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Original Article

Hand hygiene beliefs and practices and glove use attitudes of health professionals working in the emergency department

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Abstract

Introduction: Hand washing and the use of gloves in accordance with the standards are among the most significant methods used in infection control.

Methodology: This study is an analytical cross-sectional study. The sample of the study consisted of 132 health personnel working in the emergency department of a public hospital.

Results: The mean of the hand hygiene belief scale was 85.50 ± 8.71, mean of the hand hygiene practice inventory was 67.70 ± 5.19. The participants' mean general attitude towards the use of gloves was 43.71 ± 7.57, the mean of awareness about the use of gloves was 15.17 ± 3.88, the mean attitude towards the usefulness of glove use was 19.43 ± 1.47, and their attitude towards the necessity of using gloves was 12.63 ± 3.57. It was determined that glove usefulness score has a statistically significant and increasing effect on hand hygiene belief, while glove usefulness and glove awareness scores have statistically significant and increasing effects on hand hygiene practice.

Conclusions: This study determined that the hand hygiene beliefs and practices of the health personnel working in the emergency department are quite high, their attitudes towards the use of gloves are positive, the attitude towards the usefulness of glove use has a significant and increasing effect on hand hygiene belief, and glove usefulness and glove awareness attitudes have a significant and increasing effect on hand hygiene practice.

Key words: hand hygiene; hand disinfection; gloves; protective; infection control; emergency department.

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Introduction

Emergency departments are the pioneers of modern healthcare systems, serving as the primary point of access to timely and life-saving medical care. In the emergency department that complex and dynamic circulation, infection prevention can easily be overlooked or superseded by other immediate and life-threatening issues. Since the emergency departments are the first places where patients who come to the hospital are evaluated, significant infectious disease risks exist in emergency care that can carry substantial clinical consequences for both patients and healthcare personnel. Therefore, infection prevention in emergency departments is now more widely accepted as essential to high-quality emergency care [1].

Hand hygiene is the most significant strategy to prevent the transmission of microorganisms among patients, healthcare personnel, and the healthcare environment [2]. In addition to hand hygiene, CDC also mandated the use of barriers (gloves, protective gowns, masks, goggles, etc.) to protect healthcare personnel from contamination by blood, body fluids, etc. [3]. The most important of these barriers is the use of gloves [4]. Although scientific evidence points to a relationship between the increase in hand hygiene and the decrease in nosocomial infection rates, the rates of consistency and compliance in hand hygiene are low [5]. Previous studies reveal that these rates vary between 5% and 81%, and the mean is around 40% [2], the compliance by health professionals (nurses, doctors, and physiotherapists) working in the emergency departments is 29% [6]. In a review study on nosocomial infection control in emergency department units, it was found that the rates of compliance with hand hygiene ranged from 7.7% to 89.7% [7]. In previous studies, hand hygiene rates among emergency clinicians have been reported to vary between 10% and 90% [4-6,8]. As can be seen, although hand hygiene is a simple process, compliance varies according to hospitals, departments, and working conditions. As the

workload increases, the number of hand washing per hour for patient care increases, which reduces compliance [5]. In addition, many factors such as the individual characteristics of healthcare professionals, their knowledge, attitudes, practices, beliefs, and perceptions about hand hygiene, workload, and lack of role models can affect the behavior of individuals to comply with hand hygiene [5,9].

The Health Belief Model suggests that individuals' health behaviors will be affected by their beliefs, values, and attitudes. In this regard, determining the beliefs and perceptions underlying the attitudes and behaviors of individuals regarding hand hygiene and the use of gloves, and completing their wrong/missing aspects will take them into action on this issue. If these beliefs and attitudes that are seen as problems are detected, the training and the steps to be taken will lead to more effective results [5]. Therefore, determining the beliefs and practices regarding hand hygiene and the attitudes toward using gloves is essential to increase the health personnel's hand hygiene compliance and the correct use of gloves. It is of critical importance to carry out studies to prevent infections that endanger patient and employee safety, especially in emergency departments, which include many factors such as overcrowding, heavy workloads, lack of time, complexity and unpredictability of patients, stress in the professional team, resource/infrastructure constraints, and often understaffing [7].

Methodology

Aim

This study was carried out to determine the hand hygiene beliefs and practices and the attitudes toward using gloves of health professionals working in the emergency department.

Research questions

What are the Hand Hygiene Beliefs of Health Professionals Working in the Emergency Department?

What are the Hand Hygiene Practices of Health Professionals Working in the Emergency Department?

What are the Glove-Using Attitudes of Health Professionals Working in the Emergency Department?

Is there any relationship between the Hand Hygiene Beliefs and Practices of the Health Professionals Working in the Emergency Department and the Attitudes toward Using Gloves?

Study design

This is an analytical cross-sectional study.

Population and Sample

The population of the research consists of 176 health personnel working in the emergency department of a public hospital in the capital city of Turkey. Before the data collection process, the sample size was calculated using the "G.Power-3.1.9.2" software. Accordingly, when the effect size of the study was taken as 0.50 (moderate), the alpha value as 0.05, and the power as 0.80, the minimum sample size was determined as 128 [10]. Considering that there would be a 10% data loss in data collection, no sample selection was made, and it was aimed to reach the entire population. In the study, 75% of the population (132 people) was reached.

Inclusion criteria

Working as a health personnel in the emergency department of the hospital where the study will be conducted and agreeing to participate in the study.

Exclusion criteria

To be on leave while the study data is collected and to fill in the data collection forms incompletely.

Data collection location and time

The data of the study were collected in the emergency department of a public hospital in the capital of Turkey between 01 May 2021 and 01 September 2021.

Data collection tools

Study data were collected using the "Information Form" prepared by the researcher, "Hand Hygiene Belief Scale and Hand Hygiene Practices Inventory" and "Health Care Workers' Attitudes toward Glove Usage Scale".

Information Form

The "information form" prepared by the researchers consists of a total of 12 questions regarding the socio-demographic and professional characteristics (age, gender, marital status, education status, seniority in the profession, duty in the emergency department, seniority in the emergency department, satisfaction in working in the emergency department, training on hand hygiene and glove use, compliance with hand hygiene in the emergency department, and factors that negatively affect glove use) of health workers.

Hand Hygiene Belief Scale and Hand Hygiene Practices Inventory

Hand Hygiene Belief Scale and Hand Hygiene Practices Inventory was developed by Van de Mortel [9] and adapted into Turkish by Karadağ *et al.* [11]. The Hand Hygiene Belief Scale consists of 22 items scored as "1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree"; The Hand Hygiene Practice Inventory consists of 14 items scored as "1 = never, 2 = sometimes, 3 = often, 4 = mostly, 5 = always". Items 5, 8, 16, 17, 18, 19, and 20 of the scale are reversed (5 = strongly disagree, 4 = disagree, 3 = undecided, 2 = agree, 1 = strongly agree).

The total score of the hand hygiene belief scale ranges from 22 to 110, and a high score is interpreted as having a positive belief about hand hygiene. The total score that can be obtained from the hand hygiene practice inventory varies between 14 and 70, and the high scores indicate that there is a positive belief about hand hygiene and hand hygiene practices are carried out effectively and all the time. In the Turkish validity and reliability study, the internal consistency reliability coefficient was determined as 0.76 for the hand hygiene belief scale and 0.85 for the hand hygiene practice inventory.[11] In this study, the internal consistency reliability coefficient was determined as 0.61 for the hand hygiene belief scale and 0.89 for the hand hygiene practice inventory.

Health Care Workers' Attitudes toward Glove Usage Scale

The scale, developed by Alaçam and Esen [12], is a 5-point Likert scale (1-Strongly disagree, 5-Strongly agree) consisting of 11 items and three sub-dimensions (awareness, usefulness, necessity). The scale includes 5 direct and 6 reversed items. Reversed items were scored reversely. The lowest score that can be obtained from the scale is 11, and the highest score is 55. An increase in the scores obtained from the scale indicates that the attitudes of healthcare workers to use gloves are positive. In the study of Alaçam and Esen [12], the Cronbach alpha value of the scale was found to be 0.83. In this study, the reliability coefficient was determined as 0.60.

Ethical Issues

Before the study was conducted, approval (Protocol No: 2021/231) from Ethics Committee, and research permission from the institution where the study was conducted was obtained. Permissions for the scales used in the study were obtained from the respective authors. Verbal consent was obtained from health workers participating in the study.

Data Analysis

All statistical analyses were performed using SPSS 25.0 (IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.) Continuous variables were defined by the mean ± standard deviation and categorical variables were defined by number and percent. Kolmogorov Smirnov and Shapiro-Wilk tests were used for the determination of normal distribution. For independent group comparisons, the Mann Whitney U test and Kruskal Wallis Variance Analysis (post hoc: Mann Whitney U test with Bonferroni correction) were used when parametric test assumptions were not provided. We used Spearman correlation analysis to investigate the relationships between continuous variables. Linear regression analysis was used to analyze the variables which had a statistically significant effect on hand hygiene beliefs and practices. Statistical significance was determined as $p < 0.05$.

Limitations of the Study

Since this study was carried out only with health personnel working in the emergency department of a single hospital, it cannot be generalized to all emergency department personnel in Turkey. Therefore, the results of the study are limited to the emergency department personnel in the hospital where the study was conducted. In addition, the results obtained in this study are limited to the scales used for data collection.

Results

The mean age of the individuals participating in the study was 34.33 ± 4.14, 62.1% were female, 51.5% were single, 38.6% had undergraduate education, and 30.3% had postgraduate education. The mean years of working in the profession of the individuals participating in the study were 11.77 ± 8.91, and the mean years of working in the emergency department were 6.61 ± 6.203. Among the participants, 66.7% were nurses in the emergency department, 22.0% were doctors, and 11.0% were emergency medical technicians. While 72.0% of the participants reported that they were satisfied with working in the emergency department, 91.7% received hand hygiene training, 48.5% received this training in the hospital, 89.4% received glove usage training, and 44.7% received this training in the hospital. Among the factors that negatively affect their compliance with hand hygiene in the emergency room, 47.0% of the participants reported time constraints, and 28.8% reported both time

Table 1. Mean scores of hand hygiene belief scale and hand hygiene practices inventory and attitudes toward glove usage scale.

Scale	M	SD	Min	Max
Hand Hygiene Belief Scale and Hand Hygiene Practices Inventory				
Hand Hygiene Belief	85.50	8.71	46	100
Hand Hygiene Practices	67.70	5.59	44	70
Attitudes toward Glove Usage Scale				
Awareness	3.88	15.17	4	20
Usefulness	19.43	1.47	12	20
Necessity	12.63	3.57	3	15
Glove Use Attitude Total	43.71	7.57	25	55

M: Mean; SD: Standard Deviation.

constraints and antiseptic solutions and soaps irritating the hands. Among the factors that negatively affect the use of gloves in the emergency room, 53.3% of the participants reported time constraints, 9.1% reported that gloves reduced dexterity, and 9.1% reported that there are not enough gloves and gloves reduced dexterity.

The participants' hand hygiene belief mean scores, hand hygiene practice mean scores, and glove use attitude mean scores are presented in Table 1.

The hand hygiene beliefs and practices of the participants and their attitudes toward using gloves were compared according to some basic characteristics (Table 2). A statistically significant difference was found in three variables. A significant difference was found between the usefulness sub-dimension scores of the attitude of using gloves according to the education level of the participants ($p < 0.05$). Using the Mann-Whitney-U test with Bonferroni correction, it was determined that this difference was due to the difference

Table 2. Comparison of participants' hand hygiene beliefs and practices and glove use attitudes according to their characteristics (n = 203).

Variables	Hand Hygiene Belief and Hand Hygiene Practices				Attitude toward Glove Usage							
	Hand Hygiene Belief		Hand Hygiene Practices		Awareness		Usefulness		Necessity		Glove Use Attitude Total	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Gender												
Female	86.29	7.91	67.70	4.90	15.10	3.53	19.51	1.16	12.62	3.53	43.52	7.34
Male	84.22	9.84	67.70	5.69	15.28	4.31	19.30	1.88	12.66	3.68	44.02	8.01
Statistical analysis	Z = -1.346; $p = 0.178$		Z = -0.518; $p = 0.605$		Z = -0.916; $p = 0.360$		Z = -0.307; $p = 0.759$		Z = -0.266; $p = 0.790$		Z = -0.637; $p = 0.524$	
Marital status												
Married	84.12	9.71	67.90	5.44	15.20	4.40	19.53	1.45	13.06	3.43	44.48	7.75
Single	86.80	7.50	67.51	4.98	15.14	3.36	19.33	1.50	12.23	3.68	42.98	7.38
Statistical analysis	Z = -1.965; $p = 0.050$		Z = -1.033; $p = 0.302$		Z = -0.579; $p = 0.562$		Z = -1.497; $p = 0.134$		Z = -1.926; $p = 0.054$		Z = -1.234; $p = 0.217$	
Education level												
High School	85.00	8.42	68.29	5.14	15.18	3.77	19.51	1.64	11.66	4.42	42.51	7.77
Associate Degree	86.14	6.88	66.71	4.92	16.78	2.80	1.35	1.33	11.71	4.06	44.64	6.31
Undergraduate	84.92	9.36	66.58	5.98	15.07	3.36	19.07	1.69	12.86	3.24	43.50	6.49
Postgraduate	88.33	8.33	68.80	5.01	15.23	4.86	19.71	1.30	13.19	3.68	45.28	9.62
Doctorate	84.21	9.08	69.36	2.00	14.15	4.75	20.00	0.00	13.47	2.31	43.52	8.69
Statistical analysis	$\chi^2 = 3.965$; $p = 0.411$		$\chi^2 = 9.506$; $p = 0.050$		$\chi^2 = 3.666$; $p = 0.453$		$\chi^2 = 14.317$; $p =$ **0.006***		$\chi^2 = 4.477$; $p = 0.345$		$\chi^2 = 2.659$; $p = 0.616$	
Profession												
Nurse	85.05	9.07	67.47	5.10	15.82	3.28	19.33	1.50	12.35	3.89	44.29	7.13
Doctor	86.31	8.98	68.93	3.81	13.20	4.75	19.89	0.55	13.86	2.06	42.51	9.09
ATT	87.18	3.73	66.36	8.28	14.90	4.61	19.00	2.48	11.72	3.40	42.00	6.79
Statistical analysis	$\chi^2 = 1.178$; $p = 0.555$		$\chi^2 = 3.400$; $p = 0.183$		$\chi^2 = 6.210$; $p =$ **0.045***		$\chi^2 = 5.283$; $p = 0.071$		$\chi^2 = 5.526$; $p = 0.063$		$\chi^2 = 1.076$; $p = 0.584$	
Satisfaction with Working in the Emergency Department												
Very satisfied	86.92	9.96	65.78	6.55	13.85	4.605	18.85	1.74	12.35	4.10	41.00	7.84
Satisfied	85.73	8.96	67.75	4.88	15.04	3.61	19.47	1.38	12.54	3.48	43.51	7.461
Not satisfied	83.69	6.71	68.65	5.47	16.52	4.30	19.60	1.67	13.17	3.76	46.17	
Statistical analysis	$\chi^2 = 2.711$; $p = 0.258$		$\chi^2 = 5.344$; $p = 0.069$		$\chi^2 = 5.323$; $p = 0.070$		$\chi^2 = 6.558$; $p =$ **0.038***		$\chi^2 = 3.226$; $p = 0.199$		$\chi^2 = 3.786$; $p = 0.151$	

*$p < 0.05$ statistically significant; M: Mean; SD: Standard Deviation; z: Mann Whitney U test; χ^2: Krusal Wallis Variance Analysis.

Table 3. The relationship between participants' hand hygiene beliefs, practices, and attitudes towards glove usage.

Hand Hygiene Belief and Hand Hygiene Practices	Attitude towards Glove Usage							
	Awareness		Usefulness		Necessity		Attitude toward Glove Usage Total	
	r	*p*	r	*p*	r	*p*	r	*p*
Hand Hygiene Belief	0.170	0.051	0.358	0.000*	0.242	0.005*	0.281	0.001*
Hand Hygiene Practices	0.214	0.014*	0.927	0.000*	0.057	0.516	0.211	0.015*

*$p < 0.05$ statistically significant; r: Spearman Correlation Coefficient.

between those who received doctoral education and those who received undergraduate education ($p < 0.05$). Health professionals with doctoral degrees believed significantly more in the usefulness of using gloves than those with a bachelor's degree. A significant difference was found between the awareness sub-dimension scores of the attitudes toward glove usage scale according to the occupations of the participants ($p < 0.05$). Using the Mann-Whitney-U test with Bonferroni correction, it was determined that this difference was due to the difference between nurses and doctors ($p < 0.05$). Nurses' awareness of using gloves was significantly higher than doctors. A significant difference was found in the usefulness sub-dimension scores of the attitude toward glove usage according to the 'participant's satisfaction with working in the emergency department ($p < 0.05$). Using the Mann-Whitney-U test with Bonferroni correction, it was determined that this difference was due to the difference between those who were very satisfied with working in the emergency department and those who were not ($p < 0.05$). The belief in the usefulness of using gloves of those who were not satisfied with working in the emergency department was significantly higher than those who were satisfied with working in the emergency department ($p < 0.05$) (Table 2).

The relationship between the participants' hand hygiene beliefs and practices and their attitudes towards glove usage was examined, and a positive and significant relationship was found between hand hygiene belief and attitudes towards glove usage (r = 0.281, $p = 0.001$), between hand hygiene belief and usefulness sub-dimension of the attitudes towards glove usage (r = 0.358, $p = 0.000$), and between hand hygiene belief and necessity sub-dimension of the attitudes towards glove usage (r = 0.242, $p = 0.005$). A positive and significant relationship was found between hand hygiene practices and attitudes towards glove usage (r = 0.211, $p = 0.015$), between hand hygiene practices and awareness sub-dimension of the attitudes towards glove usage (r = 0.214, $p = 0.014$), and between hand hygiene practices and usefulness sub-dimension of the attitudes towards glove usage (r = 0.927, $p = 0.000$) (Table 3).

When the relationship between the participant's age, seniority in the profession and seniority in the emergency department, and hand hygiene beliefs and practices, and glove use attitudes were examined, a positive and significant relationship was found between age and awareness sub-dimension of the attitudes towards glove usage (r = 0.192, $p = 0.027$) and between seniority in the profession and awareness sub-dimension of the attitudes towards glove usage (r = 0.224, $p = 0.010$). A positive and significant correlation was found between the seniority in the emergency department and hand hygiene practices (r = 0.210, $p = 0.016$), and between seniority in the emergency department and usefulness sub-dimension of the attitudes towards glove usage (r = 0.233, $p = 0.007$) (Table 4).

The factors that have an effect on hand hygiene belief were primarily examined with univariate linear regression models. It has been determined that variables such as receiving training on the use of gloves, attitude

Table 4. The Relationship between some basic characteristics of the participants and their hand hygiene beliefs and practices and attitudes towards glove usage (n = 203).

Variables	Hand Hygiene Belief and Hand Hygiene Practices				Attitude towards Glove Usage							
	Hand Hygiene Belief		Hand Hygiene Practices		Awareness		Usefulness		Necessity		Total	
	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*
Age	0.061	0.484	0.079	0.371	0.192	0.027*	0.109	0.215	0.060	0.492	0.157	0.072
Seniority in Profession	0.105	0.233	0.138	0.113	0.224	0.010*	0.164	0.061	0.034	0.703	0.156	0.075
Seniority in the Emergency Department	0.051	0.560	0.210	0.016*	0.073	0.405	0.233	0.007*	0.082	0.348	0.079	0.365

*$p < 0.05$ statistically significant; r: Spearman Correlation Coefficient.

towards glove usage, and awareness, usefulness, and necessity sub-dimensions of attitude towards glove usage have a statistically significant effect on hand hygiene belief. As a result of the multivariate linear regression model set with these variables, which have a significant effect, it was determined that only the glove usefulness score had a statistically significant and increasing effect on hand hygiene belief (Table 5).

The factors that have an effect on hand hygiene practices were primarily examined with univariate linear regression models. It has been determined that variables such as seniority in the emergency department, receiving hand hygiene training, receiving training on the use of gloves, attitude towards glove usage, and awareness and necessity sub-dimensions of attitude towards glove usage have a statistically significant effect on hand hygiene practices. As a result of the multivariate linear regression model set with these variables, which have a significant effect, it was determined that the glove usefulness and awareness scores have a statistically significant and increasing effect on hand hygiene practices (Table 6).

Table 5. Factors affecting hand hygiene belief.

Variables	Univariate Models			Multivariate Model		
	Std. Beta	*p*	%95 C.I. Lower -Upper	Std. Beta	*p*	%95 C.I. Lower – Upper
Age	0.061	0.484	-0.103 - 0.217	-	-	-
Gender	-0.116	0.186	-5.158 - 1.012	-	-	-
Marital status	0.154	0.077	-0.295 - 5.662	-	-	-
Education level	0.019	0.825	-1.04 - 1.302	-	-	-
Seniority in Profession	0.105	0.233	-0.066 - 0.271	-	-	-
Seniority in Emergency Department	0.051	0.56	-0.172 - 0.315	-	-	-
Satisfaction with Working in the Emergency Department	-0.102	0.243	-4.547 - 1.163	-	-	-
Status of receiving training on hand hygiene	0.052	0.551	-3.799 - 7.089	-	-	-
Status of receiving training on the use of gloves	0.218	0.012*	1.386 - 10.936	0.105	0.212	-1.707 - 7.608
Mean Score of Attitudes toward Glove Usage Scale	0.281	0.001*	0.131 - 0.515	0.101	0.648	-0.385 - 0.617
Awareness	0.17	0.05*	-0.002 - 0.766	0.035	0.858	-0.777 - 0.933
Usefulness	0.358	0.0001*	1.154 - 3.064	0.292	0.001*	0.747 - 2.695
Necessity	0.242	0.005*	0.179 - 0.999	0.15	0.263	-0.279 - 1.011

*$p \leq 0.05$ statistically significant; Std. Beta: Standardized Beta Coefficient; C.I: Confidence Interval.

Table 6. Factors affecting hand hygiene practices.

Variables	Univariate Models			Multivariate Model		
	Std. Beta	*p*	%95C.I. Lower - Upper	Std. Beta	*p*	%95 C.I. Lower - Upper
Age	0.079	0.371	-0.052 - 0.139	-	-	-
Gender	-0.001	0.994	-1.859 - 1.844	-	-	-
Marital status	-0.038	0.667	-2.187 - 1.404	-	-	-
Education level	0.078	0.375	-0.383 - 1.009	-	-	-
Seniority in Profession	0.138	0.113	-0.019 - 0.181	-	-	-
Seniority in Emergency Department	0.21	0.016*	0.034 - 0.318	-0.009	0.784	-0.065 - 0.049
Satisfaction with Working in the Emergency Department	0.136	0.121	-0.357 - 3.032	-	-	-
Status of receiving training on hand hygiene	0.179	0.04*	0.15 - 6.544	-0.07	0.312	-3.838 - 1.235
Status of receiving training on the use of gloves	0.232	0.007*	1.068 - 6.741	0.085	0.218	-0.85 - 3.698
Mean Score of Attitudes toward Glove Usage Scale	0.211	0.015*	0.028 - 0.261	-0.073	0.185	-0.125 - 0.024
Awareness	0.214	0.014*	0.06 - 0.513	0.109	0.047*	0.002 - 0.289
Usefulness	0.927	0.0001*	3.029 - 3.486	0.92	0.0001*	2.989 - 3.474
Necessity	0.057	0.516	-0.169 - 0.334	-	-	-

*$p \leq 0.05$ statistically significant; Std. Beta: Standardized Beta Coefficient; C.I: Confidence Interval.

Discussion

The most important methods used in infection control are hand washing in accordance with the standards and the use of gloves. This study was carried out to assess the hand hygiene beliefs and practices and gloves use attitudes of healthcare professionals working in the emergency department.

Although hand hygiene is a simple process, belief and compliance with hand hygiene vary according to hospitals, departments, and working conditions. Although hand washing rates and compliance were found to be different in many studies on hand washing, the common point of all studies is that the hand washing rates of healthcare workers are lower than expected [5,8,13]. The literature reveals that these rates vary between 5% and 81%, the mean is around 40%[2], and compliance by health professionals, especially in emergency departments, varies from 10% to 90% [1,4-6]. Although hand hygiene compliance rates are low in the literature, hand hygiene beliefs and practices of health personnel working in the emergency department were found to be quite high in this study. It is considered that this situation is due to reasons such as attaching great importance to infection control measures in all units of hospitals, especially in emergency departments due to the COVID-19 pandemic, which has affected the whole world in recent years, and increasing training and supervision on this issue. In parallel with this study, another study conducted in Turkey in recent years determined that the hand hygiene beliefs and hand hygiene practices of healthcare workers were high [14]. Another standard isolation measure used to control hospital infections is the use of gloves [15]. Özden and Özveren [16] found that nurses' hand hygiene and glove use mean scores were low. A limited number of recent studies examine the use of personal protective equipment in emergency departments [17]. Following the introduction of universal measures in the early 1990s [3], several studies report inadequate compliance with these measures in the emergency department [18,19]. More recently, Singh *et al.* [20] found that gloves are frequently used in the emergency room. Akça and Keşaplı [13], on the other hand, found that 63.4% of 814 contacts of emergency department workers were not wearing gloves. This study had determined that the attitudes of emergency department health personnel towards the use of gloves were positive. It is considered that this situation is due to reasons such as attaching great importance to infection control measures in emergency departments due to the COVID-19 pandemic, which has affected the whole world in recent years, and increasing training and supervision on this issue.

Compliance with hand hygiene varies according to hospital, department, and working conditions. As the workload increases, the number of hand washing per hour for patient care increases, reducing compliance [5]. In addition, many factors such as the individual characteristics of healthcare professionals, their knowledge, attitudes, practices, beliefs, and perceptions about hand hygiene, workload, and lack of role models can affect the behavior of individuals to comply with hand hygiene [5,9]. In this study, participants reported time constraints and irritating hands with antiseptic solutions and soaps most among the factors that negatively affect their compliance with hand hygiene in the emergency department. In some studies, it is stated that factors such as hospital conditions, the density of the department, the architectural structure of the hospital, the difficulty of reaching the washbasins and hand antiseptics for hand washing, and the high workload negatively affect the compliance of health personnel with hand hygiene [11,21]. In the study of Khodadadi [22], it was stated that beliefs about the effect of hand hygiene, lack of personnel, excessive workload, forgetfulness, and the skin-irritating effect of the aseptic solutions negatively affect the hand hygiene compliance of healthcare personnel. Our study results are similar to the results of other studies, and time constraint is the primary factor that negatively affects hand hygiene compliance in an environment such as the emergency room, where rapid interventions are at the forefront.

Previous studies have reported that gloves affect dexterity and generally delay task completion [23,24]. In this study, time constraint was the most reported factor that negatively affected the use of gloves by the participants, followed by the thought that the gloves reduce their dexterity, and shortage of gloves. The findings of this study support the literature.

In our study, it was determined that the significant difference between the usefulness sub-dimension scores of the attitude of using gloves according to the education level of the participants was due to the difference between those who received doctoral education and those who received undergraduate education. Health professionals with doctoral degrees believe significantly more in the usefulness of using gloves than those with undergraduate degrees. Urkan *et al.* [25] stated that as the level of education increases, the attitude towards glove use increases. Şahin *et al.* [26], on the other hand, found a statistically significant

difference in terms of awareness score when they examined the attitudes toward glove usage scale sub-dimensions mean scores of healthcare workers according to their education level.

In our study, a significant difference was found between the awareness sub-dimension scores of the attitudes toward glove usage according to the professions of the participants. It was determined that nurses' awareness of using gloves was significantly higher than doctors. Urkan *et al.* [25] determined that nurses' attitudes toward the use of gloves are more positive than other professions. Studies examining the correct use of gloves by occupational groups indicate that nurses use gloves more frequently and accurately than physicians [13-25]. The results in the literature support our study results. It is considered that nurses are more aware of using gloves because they are health professionals who have the most contact with patients and take an active role in the care and treatment process.

Gloves alone are not sufficient to prevent infection and cannot fully protect healthcare personnel and patients against microbial agents. Therefore, health personnel should perform hand washing and use of gloves together [27]. In our study, when the relationship between the hand hygiene beliefs and practices of the participants and the attitudes toward glove usage was examined, a positive and significant relationship was found between the participants' hand hygiene beliefs and the usefulness and necessity sub-dimensions of the attitudes toward glove usage.

The factors that have an effect on hand hygiene belief were primarily examined with univariate linear regression models. As a result of the multivariate linear regression model set with the variables that have a significant effect, it was determined that only the glove usefulness score had a statistically significant and increasing effect on hand hygiene belief. The factors that have an effect on hand hygiene practices were primarily examined with univariate linear regression models. As a result of the multivariate linear regression model set with the variables that have a significant effect, it was determined that the glove usefulness and awareness scores have a statistically significant and increasing effect on hand hygiene practices. Ghorbani *et al.* [27] stated that nurses' hand hygiene rate and compliance with wearing gloves are low in intensive care units and that most of the nurses use gloves without hand hygiene. Pan *et al.* [28] stated that nurses did not wash their hands before and after wearing gloves, and they considered this is due to the nurses' assumption that frequent hand washing with soap causes skin dryness, skin allergies, and dermatitis in some cases. It should be underlined that the use of gloves is not a substitute for hand hygiene. However, the use of appropriate gloves can reduce the transmission of infection from staff to patients and the risks of cross-infection. To correct the erroneous understanding of health personnel about hand hygiene and the use of gloves, providing periodic training on this subject is recommended [29].

Conclusions

This study determined that the hand hygiene beliefs and practices of the health personnel working in the emergency department were quite high, and their attitudes toward the use of gloves were positive. In the study, it was reported by the participants that the time constraints and the irritation of the hands with antiseptic solutions and soaps negatively affected compliance with hand hygiene in the emergency room. Also, it was reported by the participants that time constraints, the thought that gloves reduce dexterity, and the inability to find enough gloves negatively affect the use of gloves. It was determined that the attitude towards glove usefulness had a significant and increasing effect on hand hygiene belief while attitude towards the glove usefulness and awareness had a significant and increasing effect on hand hygiene practices. In line with the results, providing training on ensuring hand hygiene and using gloves in accordance with standards, preventing time constraints by increasing the number of health personnel working in the emergency departments, eliminating the lack of gloves in health institutions, delivering training to health personnel on hand hygiene and glove use at regular intervals, conducting studies on this subject in different hospitals, and conducting observational studies is recommended.

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