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# Investigating the Factors Affecting the Hand Hygiene Compliance from the Viewpoints of Iranian Nurses Who Work in Intensive Care Units

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## Abstract

**Background:** Hospital infections are known as one of the most important risk factors in healthcare units, and the hand hygiene is the first step in controlling these infections. Considering the importance of hand hygiene in reducing hospital infections, especially in intensive care units (ICUs), this study aimed to determine the factors affecting the compliance of hand hygiene among the ICU nurses in educational hospitals of Tabriz in Iran. **Methods:** This descriptive cross-sectional study was performed on 200 nurses working in ICU of educational hospitals in Tabriz. Sampling method determined the sample size and a 29-item researcher-made tool helped to collect data on demographic characteristics of nurses and organizational factors as self-report. The software SPSS 21 was used for descriptive analysis and statistics. **Results:** The results of this study showed that majority of nurses' viewpoint as an individual was affirmative by indicating: "positive effects of hand hygiene on reducing the incidence of hospital infections"; "skin irritation from repeated hand washes"; and "wearing gloves instead of using hygiene solution". The nurses' viewpoint on the organizational factors, distinguished: "working in ICU with simultaneous care of several patients"; "the type of hand washing solution used in the hospital"; "the availability of hand washing solutions at all times"; "the correct sink location"; "continuing education and retrain for ICU nurses"; "caring for isolated patients"; and "administrative support and their encouragement is effective for hand hygiene compliance". **Conclusions:** The results of this study showed that the level of hand hygiene compliance among the healthcare personnel who work in ICU, are associated with several personal and organizational factors. These results can facilitate institutional application of more effective hand hygiene procedures in ICU by specialized nurses and reduce the hospital infection rates.

**Keywords:** hand hygiene, personal and organizational factors, intensive care units, nurses

## **1. Introduction**

Currently, the World Health Organization (WHO) has reported hospital infections as a serious global issue leading to prolonged hospitalization, ineffective treatments, increased costs, and high mortality [1, 2]. Hospital infections mostly occur in ICUs at 10–80% rates, and patients in these units are 5–7 times more likely to develop infections when compared to other units [3–5]. In fact, patients in the ICU units are more at risk for injuries due to the lack of full consciousness and weaker immunity [6, 7].

However, about 50% of hospital infections are caused by the hands of personnel [8]. Evidence suggests that wearing gloves reduces the risk of pathogen transmission to the patients by the healthcare staff. The World Health Organization has also emphasized the use of gloves when it comes to contact with body fluids and secretions or when necessary for meeting the precautionary requirements [1, 9]. In addition, studies have shown that hand hygiene role is not well known and an average of hand washings rate is usually less than 50% among nurses, so the majority of them wear gloves in order to protect themselves [6, 10, 11].

Other study findings show that healthcare personnel express various barriers for poor hand hygiene such as skin irritation, lack of hygiene products, negative view of patients when nurses wear gloves, forgetfulness, ignoring instructions, lack of time, high workload, personnel shortage, and lack of scientific evidence on hand hygiene reducing hospital infections [12–14]. On the other hand, evidence suggests that hand hygiene among the healthcare personnel is influenced by religion and culture [15]; attitude and awareness [16]; and personal and organizational factors [17]. The results of some studies have shown that personal factors such as age, gender, education, and the organizational factors include management style, work environment, and education are important factors among the healthcare personnel [17–19].

A review of the studies shows that the acceptance of hand hygiene among nurses is low [20, 21], and some studies have reported a direct correlation between hand hygiene rate among the nurses and medical staffs in ICU units and a statistical high rate of hospital infections [22–24]. Considering the importance of hand hygiene in reducing hospital infections, especially in ICUs, the review of previous studies show that the factors affecting the hand hygiene compliance on reduction of infection among hospitalized patients have not been explored among the Iranian ICU nurses; therefore, the present study aimed to investigate the factors affecting the compliance of hand hygiene among ICU nurses in several hospitals in Tabriz, Iran.

## **2. Materials and methods**

This cross-sectional descriptive study was conducted in 2015, in Tabriz, Iran by targeting ICU nurses who worked in teaching hospitals. A total of 200 ICU nurses participated in this study by self-reporting a researcher-made 29-item questionnaire. There were two parts in the questionnaire for assessing nurses' demographic characteristics such as age, gender, and marital status. On the second part of the questionnaire, nurses were asked about personal (eight items) and organizational (21 items) factors. The scoring was based on the Likert scale from "very effective = 5" to "without effect = 1". The content validity of the questionnaire was established by several nursing professors from the Tabriz University of Medical Sciences. The reliability of the questionnaire was performed by a test-retest method, and the correlation coefficient of items was calculated to be 78%.

Information about the overall goals of the study was provided for all participants, and a written informed consent was signed by each participant. Voluntary

participation and maximum confidentiality were emphasized. The informed consent and the study implementation were approved by the Ethics Committee of Tabriz University of Medical Sciences (No. 5/2079). The questionnaires were provided to ICU nurses, and completed questionnaires were collected. Descriptive statistics (percentage and frequency, mean, and standard deviation) were used to analyze the data using SPSS 21 statistical software.

### 3. Results

The demographic results of this study shown in **Table 1** consist of 200 ICU nurses from Tabriz hospitals in Iran. Majority of nurses were female, married, held an undergraduate degree, and their mean age was  $33.9 \pm 3.4$ . Most of them were working in various shifts and reported attending hand hygiene workshops.

Participating nurses agreed with the personal factors such as “positive effects of hand hygiene on reducing the incidence of hospital infections, hand injuries due to the use of washing solutions, high workload and lack of time, firm belief about the effect of hand washing, and wearing of gloves instead of hand hygiene” were effective factors in hands hygiene and identified items “mental disturbances, the preference of satisfying the patient’s needs for hand hygiene, and the gender of nurses (male or female)” were ineffective or low for hands hygiene compliance (**Table 2**).

The findings of this study showed that majority of nurses had considered organizational factors including ICU employment, simultaneous care of several patients, type of hand washing solution, availability of hand washing solutions, presence and location of sinks in ICU, offering continuing education programs, emergency care for patients, care for isolated patients, and organizational support to be influential in hand washing behavior. Other organizational factors included short-term care such as vital signs control, sufficient amount of paper napkins, impacts of higher skill senior nurses on junior nurses, head nurse continuous

Demographic characteristics of nurses, N = 200		Number/percent
Gender	Female	135 (67.5)
	Male	65 (32.5)
Marital status	Married	129 (64.5)
	Single	71 (35.5)
Academic level	Bachelor’s degree	173 (86.5)
	Master’s degree	27 (13.5)
Work shift	Fix	47 (23.5)
	Circulate	153 (76.5)
Organizational position	Head nurse	16 (8)
	Practitioner	184 (92)
Hand hygiene educated experiences	Yes	141 (70.5)
	No	59 (29.5)
Age (year)	$33.9 \pm 3.4$	
Work history (year)	$9.38 \pm 4.42$	

**Table 1.**  
*Demographic characteristics of study participants.*

No	Personal factors	Training effectiveness level: number (%)					Mean
		Very effective	Effective	Somewhat effective	Little effective	Without effect	
1	The positive effect of hand hygiene compliance on reducing the incidence of nosocomial infections	142 (71)	57 (28.5)	1 (5)	—	—	4.71
2	Skin damage due to the use of washing solutions	113 (56.5)	68 (34)	14 (7)	5 (2.5)	—	4.45
3	Prefer to meet patient's needs rather than hand hygiene	24 (12)	47 (23.5)	71 (35.5)	49 (24.5)	9 (4.5)	3.14
4	Workload and lack of time	33 (16.5)	114 (57)	34 (17)	13 (6.5)	6 (3)	3.78
5	Firm belief about effectiveness of hand washing	109 (54.5)	78 (39)	11 (5.5)	2 (1)	—	4.47
6	Preoccupation and negligence	12 (6)	27 (13.5)	61 (30.5)	91 (45.5)	9 (4.5)	2.71
7	Sex type of nurses	14 (7)	52 (26)	40 (20)	49 (24.5)	45 (22.5)	2.71
8	Sufficient wearing gloves instead of hand hygiene compliance	33 (16.5)	107 (53.5)	33 (16.5)	16 (8)	11 (5.5)	3.68

**Table 2.**  
*The influence of personal factors on hand hygiene compliance.*

No	Organizational factors	Training effectiveness level: number (%)					Mean
		Very effective	Effective	Somewhat effective	Little effective	Without effect	
1	Being employed in ICU ward	84 (42)	76 (38)	28 (14)	11 (5.5)	1(.5)	4.16
2	Nonholiday work shifts	19 (9.5)	24 (12)	28 (14)	61 (30.5)	68 (34)	2.33
3	Holiday work shifts	15 (7.5)	25 (12.5)	30 (15)	63 (31.5)	67 (33.5)	2.29
4	Simultaneous care of a large number of patients	26 (13)	56 (28)	62 (31)	50 (25)	6 (3)	3.23
5	The need for prompt action in multiple care and procedures for several patients	19 (9.5)	8 (4)	59 (29.5)	101 (50.5)	13 (6.5)	3.73

No	Organizational factors	Training effectiveness level: number (%)					Mean
		Very effective	Effective	Somewhat effective	Little effective	Without effect	
6	Type of hand washing solution used in the hospital	95 (47.5)	69 (34.5)	21 (10.5)	11 (5.5)	4 (2)	4.20
7	Existence of sufficient amount of hand washing solutions	78 (39)	80 (40)	30 (15)	10 (5)	2 (1)	4.11
8	Existence of sufficient number of sink in ward	39 (19.5)	68 (34)	68 (34)	20 (10)	5 (2.5)	3.58
9	Putting sinks at the appropriate place in ward	38 (19)	46 (23)	90 (45)	22 (11)	4 (2)	3.46
10	Conducting continuing education programs (retraining) in the ward or hospital	27 (13.5)	60 (30)	82 (41)	29 (14.5)	2 (1)	3.41
11	Enough paper hold	43 (21.5)	33 (16.5)	80 (40)	35 (17.5)	9 (4.5)	3.33
12	Emergency care for critically ill patients	52 (26)	125 (62.5)	18 (9)	3 (1.5)	2 (1)	4.11
13	Caring for isolated patients	139 (69.5)	44 (22)	13 (6.5)	4 (2)	—	4.59
14	Carrying out short-term care such as blood pressure control	18 (9)	43 (21.5)	44 (22)	80 (40)	15 (7.5)	2.85
15	The impact of senior nurses “performance on novice nurses” performance	23 (11.5)	29 (14.5)	23 (11.5)	23 (11.5)	102 (51)	2.24
16	Continuous head nurse supervision for nursing staff	32 (16)	41 (20.5)	67 (33.5)	55 (27.5)	5 (2.5)	3.20
17	Give feedback about hand hygiene by the head nurse	28 (14)	42 (21)	68 (34)	58 (29)	4 (2)	3.16
18	Continuous supervision by infection control manager on nurses’ hand hygiene	24 (12)	32 (16)	79 (39.5)	57 (28.5)	8 (4)	3.04
19	Give feedback about hand hygiene by infection control manager	26 (13)	29 (14.5)	79 (39.5)	58 (29)	8 (4)	3.04



No	Organizational factors	Training effectiveness level: number (%)					Mean
		Very effective	Effective	Somewhat effective	Little effective	Without effect	
20	Application of punitive methods by the organization's authorities	7 (3.5)	22 (11)	65 (32.5)	69 (34.5)	37 (18.5)	2.47
21	Applying encouragement methods by the organization's authorities	45 (22.5)	92 (46)	25 (12.5)	19 (9.5)	19 (9.5)	3.63

**Table 3.**  
*Effective organizational factors on hand hygiene compliance.*

supervision on hand hygiene practice, getting feedback from infection control staffs, keeping organization's officials accountable in cases of "ineffective or low hand hygiene performance" (**Table 3**).

4. Discussion

The results of this study showed that several factors from nurses' point of view affected the hand hygiene practices. Based on their importance, these factors were attitude and beliefs about the impact of hand hygiene, the shortage of personnel and excessive workload, forgetfulness, and the belief in the cleansing solution hazards for the skin. In other studies, most nurses did not believe in hand hygiene, and the rate among medical personnel was low [12, 19, 21, 25, 26] pointing to a global concern [27]. Farbakhsh et al. found a low rate of hand hygiene practice among the Iranian nurses [28]. Similarly, Ghorbani et al. [29] showed that compliance of hand hygiene rate and wearing gloves among the nurses in ICU units was low, and most nurses used gloves without hand hygiene [29]. On the other hand, from the nurses' point of view, there were barriers to hand hygiene, which made it less likely for them to use hygiene while working with the patient. The results of Pan et al. research in 2013 revealed that hand washing could have negative effects on the skin, since frequent washing with soap resulted in dry skin, sensitivities, and dermatitis [30]. Therefore, nurses in certain places refrained from hand hygiene. In a study by De Wandel et al. [12], researchers found that disinfectant solutions with drying and irritation to the skin were obstacles to the hand hygiene practice. They reported that general attitude of nurses in ICUs were positive toward hand hygiene and increased work load did not directly affect health of their hands [12].

However, the results of other studies have indicated that a busy and high stressed environment negatively affect hand hygiene practices [31–33]. In a study by McArdle et al. [33], the shortage of personnel and heavy workload made hand hygiene less important because more time and energy were needed to take care of several patients [33]. High level of work pressure and nursing shortage generally affected the quality of nursing care [34–36]. Evidence suggests that knowledge and attitude of healthcare staff and how hand hygiene could reduce infection were directly influenced by the level of hands hygiene promotion [37–39]. In fact, the positive attitude of nurses showed that they were influenced by their knowledge about the scientific evidence of hand hygiene efficacy [16, 40]. Ravaghi et al.

[41] indicated that increased knowledge of personnel can improve their attitude toward hand hygiene. They also found that junior nurses were more accepting hand hygiene compared to senior nurses [41]. Nicol et al. [42] reported that staffs' sense of responsibility, work ethics, and level of experience played an important role on hand hygiene compliance [42]. While Whitby et al. [43] asserted that nurses had unpleasant feelings and discomfort regarding hand hygiene, where they had to be encouraged to protect themselves and ultimately change their attitude toward hand hygiene [43]. In contrast, Hazavehei et al. showed that personnel's level of knowledge and attitude toward hands hygiene was high, but these factors alone seemed insufficient to reach their goals [44].

In this study, we found that nurses in ICUs needed to enhance their hand hygiene practices. These results were inconsistent with findings of some researches in the past [14, 45, 46]. It is likely that different participants' attitudes and practices generated different results, and in this study, nurses' gender had no effect on the hand hygiene, while other studies indicated that female nurses practiced more hand hygiene than male nurses [19, 47]. Similar to this study, Nazari and Asgari found that hand hygiene practices were the same between male and female nurses [6].

Our findings, similar to other studies, showed that availability of hand sanitizer's increased the rate of hand hygiene among nurses and healthcare personnel, but heavy workload and overcrowding will reduce the rate [20, 31, 48]. Our findings of effective health education and staff encouragement on promotion of hand hygiene among the nurses were consistent with other study findings [49–52]. Ashraf et al. [31] showed that heavy workload and overcrowding limited hand hygiene, especially when there were insufficient supplies such as paper towels gloves, hand washing solutions, skin irritation due to persistent washing, and absence of washstand sink nearby [31]. Other studies have reported the lack of time and sinks [53], high workload, patient's condition, and lack of hand washing solutions [20], and lack of time as a reason for less hand hygiene practices [48]. In a review by Smiddy et al. [32], researchers showed that high workload and shortage of personnel were barriers to hand hygiene [32]. Other studies indicated that shortage of nursing staff in ICUs had a negative effect on hand hygiene and an increase in mortality rates [33]. In other words, a sufficient number of nursing personnel could effectively reduce the hospital infection rates [54] in support of the results of in this study.

## 5. Conclusions

Based on the results of present study, there are numerous personal and organizational factors affecting the compliance of hand hygiene among the ICU nurses. Working in ICU, personal beliefs, knowledge, and attitude toward the effects of hand hygiene on reducing infections; availability hand hygiene supplies; continuous health education training; and a supportive organizational management are all part of an effective hand hygiene practice. Therefore, these results could help hospital administrators to effectively implement policies to increase the rate of hand hygiene practices among the healthcare providers and hospital staffs to reduce preventable infections.

## 6. Limitations

The ICU nurses from Tabriz hospitals in Iran took part in this study, and researchers acknowledge the study limitation regarding generalizability of the results. Therefore, it is recommended that similar research to be conducted among a



larger number of the ICU nurses in different cities to obtain an overall understanding of factors contributing to a low rate of hand hygiene.

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