students' understanding of the correct statement about handwashing with alcohol gel rose from 49 (81.67%) to 57 (95.00%). The recognition that hands should be washed with soap and water when visibly dirty increased from 52 (86.67%) to 58 (96.67%). Additionally, the number of students who understood that their hands should be washed with soap and water after using alcohol gel increased

from 45 (75.00%) to 50 (83.33%). The intervention strengthened the students' knowledge that hands should be washed with soap and water after using the restroom and before eating, with both questions maintaining a 100% correct response rate pre-and post-intervention. Finally, knowledge regarding the effective duration for using alcohol gel to kill germs improved from 17 (28.33%) to 39 (65.00%).

As for WHO Five Moments for Hand Hygiene, the mean score also showed significant improvement, increasing from 4.32 (SD = 0.68) pre-intervention to 4.97 (SD = 0.84) post-intervention. The mean difference was 0.65 (SD = 0.90), and this improvement was statistically significant ($t(59) = 5.60$, 95% CI = 0.42-0.88, $p < 0.001$), indicating a better understanding of these critical moments after the intervention (Table 2). Correct responses regarding WHO Five Moments for Hand Hygiene also improved. Awareness that hand hygiene should be performed before procedures such as catheter insertion remained high at 100% both pre-and post-intervention. The recognition of the need for hand hygiene while dispensing medication to patients increased significantly from 15 (25.00%) to 31 (51.67%). The understanding that hand hygiene should be performed after touching the patient's surroundings and before touching the patient was high, improving slightly from 58 (96.67%) to 60 (100.00%) for the latter. Knowledge about the importance of hand hygiene before handing instruments to a nursing team member saw a notable increase from 8 (13.33%) to 27 (45.00%). Finally, knowing that hand hygiene should be performed after touching bodily fluids from patients improved from 58 (96.67%) to 60 (100.00%).

Table 2: Comparison of Handwashing Knowledge and Understanding of WHO Five Moments for Hand Hygiene Pre- and Post-Intervention

	Mean (SD)	Mean Difference (SD)	Paired t-test			
			t value	df	95% CI	p-value
Handwashing knowledge			7.154	59	0.864-1.536	<0.001*
Pre-intervention	5.41 (1.06)	1.20 (1.299)				
Post-intervention	6.62 (1.10)					
WHO Five moments for hand hygiene			5.60	59	0.42-0.88	<0.001*
Pre-intervention	4.32 (0.68)	0.65 (0.90)				
Post-intervention	4.97 (0.84)					

* $p < 0.001$ significant difference

Table 3: Correct answers onhandwashing knowledge and WHO Five moments for hand hygiene before and after intervention (n=60)

Statements	Pre-intervention		Post-intervention	
	n	(%)	n	(%)
Handwashing knowledge				
1. If you accidentally come into contact with blood in an emergency without wearing gloves, what is the “best” hand-cleaning process then?	4	6.67	18	30.00
2. According to the World Health Organization (WHO), how many similar steps are there when handwashing using soap and alcohol gel?	35	58.33	49	81.67
3. As a practitioner nurse, where should we wash our hands?	3	5.00	6	10.00
4. Which statement is “correct” about handwashing with alcohol gel?	49	81.67	57	95.00
5. When your hands are visibly dirty, you should wash your hands with soap and water	52	86.67	58	96.67
6. After washing hands with alcohol gel, you should immediately wash your hands with soap and water.	45	75.00	50	83.33
7. You should wash your hands with soap and water after using the restroom.	60	100.00	60	100.00
8. You should wash your hands with soap and water before eating.	60	100.00	60	100.00
9. How long should alcohol gel be used to effectively kill germs?	17	28.33	39	65.00
WHO Five moments for hand for healthcare settings				
Which of the following are included in the 5 moments of hand hygiene recommended by WHO in a healthcare setting?				
1. Before performing procedures such as catheter insertion for patients	60	100.00	60	100.00
2. While dispensing medication to patients	15	25.00	31	51.67
3. After touching the patient’s surroundings	60	100.00	60	100.00
4. Before touching the patient.	58	96.67	60	100.00
5. Before handing instruments to a nursing team member	8	13.33	27	45.00
6. After touching bodily fluids from patients	58	96.67	60	100.00

The findings of this study demonstrate a significant positive effect of an interactive lecture intervention on nursing students’ hand hygiene knowledge and understanding of the WHO Five Moments for Hand Hygiene. These results are consistent with existing literature that shows the effectiveness of educational interventions in improving hand hygiene compliance among healthcare workers. For instance, Gould et al. (2017)¹⁰ reported that educational interventions,

particularly those incorporating practical demonstrations and interactive components, significantly enhance hand hygiene practices among healthcare workers. The increase in correct responses to specific handwashing knowledge questions further supports the effectiveness of the intervention. For example, the recognition of the best hand-cleaning process after accidental contact with blood without gloves improved markedly from 6.67% to

30.00%. This finding is consistent with Larson et al. (2001)¹¹, who found that structured educational programs significantly improved healthcare workers' knowledge and compliance with hand hygiene protocols.

Furthermore, the enhanced understanding of the number of steps for handwashing using soap and alcohol gel, as recommended by the WHO, from 58.33% to 81.67%, underscores the importance of detailed and interactive educational sessions. Previous studies have demonstrated that multimodal educational strategies and comprehensive training programs, including visual demonstrations and hands-on practice, are effective in improving knowledge retention and application in clinical practice^{4,9, 12, 13}.

The integration of interactive methods in the educational intervention likely contributed to the significant improvements observed, as supported by previous studies. For instance, the efficacy of interactive approaches in reinforcing hand hygiene practices among nursing students. These findings indicate that engaging students in practical exercises can enhance their understanding and retention of key hand hygiene principles^{14, 15}. Additionally, recent research has explored the use of technology in hand hygiene education. Mobile applications and online modules improved hand hygiene knowledge and compliance among healthcare workers. The integration of technology into educational interventions can provide continuous learning opportunities and immediate feedback, which are critical for habit formation^{16, 17}.

The study has several limitations. The small sample size from a single institution limits generalizability, and the short-term evaluation does not assess long-term knowledge retention. The lack of a control group makes attributing improvements solely to the intervention difficult. The focus on knowledge rather than observed behavior and the variability in teaching methods further complicate the findings. Additionally, institutional differences and unverified assessment tools could affect the applicability and credibility of the results. Future research should address these limitations to understand better the effectiveness of educational interventions on hand hygiene practices.

Conclusion

In conclusion, the interactive handwashing lecture intervention significantly enhanced nursing students' hand hygiene knowledge and their understanding of the WHO Five Moments for Hand Hygiene. These findings support the integration of similar educational strategies in nursing curricula to encourage better hand hygiene practices and ultimately improve patient safety.

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Ethical consideration

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