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Assessment of knowledge, attitude, and practices of hand hygiene among nursing students in the south of Vietnam

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Abstract---Health care-associated infection (HCAI) is one of the leading causes of morbidity and mortality associated with clinical, diagnostic, and therapeutic procedures in healthcare organizations. Enhancement of hand hygiene practices among healthcare workers is recognized as a measure to decrease healthcare-associated infections. However, previous studies indicated that healthcare institutions' adherence to hand hygiene procedures was fragile. This cross-sectional descriptive correlational study aimed to examine the knowledge, attitude, and practice of hand hygiene following the five moments for hand hygiene and hand hygiene procedures of the Vietnamese Ministry of Health and their associations among 104 bachelor's nursing students. Knowledge and attitude were examined using a self-structured questionnaire, while practice was evaluated by observation based on the hand hygiene checklist. The study findings showed that 44.2% and 66.3% of participants had good knowledge

and a positive attitude regarding hand hygiene. An unsatisfied adherence of 5 moments of hand hygiene (57.5%) and 6 steps of hand hygiene procedure (42.8%) was revealed. Nursing students had significant associations between knowledge, attitude, and hand hygiene practices. In conclusion, unsatisfied levels of knowledge, attitude, and practices among nursing students were reported. The study findings support previous literature and find that respondents emphasized the importance of training programs and hand hygiene monitoring in improving hand hygiene practices for students, which will benefit patients and nurses in the future.

Keywords---hand hygiene, knowledge, attitude, practice, nursing students.

Introduction

Health care-associated infection (HCAI) is recognized as one of the most critical problems in health care services worldwide, especially in developing countries, with the incidence of HCAI from 2 to 20 times higher in developing countries (Novák et al., 2020). The HCAI constitutes one of the most important causes of morbidity and mortality regarding clinical, diagnostic, and therapeutic procedures. In addition, they are related to an extended hospital stay, increased healthcare costs, economic hardship to patients and their families, higher resistance to pathogenic organisms, and lower quality of life (Alshammari et al., 2018).

All nurses' providing care activities could raise the risks of HCAI in patients if there is inadequate compliance with hand hygiene. Nursing adherence to infection control, especially hand hygiene measures, is critical in prevention efforts. According to the World Health Organization and the Vietnamese Ministry of Health, there are five moments of hand hygiene and six steps of hand hygiene procedures require nurses to adhere to during their patient care. They are applied to the provided care of all patients in all health care settings with or without the suspected or confirmed presence of infectious agents (Le et al., 2019). According to the guideline by WHO, hand hygiene practices, systematic organizational monitoring systems, and feedback for continuous professional development and training are essential for improving procedures and reducing the transmission of pathogenic microorganisms to patients and health care workers (Challenge, 2009). Therefore, it has been encouraged to incorporate the practice into an organizational training program (Challenge, 2009). However, adherence to the hand hygiene guideline is a challenge.

Nurses are the nucleus of the healthcare system. They spend most of their working time with patients. Although hand hygiene is the single most effective preventive measure, previous literature has demonstrated that the incidence of compliance with hand hygiene procedures is fragile among nurses and nursing students – who also participate in caring for patients. According to related literature, the knowledge and attitude on hand hygiene were moderate. The rate of good knowledge regarding hand hygiene among healthcare workers and

students was low. When assessed for hand hygiene practices, poor hand hygiene practices were shown. These might significantly increase in overall rates of nosocomial infection (Qasmi et al., 2018).

There are many factors related to hand hygiene practices among healthcare workers and students, including skin conditions, allergies and irritants to the hand washing agents, insufficient equipment supplies, materials, and resources for good hand hygiene maintenance. However, knowledge and attitude regarding hand hygiene were identified as the most significant predictor of practices or adherence to hand hygiene in healthcare institutions (Vu & Truong, 2018). As a result, it was essential to analyze nursing students' knowledge, attitudes, and hand washing practices to develop appropriate strategies to promote hand hygiene adherence. This study has been carried out to examine knowledge, attitude, and performance and their associations among nursing students regarding hand hygiene.

Materials and Method

Study design, setting, study population, and samples

A cross-sectional descriptive design conducted from September 2021 to January 2022 was used to examine knowledge, attitude, and practice of hand hygiene and their associations among nursing students. Third- and fourth-year nursing students from the Faculty of Nursing, Can Tho University of Medicine and Pharmacy in Can Tho, Vietnam, who had started clinical practices at hospitals, were enrolled in this study. One hundred thirty-nine nursing students were invited to participate in the study. However, the researchers received 104 responses to participation. The response rate was 74.8%.

Research instruments

Study subjects' demographic characteristics, knowledge, and attitude were examined using a self-structured questionnaire. The questionnaire was divided into three sections. The first section was demographic specifications, including age, gender, university education year, and GPA grades. The second section measured participants' knowledge regarding hand hygiene based on the Vietnamese Ministry of Health questionnaire (Vietnamese Ministry of Health, 2017). It was composed of 30 items. Among them were 15 yes or no questions and 15 multiple choice questions. The correct answer was scored by 1. The total score was calculated by the sum of each item's score. It ranged from 0 to 30. It was also categorized as good knowledge (21–30) and poor knowledge (0 – 20).

The third part was specified to measure the nursing student's attitude about hand hygiene, and it included 9 items in which the questions were answered by the Likert 5-scale. Each item ranged from 1 as strongly disagree to 5 as strongly agree. The total attitude score was 9 to 45 and classified into positive attitude (32–45 scores) and negative positive (9–31 scores). The practice of hand hygiene was evaluated by observation with a checklist of hand hygiene procedures. Each participant was observed when they provided care to a patient to assess their compliance with the checklist of 5 moments and 6 steps of hand hygiene (Table 1)

(Vietnamese Ministry of Health, 2017). The knowledge and attitude toward hand hygiene questionnaires were tested for their internal consistency and reliability with 20 nursing students who had similar characteristics to the sample of this study. Their reliabilities were 0.81 and 0.84 in order.

Data collection

After getting the ethics approval from Can Tho University of Medicine and Pharmacy (Ethical Approval No.2510/DHYDCT), the letter asking permission to collect data was presented to the dean of the Faculty of Nursing and Medical Technology. When the researchers received approval, the data collection was started. Three-section questionnaire was distributed among nursing students who signed the consent forms. Each student had fifteen minutes to complete the questionnaire. After completing the questionnaire, participants were appointed to observe their hand hygiene practices while providing patient care using a hand hygiene checklist.

Table 1
Hand hygiene checklist (Adapted from Vietnamese Ministry of Health, 2017)

Moment of hand hygiene	Washing hand	Using appropriate alcohol or soap	Compliance with 6 steps of hand hygiene
1. Before touching a patient	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> Good <input type="checkbox"/> Poor
2. Before clean/aseptic procedures	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> Good <input type="checkbox"/> Poor
3. After body fluid exposure risk	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> Good <input type="checkbox"/> Poor
4. After touching a patient	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> Good <input type="checkbox"/> Poor
5. After touching patient surroundings	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> True <input type="checkbox"/> False	<input type="checkbox"/> Good <input type="checkbox"/> Poor

Statistical analysis

Data were collected, encoded, and inputted using IBM® SPSS Statistics version 22.0. Descriptive statistics in frequency, percent, mean, standard deviation and range were used to examine demographic characteristics, knowledge, attitude, and hand hygiene practices. Chi-square (χ^2) and Pearson's correlation tests were used to determine relationships between categorical and continuous variables. Statistical significance was considered at lower than 0.05.

Results

Knowledge, attitude, and practice of hand hygiene among nursing students

The nursing student's mean age was 21.7 ± 0.8 . Most nursing students were female (86.5%). 81.7% of participants had a good level of GPA. 100% of the students were educated about hand hygiene in their course. More than half

(55.8%) of nursing students had poor hand hygiene knowledge (Table 2). In detail, nursing students achieved a high score on the significance of hand hygiene; more than half of the participants had good knowledge of 5 moments and 6 steps of hand hygiene while knowledge of using soap and alcohol in hand washing was low (Fig 1). Results also showed that 69/104 (66.3%) nursing students had a positive attitude toward hand hygiene (Table 3). There were fragile practices of hand hygiene among nursing students with a low rate of adherence with 5 moments of hand hygiene (57.5%) and 6 steps of hand hygiene procedure (42.8%) (Table 4).

Table 2
Knowledge of hand hygiene among nursing students

	Mean	Good knowledge	Poor knowledge
Knowledge of hand hygiene	20.1	49 (44.2%)	55 (55.8%)

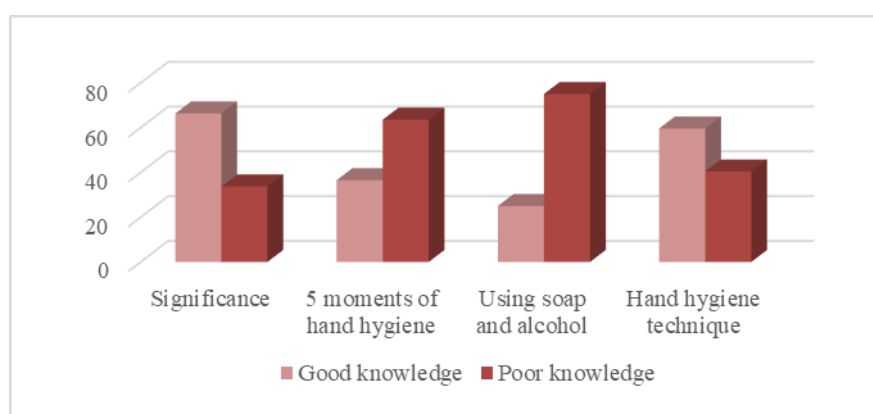


Figure 1. Knowledge regarding hand hygiene among nursing students in detail

Table 3
Attitude toward hand hygiene among nursing students

	Mean	Positive attitude	Negative attitude
Attitude toward hand hygiene	33.4	69 (66.3%)	35 (33.6%)

Table 4
Practices of hand hygiene among nursing students

	Mean	S.D.	Range
Compliance with 5 moments for hand hygiene	57.5	25.7	0-100
Compliance with 6 steps of hand hygiene	42.8	25.8	0-100

Associations between knowledge, attitude, and practice of hand hygiene among nursing students

We further analyzed an association between knowledge, attitude, and practice. Results showed that the students with a positive attitude had significantly higher compliance scores with 5 moments for hand hygiene (Table 5). Furthermore, the students with higher knowledge and attitude scores also had significantly higher levels with the practice of hand hygiene regarding the 6 steps of hand hygiene among nursing students (Figure 2).

Table 5
Associations between knowledge, attitude, and compliance with 5 moments for hand hygiene

Factors		Compliance with 5 moments for hand hygiene	χ^2	<i>p</i>
Knowledge	Good (n = 49)	65.9 ± 24.6	10.951	0.090
	Poor (n = 55)	50.9 ± 24.7		
Attitude	Positive (n = 69)	67.9 ± 21.5	45.555	<0.001
	Negative (n = 35)	37.1 ± 20.7		

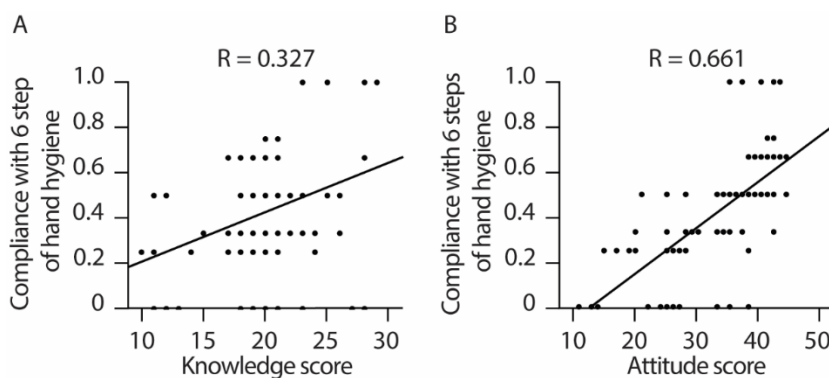


Figure 2. Associations between knowledge, attitude, and compliance with 6 steps of hand hygiene

Discussion

Hand hygiene is the single most preventive means of the spread of infectious organisms and hospital-acquired infections. The study findings showed nursing students' insufficient knowledge, attitude, and hand hygiene practice. These findings supported previous studies, revealing low hand hygiene practices among nursing students and healthcare workers. According to Qasmi, only 56.8% of medical and nursing students adhered to hand hygiene procedures when caring for patients (Qasmi et al., 2018). A study conducted on 270 students (140 medical, 83 nursing, and 47 medical technique students) in Saudi Arabia indicated an unsatisfied incidence of hand hygiene practices among students. However, among participants, nursing students' compliance was the highest (Humran & Alahmary, 2018). According to Nair et al., nursing students had

moderate knowledge and poor hand hygiene attitudes. Their study results showed that only 9% of participants had good knowledge of hand hygiene and that most students had poor attitudes concerning hand hygiene (Nair, et al., 2014).

Related literature which investigates healthcare workers also supported our findings. A study conducted by all healthcare workers in general hospitals showed unsatisfactory compliance with hand hygiene protocol, although the participants had good knowledge and a positive attitude (Powell-Jackson, 2020). Knowledge, philosophy, and hand hygiene practice to enhance infection control among nurses were limited. This assumption was demonstrated by a study by Tran et al. on nurses who worked in a general hospital in Vietnam. In this study, Tran et al. found that 55% of nurses answered correctly about hand hygiene. In detail, 40%, 56.3%, and 75% had good knowledge of significance, choosing soap or alcohol, and hand hygiene procedures (Tran et al., 2018). Based on the open question, training might be a factor that promotes hand hygiene practices. Most nurses from previous studies reported attending many training courses and updated conferences regarding hand hygiene at their working institution. However, our respondents indicated that they did not participate in any training course except learning and practicing in the introductory nursing course.

Our study found that knowledge and attitude were significantly associated with hand hygiene practices among nursing students in compliance with 5 moments and 6 steps of hand washing procedures. Our study was consistent with the related literature. A study by Cruz and Bashtawi (2016) showed that having adequate knowledge regarding the effect of hand hygiene in preventing HCAI and a good attitude toward hand hygiene were predictors of better hand hygiene practice among Saudi nursing students. The student with better knowledge and a positive attitude would have better hand hygiene protocol methods (Cruz & Bashtawi, 2016). A study by Nair et al. showed strong relationships among nursing students' knowledge, attitude, and hand hygiene practices. The student with higher knowledge and a positive attitude had better methods of hand hygiene protocol (Nair, 2014). Even though our research tools were similar to Nair's, our study also evaluated participants' compliance with 5 moments and 6 steps of hand hygiene.

The Vietnamese Ministry of Health developed these tools in 2017. The key characteristics of the tools are assessing knowledge and attitude regarding the significance of hand hygiene in reducing the HCAI and adherence to hand hygiene protocol in healthcare organizations, and observing compliance with 5 moments and 6 steps of hand hygiene (using alcohol or soap and water) during healthcare workers' caring activities for patients. A study conducted at Vinh Medical University with 337 students to examine their compliance with standard precautions found that 65,9% of students had a positive attitude related to hand washing. Besides, a group of students with a positive attitude had an incidence of compliance with hand hygiene 2.7 times higher than a group with a negative attitude (Vu & Truong, 2018). Knowledge and attitude were predictors of hand hygiene practices among nurses. Nabavi et al. conducted research at Imam Hossein hospital, Tehran, Iran, with 270 healthcare workers. The findings showed that healthcare workers had moderate knowledge but poor attitudes and practices

overall. Their knowledge and attitude significantly predicted their compliance with hand hygiene procedures in their caring activities (Nabavi, 2015).

Consistent results were also found by Le et al. in 2019. They involved 371 healthcare workers (59 doctors, 185 nurses, 27 paramedics, 71 nursing students, and 29 medical assistants) in evaluating factors related to hand hygiene practices among study subjects. The findings indicated that 38.8% of nurses had good practices and achieved the highest scores in trials with hand hygiene procedures compared to other groups. In addition, good knowledge and a positive attitude are positively associated with hand hygiene performance among healthcare workers (Le et al., 2019). Recently, Bimerew and Muhawenimana demonstrated that maintenance of standards in the levels of knowledge and attitudes, as well as correct practices of hand washing procedures in nurse professionals, were essential for preventing infection (Bimerew and Muhawenimana, 2022). Our study finds the significance of improving nursing students' current training programs targeting hand hygiene practices. Hand hygiene training sessions may need to be conducted more frequently for students with continuous monitoring and performance feedback to encourage them to increase their compliance with hand hygiene procedures. Our study indicated the importance of introducing measures to increase the knowledge, attitudes, and practices of hand hygiene which might play an essential role in decreasing HCAI and improving the quality of care. These protocols can also be incorporated into our curriculum to raise concerns among the nurse students.

Conclusion

Concerning hand hygiene, the nursing students had unsatisfied knowledge, attitude, and practices which might increase the risks of HCAI. Relationships between knowledge, attitude, and practices were indicated. Therefore, educational interventions such as pieces training and seminars on hand hygiene may need to be conducted frequently for students with continuous monitoring and performance feedback to motivate them to increase their compliance with hand hygiene procedures. For future research, depth interviews or indirect observation recordings should be used to evaluate hand hygiene practices for further intervention design for self-reported practice improvement.

Conflict of Interest

The authors declare that there is no conflict of interest.

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