Original Article

A Survey of Nurses' Compliance with Hand Hygiene Guidelines in Caring for Patients with Cancer in a Selected Center of Isfahan, Iran, in 2016

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Abstract

Background: Hand hygiene is one of the key ways of preventing healthcare-associated infections (HCAI), especially in patients with cancer. The aim of this study was to determine nurses' compliance with hand hygiene guidelines in caring for patients with cancer in a selected center in Isfahan, Iran, in 2016. **Materials and Methods:** The present observational study was conducted on nurses in a cancer center in Isfahan in 2016. The participants were selected via convenience sampling method. Nurses serving at bedsides and willing to participate were entered into the study. Data were collected through the direct observation of nurses during delivering routine care, using the standard checklist for direct observation of the "five moments for hand hygiene" approach. **Results:** In the present study, 94 nurses were studied at 500 clinical moments. The overall hand hygiene compliance rate was 12.80%. The highest hand hygiene compliance rate was observed in the after body fluid exposure moment (72.70%). In addition, hand hygiene compliance rate in preprocedure indications (before patient contact and before aseptic procedure) and postprocedure indications (after patient contact, after body fluid exposure, and after patient surrounding contact) were 3.40 and 21%, respectively, which had a significant correlation (p = 0.001). **Conclusions:** The findings indicate that the hand hygiene compliance rate among nurses was low. Further research in this regard is recommended in order to find the causes of low compliance with hand hygiene and design interventions for improvement in hand hygiene compliance rate among nurses.

Keywords: *Hand hygiene, Iran, neoplasm, nurse*

Introduction

Patients with cancer are at a high risk for infection due to different reasons such as innate and adaptive immune system deficiency, body system disorders, and malnutrition.[1-3] Healthcare-associated infection (HCAI) is a great challenge and causes mortality, morbidity, extended hospitalization, and increased expenditures.[4] Infection control strategies in patients with cancer can prevent infections. One of the most important strategies of infection control for preventing HCAI is compliance with hand hygiene standards among healthcare providers.[1-3] Hospital personnel's hands, as factors with high rate of contact to surfaces, are the most important causative factors of the transmission and spread of bacteria in hospitals. Improving personnel's hand hygiene is considered the most important strategy for controlling HCAI.[5] Suitable hand hygiene is the basic factor for HCAI in clinical sittings.[6] High rate of hand hygiene compliance can significantly decrease sepsis, urinary tract infections, and soft tissue infections.[7]

Despite the significance of this issue and development of some guidelines by the Center for Disease Control and Prevention, hand hygiene compliance rate among healthcare providers ranges from 5 to 89% with an overall average of 38.70%. According to the World Health Organization (WHO), this rate is very low.[8] This may be due to lack of healthcare personnel, low ratio of nurses to patients, lack of time, negligence, lack of washing supplies, crowded ward, defects in management systems, poor understanding and awareness of infection risk and its impacts, low self-efficacy, cultural barriers, personal perceptions, etc.[2,9] Moreover, nurses as the main healthcare providers who interact directly with patients have special roles in this serious issue.[10] Review articles indicate that limited studies have been conducted in Iran regarding hand hygiene. Most studies conducted in Iran on hand

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hygiene have methodological limitations. For example, the results of reviewing 14 articles published between 1996 and 2011 shows that only one study had a sample size of more than 200. Therefore, it is necessary to perform more studies with larger sample sizes. Most studies have been performed in critical units and other units have not been considered. However, due to the methodological limitations of reviewed articles, it is necessary that more researches be conducted on the awareness, acceptance, and performance of the healthcare personnel.[11]

Paying attention to hand hygiene is very important with regard to differences in hand hygiene compliance rate in different studies. Since hand hygiene compliance is a simple, easy, and fundamental action for reducing HCAI, it has a very significant role in enhancing the level of patient safety. Furthermore, identifying performances, improving or increasing abilities, and recognizing guidelines on hand hygiene among nurses can have effective roles in preventing HCAI. This deeper recognition requires the investigation of nurses hand hygiene compliance in settings related to oncology in order that some measures can be taken for improving conditions. Therefore, the present study was conducted with the aim of investigating nurses' compliance with hand hygiene guidelines in caring for patients with cancer in a selected center in Isfahan, Iran, in 2016.

Materials and Methods

The present observational study was conducted on nurses in different wards in a cancer center affiliated to Isfahan University of Medical Sciences, Iran. In this study, the participants were selected using convenience sampling method. All participants were assured that all their information would remain confidential. Nurses serving at bedsides and willing to participate were entered into the study. The data collection instrument was an observational checklist which investigates hand hygiene based on the "five moments for hand hygiene" approach according to the guidelines presented by the WHO.

Data were obtained between June 21 and October 6, 2016 (a 16-week period) in the morning (100 hours) and evening (100 hours) shifts. The research process and checklist were explained to the head nurse and participants in each ward by observer. Therefore, there was the possibility of changes in nurses' behaviors and reactivity at the presence of the observer(s). Habituation was done in order to control reactivity. Therefore, the observer helped the nurses in clinical activity until habituation to the observer occurred. By consulting a statistician, considering a confidence interval (Z) of 95%, estimated compliance rate (p) of 50% in each moment, $d = 0.0438$, the number of samples was calculated as 500 hand hygiene opportunities.

In the present study, data were gathered through an observational checklist. This checklist includes demographic data (age, gender, passing infection class, shift, degree, and employment status). Moreover, nurses were observed based on the "five moments for hand hygiene" approach recommended by the WHO (before patient contact, before aseptic procedure, after patient contact, after body fluid exposure, and after patient surrounding contact) and the checklists were completed. Nurses should adhere to recommended hand hygiene guidelines including using alcohol-based hand rub and hand washing in these moments. The constructed moments were considered as samples. The validity and reliability of this checklist has been approved by the Iran Ministry of Health and Medical Education and it was used in the studies of Ataei *et al.* and Kavakebi *et al.*[12,13] The collected data were analyzed using Statistical Package for the Social Sciences statistical software (SPSS, version 18, SPSS Inc., Chicago, IL, USA) for descriptive statistics, Chi-square test, and Fisher's exact test at $p < 0.05$.

Ethical considerations

The study was approved by the Ethics Committee of Isfahan University of Medical Sciences with the Ethical code IR.MUI.REC.1395.3.233. Hospital administrators and ward managers of the selected hospital approved the study, and after confirmation of the study, sampling began. All nurses were aware of the study, and were assured that the data would be recorded anonymously.

Results

In the present study, 94 nurses were observed in 500 hand hygiene opportunities. The high number of observations was possible due to various moments created by nurses. The duration of observation in each hand hygiene opportunities was 20 ± 10 min. The total observation time was 200 h. The data related to frequency distribution of these hand hygiene opportunities are presented in Table 1 in terms of some characteristics and indications. The results indicated that the highest frequencies were related to woman (90.80%), BSc degree (91.20%), informal employment (76.40%), and passing infection control class (79.20%).

The data related to the way of performing hand hygiene and some other characteristics are presented in Table 2. This table shows that the rate of noncompliance with hand hygiene was very high. In addition, the rate of hand washing was higher than alcohol-based hand rub use. The overall hand hygiene compliance was 12.80%. Moreover, the rate of using gloves was high in all the investigated variables.

The data related to the relationship of hand hygiene compliance with other characteristics and demographic characteristics of nurses and healthcare indications are presented in Table 3. This table illustrates that there was a significant correlation between hand hygiene compliance in moments of preprocedure indication (before patient contact and before aseptic procedure) and postprocedure indications

Table 1: Frequency distribution of hand hygiene opportunities in terms of some characteristics and indications

Character, frequency	Status	Number (%)
Age	<29	234 (46.80)
	≥29	266 (53.20)
Experience	<5	226 (45.20)
	≥5	274 (54.80)
Oncology experience	<2	208 (41.60)
	≥2	289 (57.80)
Passing infection class	Yes	396 (79.20)
	No	104 (20.80)
Number of infection class	≤2	229 (45.80)
	>2	133 (26.60)
Last time of infection class	<12	115 (23)
	≥12	257 (51.40)
Gender	Male	46 (9.20)
	Female	454 (90.80)
Degree	Associate's degree	10 (2)
	BSc	456 (91.20)
	Postgraduate	34 (6.80)
Employment status	Formal	118 (23.60)
	Informal	382 (76.40)
Ward	Internal	185 (37)
	Surgery	83 (16.60)
	ICU	47 (9.40)
	Pediatric	103 (20.60)
	Emergency	49 (9.80)
	Chemotherapy	33 (6.60)
Indication	Before patient contact	76 (15.20)
	Before aseptic procedure	157 (31.40)
	After body fluid exposure	33 (6.60)
	After patient contact	142 (28.40)
	After patient surrounding contact	92 (18.40)

(after patient contact, after body fluid exposure, and after patient surrounding contact) (p = 0.001). Furthermore, there was a significant correlation between the employment status and compliance with hand hygiene (p = 0.01).

Discussion

The findings of the present study indicate that overall compliance rate was 12.80%. In the study of Nova *et al.* in Spain, this rate was 22%.[14] In the study by Ataei *et al.* in 2013, the rate of compliance with hand hygiene was 8.40%, which was less than the present study.[12] In their study, all healthcare workers were observed, whereas in the present study, only nurses were observed. In the study of Korniewicz and El-Masri[15] in the USA, hand hygiene compliance in an oncology hospital was 34.30%, which was higher than the present study. The age and experience of the participants were higher in their study compared to the current study. Moreover, in the study of Souza *et al.*[16] in Brazil, hand hygiene compliance in intensive care unit (ICU) was 47.50%, which was higher than the present study. The difference between hand hygiene compliances could be caused by difference in the studied ward and health system. In the study of Farbakhsh *et al.*,[17] hand hygiene compliance was very poor in a hematology unit. In the study of Farbakhsh *et al.* which was conducted on fewer participants than the present study, other healthcare providers such as physicians and students were observed. In another study conducted in Shiraz, Iran, in 2015, in spite of the high degree of awareness and attitudes of the oncology staff toward hand hygiene, 50.70% of them reported poor performance in this regard in their self-report performances.[18] However, there are some studies indicating that hand hygiene compliance was higher than 50%. This rate is much higher than the rate obtained in the present study.[19-22] Nevertheless, other factors such as unawareness, lack of time, skin irritation caused by disinfectants, heavy workload, lack of organizational supports, and different management systems can be effective on compliance with hand hygiene.[23,24] For the improvement of hand hygiene, multimodel programs are needed. Multimodel programs of the WHO include changes in the system, training the staff, evaluation, feedback, hand hygiene performance reminder, and institutionalization of safety culture. The combination of the "five moments for hand hygiene," multimodel programs of the WHO, and paying attention to strategies such as extensive education programs, promotion of hand hygiene guidelines, and frequent assessment can promote safety culture and hand hygiene.[25]

Furthermore, the present study showed that the rate of using gloves in clinical settings was 49.40%. In other studies, the rate of using gloves was high.[14,26,27] Although gloves cannot be an alternative for hand hygiene, the rate of their use in clinical settings is very high, which can be a factor for noncompliance with hand hygiene.[21,28,29] One of the observed problems in using gloves in the present study was not changing gloves for clinical care. Appropriate use of gloves can significantly prevent infections during clinical care.[21,30] The high rate of using gloves may be due to the ease of using them, not being time-consuming, inappropriate sense of safety with the use of gloves, or wrong understanding of replacement of gloves with hand hygiene.[16,31,32] By omitting the use of gloves, the rate of compliance with hand hygiene can be increased. In this regard, Cusini *et al.* conducted a study on the improvement of compliance with hand hygiene by forced removal of gloves in Bern during 2009 to 2012. Their findings indicated that after changes were made in the policies of the hospital for removing gloves, the rate of compliance with hand hygiene significantly increased.[28] Although suitable use of gloves is a strategy for preventing microorganisms,[33] the limitation of gloves use seems more logical.[26]

Moreover, findings of the study showed that the rate of compliance with hand hygiene in preprocedure indication

Table 2: Hand hygiene status in observed opportunities in terms of some characteristics and indications

Character	Status	hand hygiene compliance		hand hygiene noncompliance	
		Hand Rub (HR) (%)	Hand Wash (HW) (%)	Total (%)	Glove (%)
Gender	Male	1 (2.20)	2 (4.30)	43 (93.50)	16 (34.80)
	Female	22 (4.80)	39 (8.60)	393 (86.60)	231 (50.90)
Passing infection class	Yes	21 (5.30)	30 (7.60)	345 (87.10)	189 (47.70)
	No	2 (1.90)	11 (10.60)	91 (87.50)	58 (55.80)
Shift	Morning	19 (7.30)	21 (8)	221 (84.70)	126 (48.30)
	Evening	4 (1.70)	20 (8.40)	215 (90)	121 (50.60)
Degree	Associate's degree	0	1 (10)	9 (90)	3 (30)
	BSc	22 (4.80)	35 (7.70)	399 (87.50)	227 (49.80)
	Postgraduate	1 (2.90)	5 (14.70)	28 (82.40)	17 (50)
Employment status	Formal	11 (9.30)	12 (10.20)	95 (80.50)	50 (42.40)
	Informal	12 (3.10)	29 (7.60)	341 (89.30)	197 (51.60)
Indication	Before patient contact	5 (6.60)	0	71 (93.40)	41 (53.90)
	Before aseptic procedure	0	3 (1.90)	154 (98.10)	102 (65)
	After body fluid exposure	0	24 (72.20)	9 (27.30)	9 (27.30)
	After patient contact	18 (12.70)	14 (9.90)	110 (77.50)	62 (43.70)
	After patient surrounding contact	0	0	92 (100)	23 (35.90)
Total	Compliance rate	23 (4.60)	41 (8.30)	436 (87.20)	247 (49.40)

Table 3: Relationship of hand hygiene compliance with some characteristics and demographic characteristics of nurses and healthcare indications

Character	Status	Hand hygiene compliance (%)	*p*
Gender	Male	6.50	0.18#
	Female	13.40	
Passing infection class	Yes	12.90	0.91*
	No	12.50	
Shift	Morning	15.30	0.07#
	Evening	10	
Degree	Associate's degree	10	0.67#
	BSc	12.50	
	Postgraduate	17.60	
Employment status	Formal	19.50	0.01#
	Informal	10.70	
Indication	Preprocedure hand hygiene (before patient contact, before aseptic procedure)	3.40	0.001*
	Postprocedure (after body fluid exposure, after patient contact, after patient surrounding contact)	21	

#Chi-square; *Fisher's exact test

(before patient contact and before aseptic procedure) was significantly lower than postprocedure indications (after patient contact, after body fluid exposure, and after patient surrounding contact). These findings are consistent with the results of other studies.[14,16,27,34] In a self-report study conducted in Turkey, the degree of compliance before patient contact was 65–93% and after patient contact was 96–100%.[35] Preprocedure indication in hand hygiene for reducing the risk of transmission of infection to patients and postprocedure indication in hand hygiene for protecting healthcare providers and other patients are very important. The internal concern and belief of individuals about the significance of postprocedure indication and low significance of preprocedure indication can be among the causes of the higher nurses' compliance with postprocedure indication.[15,36]

Additionally, the highest rate of hand hygiene compliance was observed in the "after body fluid exposure" moment (72.70%). In other studies, the highest rate of compliance with hand hygiene was also in this moment.[12,16,22,37] Exposure to conditions with high risk of infection and the nurses' mental frameworks may result in their high compliance with hand hygiene after exposure to patients' body fluids.[15,27,38,39] Another interesting finding of the study was the noncompliance (100%) with hand hygiene in the "after patient surrounding contact" moment. Different studies have indicated that the rate of compliance in this

clinical setting was low.[14,12,37] In a study conducted in Brazil in 2013, the rate of compliance with hand hygiene in this moment was 88%. This rate is much higher than the rate obtained in the present study.[22] In another study conducted in Brazil, the rate of compliance in this moment was 49.10%.[16] These studies indicated that the degree of hand hygiene compliance depends on the type of care. Moreover, the cleanness of the surrounding environment can reduce the rate of hand hygiene in the personnel.[40] As a consequence, clean surroundings can result in higher sense of safety in the personnel and low hand hygiene compliance. Healthcare providers should consider that even in low-risk situations, transmission of bacteria can occur. Therefore, educational programs can help to improve hand hygiene compliance in this moment.[13,41]

Hand hygiene is a key component in the prevention of HCAI. Therefore, healthcare providers must understand the significance of hand hygiene in the institutionalization of this important issue and improvement of patient safety. The present study was performed with a small sample size and in a limited geographical area during a 16-week period. Although nurses constitute a large part of those healthcare providers, other healthcare providers such as physicians and medical and nursery students are involved in caring for patients. Moreover, there was the possibility of changes in nurses' behaviors at the presence of the observer (s). Thus, the observer explained the process of the project for the head nurse and participated in clinical activities along with nurses in order to find compatibility and minimize errors. In evaluating hand hygiene, there are also other methods such as measuring the degree of solutions used for hand hygiene (soap and alcoholic ingredients), but direct observation is a standard method recommended by the WHO. In addition, samples were collected in the morning and evening shifts and the collection of samples in the night shift was impossible due to lack of permission to enter the hospital by the administrator.

Conclusion

In conclusion, hand hygiene compliance rate among nurses was low. Therefore, the determination of the reasons for low compliance in settings with high potentiality of infection, revision of the infection control system with regard to the low hand hygiene compliance rate, frequent trainings for recalling the significance of hand hygiene, training-incentive programs, and frequent assessments are recommended.

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Conflicts of interest

Nothing to declare.

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