http://dx.doi.org/10.52547/pcnm.12.1.11

Preventive Care in Nursing and Midwifery Journal
2022; 12(1): 11-19

Knowledge, Attitude and Performance of Nursing Students Towards Hand Hygiene in Medical and Surgical Wards of Zanjan Teaching Hospitals in 2019 -2020

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Received:28 Nov 2021
Accepted: 12 Des 2021
Published: 16 Jan 2022

Abstract

Background: Healthcare-associated infections (or nosocomial infections) impose many health problems and costs on patients and hospitals. Hand hygiene compliance is one of the most effective ways to control and prevent the spread of nosocomial infections.

Objectives: This study aims to investigate the knowledge, attitude and performance of nursing students towards hand hygiene in medical and surgery wards in Zanjan teaching hospitals, 2019.

Methods: The current descriptive cross-sectional study was conducted on 50 junior and senior undergraduate nursing students of Zanjan Nursing and Midwifery faculty who were selected based on convenience sampling. Students' knowledge and attitude on hand hygiene were assessed through a standard questionnaire recommended by the World Health Organization and a researcher–made one. The study has been conducted from 12.10.2019 to 9.02.2020. Data were analyzed using Chi-square test, Fisher's exact test and paired t-test by SPSS Software version 22.

***Results*:** The results of the study demonstrated that 62% of students had moderate knowledge about hand hygiene. Based on the findings only 12% had a positive attitude to hand hygine.

Conclusion: Since the unfavorable knowledge and attitude of students about hand hygiene and also the unavailability of essential facilities for hand hygiene increase the risk of transmission of healthcare associated infections by students, so to prevent cross-infection ,it is recommended to improve facilities concerning hand hygiene, training and supervision.

Keywords: hand hygiene, nursing students, knowledge, attitude, performance

Introduction

Infections related to nosocomial organisms are a common problem in developed and developing countries [1]. At present, the term Healthcare-Associated Infections (HAI) is used in most medical texts in lieu of nosocomial infections. HAI, as defined by the Centers for Disease Control &Prevention are infections that patients may contract while receiving medical or surgical treatment in the care environment [2].

The prevalence of these infections is not the same all over the world. According to statistics from the World Health Organization (WHO), in 2018, the incidence of HAI in developed countries was 5 to 10 percent and in developing countries over 15 percent [3]. A report by the American Institute of

Health Care Research indicates that HAI is the most common complication of hospital care and one of the 10 leading causes of death in the United States [4]. In a study conducted by Suetens et al. (2018) in the European Union and in the European Economic Area (EU/EEA), the rate of HIA during the years 2016-2017, in acute care centers (acute care hospitals) was 6.5% and in chronic long-term care facilities was 3.9% [5]. The number of studies conducted on the prevalence of nosocomial infections in Iran is limited. In Ghazvini's study, the prevalence of infection was reported 10.85% [6].

HIA not only impose many problems and costs on patients and the hospital, but also increase the length of hospital stay. According to a study in Germany, nosocomial infections cost an additional € 5,800 to € 11,800 per patient [7]. According to the Centers for Disease Control & Prevention in Europe, HIA in developed European countries lead to 16 million days of hospitalization and $ 7 billion of direct costs [8]. Unfortunately, there are no official and documented statistics on the cost of HIA in Iran, but studies show billions of tomans spending and several hundred thousandof additional hospitalizations [9].

Hand hygiene is recognized as one of the most important strategies to prevent HIA and the transmission of drug-resistant organisms [10]. In this regard, the results of a study in the intensive care unit (2013) in Kuwait showed that improving the acceptance of hand hygiene in employees reduced HIA from 37.2% before the intervention to 15.1 after the intervention [11]. WHO has acknowledged hand hygine as an important measure to prevent and control HIA and has provided guidelines in this regard. According to the guidelines of the WHO, the five moments to comply with hand hygiene include before touching the patient, after touching the patient, before performing sterile precedures, after exposure with the patient's body fluid and after touching the patient's surroundings. Also, according to the guidelines of WHO, hand hygiene is done in two ways: hand washing or hand disinfection with an alcoholic solution [12].

Despite the importance of hand hygiene in the prevention of care-associted infections, studies show that the rate of hand hygiene compliance in health-care staff [13,14] and students is not desirable. Students as a member of the care team, play an important role in the transmition of HIA. Students attend all wards and are in contact with different patients. Therefore, students 'non-compliance of hand hygiene is a serious threat to patients' health. A study by Mahmood et al. (2016) in India showed that 72% of the nursing students under study had moderate knowledge about hand hygiene and only 52% of them complied with hand hygiene [15]. In this regard, the study of Da Silva in Brazil (2012) on 61 medical and nursing students showed that only 35.7% of nursing students and 15.1% of medical students followed the seven steps recommended by the World Health Organization [16]. The study of Jeong and Kim (2016) also showed that 68% of nursing students in South Korea had sufficient knowledge about hand hygiene and according to their study, this level of knowledge is undesirable and can not change attitudes about hand hygiene and consequently lead to poor performance in hygiene compliance [17]. The results of another study by Ariyaratne et al. (2013) in Sri Lanka, showed that senior medical and nursing students had moderate knowledge of hand hygiene. But their attitudes and performances regarding hand hygiene were poor [18]. In Muhammad (2015) study of 137 medical and nursing students in Nigeria, 37.3% of students stated that they did not comply with the principles of hand hygiene [19]

A review of the literature shows that there are limited studies on the hand hygiene compliance among medical and nursing students in Iran. The results of a review study by Najafi Ghezeljeh et al. (2012) indicated that nurses and especially physicians had no desirable knowledge and performance regarding hand hygiene compliance [13]. In another study conducted by Zia Shaykh al-Islami et al. (2016) in Qom, the rate of hand hygiene compliance by nurses was 44.5% [14]. A study by Zakeri et al. (2019) on the knowledge and attitude of medical students towards hand hygiene in Mashhad showed that only 27% of students had a good attitude towards hand hygiene and majority of them (64%) had moderate knowledge about hand hygiene [20]. Due to the lack of adequate studies on hand hygiene compliance in students in Iran and Zanjan and the importance of hand hygiene in breaking the transmission chain of HIA, present study conducted to assess the knowledge and attitude

among nursing students in Zanjan university of medical sciences in 2019.

Methods

The current study (with the code A-11-149-11) is a descriptive cross-sectional study with ethical code (IR.ZUMS.REC.1398.173), has been approved in Zanjan University of Medical Sciences and conducted on junior and senior nursing students of Zanjan nursing school from 12.10.2019 to 9.2.2020.

The study population included nursing students of Zanjan nursing faculty. The samples of the study were selected by convenience sampling method. Students were allowed to participate in the study based on having characteristics such as being in the third to fourth year, having an internship in the medical and surgical wards and tendency to participate in the study. Due to the lack of similar studies on Iranian students, the sample size was determined based on the study of Da Silva et al. [16]. In the above study, the rate of hand hygiene compliance among nursing students was 35.7%. The sample size was calculated with 2% error and 95% confidence based on the following formula and thus, the sample size was 50 people.

$(Z1-\alpha/2+Z1-\beta)^2 pqN= d^2$

d=2%

α=0/05

Z=1/96

β=10%

P=25%

The instruments used to collect data included two parts: Checklist for observance of hand hygiene performance and a questionnaire. Performance observation checklist based on the observation form introduced by the WHO [12], which provides 5 moments for hand hygiene (before touching the patient, after touching the patient surroundings, before performing aseptic procedures, after touching the patient and after exposure with the patient's body fluid) was prepared. In this checklist, in addition to considering 5 essential moments for hand washing, essential hand hygiene facilities, including a flawless container containing hand washing solution, soap or alcohol solution for hand washing, an educational poster on how to wash hands next to the sink and disposable paper towels for hand drying were also evaluated. In the present study, hand hygiene compliance above 50% was considered desirable [20].

The questionnaire consisted of 3 sections: demographic characteristics (including age, gender, marital status, workshop experience) knowledge questions and attitude questions. The knowledge questions (25 questions) were prepared according to the guidelines of the WHO. To score the questions in the knowledge part of this questionnaire, one point was considered for each correct answer and zero point for each incorrect answer. The overall knowledge score ranged from 0 to 25. Based on the aquired scores, the participants' knowledge was divided into 4 categories. Thus, the score ≤12 was considered as low knowledge, the score13 to 17 as moderate knowledge, the score 18 to 20 as good knowledge and the score and score 21 and above as very good knowledge. The scores were categorized according to the standard form of the WHO and similar studies [12,21-23].

In terms of validity and reliability, knowledge questions have already been used in the study of Edalatdoust et al. [23]. While examining the face validity of the instrument, Edalatdoust and collegues reported Cronbach's alpha of 0.871 for its internal reliability.

In the current study, in addition to examining face validity by expert panel , examining validity through Cronbach's alpha test also showed the optimal validity of the instrument (Cronbach's alpha is equal to 0.78).

The third part of the questionnaire was related to attitude questions. The questions were prepared through literature reiview and Edalatdoust and colleagues ' study. Attitude questions consisted of 15 questions which were scored on a 5-point Likert scale (from strongly disagree with score 1 to strongly agree with score 5). Four questions were scored inversely. The highest score was 75.

If the participants got the score of 30 or less they were categorized as having a negative attitude and if they scored 31-45 they were classified as having neutral attitude and if they scored higher than 45 they were considered as having a positive attitude [19]. The referred instrument was previously examined in the study of Edalatdoust et al. [23] through face validity and its internal reliability based on measuring the internal

stability of the instrument was desirable (Cronbach's alpha coefficient equal to 0.71). In the present study, while re-evaluating the face validity by the the expert panel, Cronbach's Alpha for examining the internal stability of the instrument was 0.74.

To observe the students' performance and to complete the performance evaluation checklist for students' hand hygiene compliance, the researcher attended the medical and surgical wards. In order to prevent any change in the behavior of students while being observed, the researcher positioned in a place that could observe the students 'behavior without any effect on their behavior.

15 oppurtunities of hand hygiene were observed for each student. After completing the observation opportunities, if the student consented to continue participating in the study, the knowledge and attitude questionnaire was completed by them. With regard to the normality of the data, the collected data were analyzed using descriptive tests (mean, percentage and standard deviation) and inferential tests (independent t-test, Fisher exact test and Pearson) through SPSS 22 software.

Results

Regarding the demographic characteristics of students, 54% were female and 46% were male. The mean age of students was 22.5(±3/01). Most of the students (84%) were single and 76% of them had experienced a workshop on hand hygiene. Among the students who took the hand hygiene workshop, only 52% rated the hand hygiene workshop as beneficial. Regarding nessessry hand hygiene facilities, the results showed that in 62% of opputunites, a flawless disinfectant pump were are intact and perform properly and in 90% of opputunites disinfectant liquid was available, but there was no access to paper towels to dry hands in any of the observed hand hygiene opportunities (Table 1).

Table 1: The Frequency distribution of demographic characteristics characteristics and some contextual variables in particpants

Varaibles		Frequencies	Percentages
Ages	20-24	44	%88
	25-35	6	%12
Genders	Female	27	%54
	Male	23	%46
Marital Status	single	42	%84
	married	8	%16
Workshop experience	Yes	38	%76
	No	12	%24
Workshop usefulness	Useful	26	%52
	Useless	3	%6
	Fairly useful	9	%18
Hygiene Facility	Intact disinfection pumps availability	31	62%
	Paper towel availability	0	0
	Disinfectant availability	45	90
	Handwashing posters availability	100	100

Distribution of absolute and relative frequencies of demographic characteristics and some contextual variables

The results of study showed that the majority of students (62%) had moderate knowledge about hand hygiene and only 34% of them had good knowledge about hand hygiene. Regarding the attitude, 78% of students had neutral attitude toward towards hand hygiene and only 12% had a positive attitude towards the need to comply hand hygiene. Regarding the performance of students in terms of hand hygiene, the results of the study showed that the rate of hand hygiene in students was 14.13(±9.86) (Table 2,3).

Table 2: Frequency distribution of students in terms of knowledge and attitudes toward hand hygiene

Knowledge			Attitudes		
Classified Levels	**Frequencies**	**Percentages**	**Classified Levels**	**Frequencies**	**Percentages**
≤ 12 Poor	2	%4	≤ 30 Negative	5	%10
(13-17 Moderate)	31	% 62	31 - 45 Neutral	39	%78
(18-20) Good	17	%34	45 > Positive	6	%12
21 ≥ Very good	0	% 0			

Table 3: Mean and standard deviation and median scores of knowledge, attitude and hand hygiene compliance in participants

Variables	Mean	Standard Deviation	Median
Knowledge	16.34	2.11	17
Attitudes	37.98	4.98	38/50
Performance	14.13	9.86	13.33

The results showed that there was a significant relationship between compliance with hand hygiene and gender of students ($p<0.05$) so that the rate of compliance was higher in female students than the male ones (79/79). 16% vs. 11.01%).Although the rate of hand hygiene compliance decreased with age (13.33(±7.30) vs. 14.24(±10.22), but the relationship between age and the rate of compliance was not significant. The results also showed that the rate of hand hygiene compliance was better in students who had more knowledge and positive attitude towards hand hygiene, but the relationship between knowledge and attitude with the rate of compliance were not significant ($p<0.05$) (Table 4).

Table 4: Relationship between the hand hygiene compliance with knowledge, attitude and other demographic variables

Variables		Mean	SD	P-Value
Ages	<25	14.24	10.22	0.835
	>25	13.33	7.30	
Genders	Male	11.01	7.13	0.032
	Female	16.79	11.15	
Marital status	Married	14.16	9.04	0.992
	Single	14.12	10.11	
Workshop Experience	Yes	13.85	10.85	0.731
	No	15.00	7.58	
Knowledge	Poor	13.33	0.00	0.842
	Moderate	13.54	8.85	
	Good	15.29	12.29	
	Very good	-	-	
Attitudes	Negative	13.33	9.42	0.925
	Neutral	14.01	10.00	
	Positive	15.55	10.88	

Discussion

This study aimed to examine the knowledge, attitude and performance of nursing students of Zanjan University of Medical Sciences towards hand hygiene in 2019. The results of the study showed that the majority of students had moderate knowledge about hand hygiene but they were not in a desirable status in terms of attitude and performance.

Regarding the status of knowledge, only 34% of the participants had good knowledge and the majority (62%) had moderate knowledge about hand hygiene. In addition, none of the participants had very good knowledge about hand hygiene. Similarly, in the study of Zakeri et al., most students had moderate knowledge of hand hygiene [18]. The consistency of the results of this study with Zakeri and colegues ' study is due to the fact that the majority of nursing students have acquired hand hygiene knowledge during their university courses. The nursing students' knowledge level indicate that the aquired knowledge about importancs of hand hygiene during the study period in nursing is not sufficient. In contrary to result of current study, in the study of Edalatdoust and collegues, the majority of participants had good knowledge to very good knowledge about hand hygiene [22]. In this regard, the study of Barso et al. (2015) also showed that medical students had good knowledge about hand hygiene. The reason for this difference may be due to the quality and method of holding hand hygiene workshops training as well as the difference in the study population [23].

Regarding attitudes, only a small percentage of students (12%) had a positive attitude towards health, and the majority of them were neutral to the importance of hand hygiene. The results of the present study were consistent with Nair study in which, most participants did not have a good attitude towards hand hygiene [24].Contrary to the results of the present study, in the study of Edalatdoust and colleagues, the attitude of most participants was positive. More positive attitudes among nurses in the above study can be due to their greater knowledge of hand hygiene compared to the present study. In Edalatdoust study, the relationship between knowledge and attitude towards hand hygiene was significant [22].

The unfavorable state of knowledge and attitude in the present study can be justified according to the underlying variables, including taking training courses on hand hygiene. According to the results, only 76% of the students had taken the hand hygine training workshops. Among those who attended hand hygine training workshops, 52% of the students considered the existing workshops related to hand hygiene useful. Although hand hygiene is the most effective way to control and prevent the HIA [12], but the mean of hand hygiene compliance in students was undesirable (equal to 14.13±9.86) and below 50% [20]. Edalatdoust et al. (2014) reported similar results in their study on the rate of hand hygiene compliance among the staff of ICU and CCU wards in the hospitals of Zanjan University of Medical Sciences.In their study, the compliance rate was 11% among nurses, 13% among physicians, 7.7% among other staff (laboratory and radiology) and 11.7% in general [21]. Consistent with this study, Cambil-Martin and collegues reported in their study that the performance of nursing students on hand hygiene compliance was poor [25].Contrary to the results of the present study, a study by Da Silva and collegues on compliance with hand hygiene procedures recommended by the World Health Organization in Brazil showed that 35.7% of nursing students complied with hand hygiene. The better results in the study of Da Silva could be attributed to better facilities and the importance of hand hygiene among students' supervisors and educators [16].In the study of Nair and collegues in India, it was reported that compliance with the rate of hand hygiene was 62% among nursing students [24]. In Nigeria, Mohammad et al. after studying on the hand hygiene compliance of nursing students concluded that out of 36 nursing students under study, 26 (72%) of them washed their hands before touching the patients [19].Although in some of the above studies the hand washing rate was below 50%, but in comparison with the results of the present study, the situation in the compared countries was better than ours.

Unfavorable hand hygiene status in the participants of the study can have several causes. Hand hygiene compliance by students as a behavior is influenced by motivational, personal and environmental factors (such as the existence of equipment) [26].Considering the moderate level of students' knowledge and their unfavorable attitude to hand hygiene and also the unfavorable facilities necessary for hand hygiene, the present results are not surprising.

It has been confirmed in the study of Al-Wazzan et al. on nursing students in Kuwait that there is a relationship between hand hygiene compliance and the facilities required for hand hygiene [27].
The study by Onyedibe and colleges in Nigeria also showed that the necessary facilities for hand hygiene were not desirable [28]. Yetunde et al. in their review study on hand washing barriers concluded that in developing countries heavy work, lack of infrastructure and lack of necessary facilities are important barriers to non-compliance of hygiene in people [29]. In a study by Ariyaratne et al. in Sri Lanka, senior nursing students were dissatisfied with essential hand hygiene facilities including the availability of disinfectants, alcohol, hand towels, gloves, separate sinks and training programs on how to do hand hygiene procedures [18].
In the present study, assessing the rate of hand hygiene compliance in students was based on the observation method and provided more realistic information in this regard. However, the present study had some limitations, including the fact that the study was performed on nursing students of medical and surgical wards, so the results could not be generalized to other students and wards. On the other hand, students' knowledge and attitudes were assessed based on self-report scale. Students may have exaggerated their assessment of hygiene, and this limitation was beyond the control of the researcher.

Conclusion

The present study provided information about students' knowledge, attitude and performance regarding hand hygiene compliance by nursing students. According to the results of the study, nursing students had moderate knowledge and poor attitudes and performance regarding hygiene compliance. Due to the lack of optimal level of knowledge, attitude and performance of students and the lack of available facilities in the departments to comply with hand hygiene, the use of multiple strategies including training, provision of necessary facilities for hand hygiene and monitoring and feedback to improve hand hygiene in students is recommended.

Acknowledgments

This article is extracted (code A-11-149-11) from the master's thesis in medical–sergical nursing from Zanjan University of Medical Sciences (IR.ZUMS.REC.1398.173). The researchers would like to thank all those who participated in this study.

Conflict of interest

The authors hereby state that there is no conflict of interest in the present study.

Funding:

This study was partially supported by Zanjan University of Medical Sciences Research and Technology Assistant.

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