Research Article

Knowledge and practice of hand hygiene among healthcare workers at Armed Forces Military Hospitals, Taif, Saudi Arabia

Amal M ALSofiani[1], Fahad AlOmari[2], Muied AlQarny[3]

[1]Family Medicine Department, Ministry of Health, Taif, Saudi Arabia.
[2]Family Medicine Department, Al-Hada Armed Forces Hospital, Taif, Saudi Arabia.
[3]Family Medicine Department, National Guard, Taif, Saudi Arabia.
Correspondence to: Amal M ALSofiani, E-mail: amal.hsn@hotmail.com

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Abstract

Background: Hand hygiene is an important healthcare issue globally and is a single most cost-effective and practical measure to reduce the incidence of healthcare associated infection (HCAIs) and the spread of antimicrobial resistance across all settings from advanced healthcare systems to primary healthcare center.

Objective: To evaluate knowledge of healthcare workers (HCWs) about hand hygiene and to assess practice of hand hygiene and identify obstacles among them at Armed Forces Military Hospitals in Taif.

Materials and Methods: This cross-sectional study implemented included a representative sample of HCWs in Armed Forces Military Hospitals, Taif region. Two questionnaires were used for gathering data, based mainly on data collection instrument developed and validated by the WHO and CDC. The first questionnaire was self-administered questionnaire and composed of 24 points regarding demographics and hand hygiene knowledge. The second questionnaire was fulfilled by infectious control staff to assess infrastructure and practice of participants regarding handwashing by observation and decided whether these items either met or not met the guidelines.

Result: A total of 347 HCWs in Taif Military Hospitals participated in the study with a response rate of 96.1%. The age of 45.2% of them was ≤ 30 years. Most of them (75.5%) were female subjects. Most of the surveyed HCWs (83.3%) reported getting formal training in hand hygiene in the last 3 years. Hand hygiene knowledge score was very good among 19% of HCWs, while it was good among 60% of them. Insufficient hand hygiene knowledge was reported among 21% of HCWs. Those working in Al-Hada Hospital and joined this health facility since more than 3 months showed better significant knowledge of hand hygiene. On the other hand, practice score was excellent among more than three-quarters of the participants (76.1%). Female subjects, nurses, and those working at Al-Hada Hospital and in the Departments of Obstetrics and Intensive Care Unit showed better significant hand hygiene practice. The commonly reported obstacles for following guidelines of hand hygiene as mentioned by HCWs were that emergency and other priorities make hand hygiene more difficult at times, the frequency of required hand hygiene make it difficult for them to carry it out as often as necessary, and that there are some practical barriers to hand hygiene because of their particular job/role.

Conclusion: Overall, hand hygiene knowledge score was good and above among 79% of HCWs in Taif Armed Forces Hospitals. On the other hand, practice score was excellent among more than three-quarters of the participants. Insufficient hand hygiene knowledge was reported among a considerable proportion of HCWs (21%).

KEY WORDS: Hand hygiene, healthcare workers, knowledge, practice, Saudi Arabia

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Introduction

Hand hygiene is an important healthcare issue globally and is a single most cost-effective and practical measure to reduce the incidence of healthcare associated infection (HCAIs) and the spread of antimicrobial resistance across all settings from advanced healthcare systems to primary health-care centers; these infections are the most common adverse

events resulting from a stay in the hospital affecting approximately 5%–10% of hospitalized patients in the developed world, and the burden is larger in underdeveloped nations.[1]

However, it has been stated that at least 20% of all are avoidable through infection-control measures applied under normal working conditions. Of these measures, hand hygiene (i.e., handwashing with either plain or antiseptic soap and water or alcohol-based products) is frequently cited as the single most important means of preventing the transmission of infectious agents. Nonetheless, only 50%–70% of healthcare workers (HCWs) comply with hand hygiene recommendations. Adherence to recommendations is determined by awareness, perceived threat, individual's opinion, availability of hand hygiene agents, workload, and kind of ward.[2]

At present, proper handwashing is not as popular as preferred globally. It has been stated that the frequency of handwashing with soap before handling food or after using a toilet was noted in only between 0% and 34.0% cases. Center for Disease Control (CDC) and Association for Professionals in Infection Control and Epidemiology have created guidelines for handwashing. In addition, in order to emphasize the importance of handwashing, October 15 has been declared as the Global HandWashing Day by UNICEF since 2008.[3]

This study aimed to assess the knowledge and practice of hand hygiene among HCWs in order to set a plan for improving the implementation of infection control guideline for safe patients, staff and practice.

Materials and Methods

A cross-sectional study was adopted including a random representative sample of HCWs (physicians, nurses, laboratory technicians, social worker) in Armed Forces Military Hospitals, Taif city. It is a city in Makkah Al-Mokarramah Province of Saudi Arabia with a population of 1,011,613 (2010 census). In Taif, there are many different healthcare sectors including hospitals and primary healthcare centers. Pharmacists (who are not in contact with patient), supportive services staff such as porters and maids, and clerical staff and administrative staff were excluded.

Sample was selected using a Raosoft sample size calculator with a margin error of 5% and confidence level of 95%, with a total number around 4,000 employees, 2,196 of them are considered as healthcare providers. The estimated sample size was 327 participants. The sample was increased by 10% to be 360 in order to compensate for drop out and nonresponse. Systematic random technique according to the sampling proportion in each facility was applied to select participants.

Two questionnaires were used for gathering data. They were based on the Perception Survey for Health-Care Workers of the WHO Clean your hands campaign.[4] Questions were added to fulfill our objectives. The first questionnaire was self-administered questionnaire and composed of 24 points regarding demographics and hand hygiene knowledge. The initial part of the questionnaire consisted of demographics such as facility, age, gender, profession, department, and duration of the respondents' work experience in their practice. The last part of the first questionnaire was designed to examine the respondent's decision-making process in relation to hand hygiene and to identify the HCWs knowledge and barriers of hand hygiene. In each point, we tried to assess participates knowledge regarding each single aspect of hand hygiene. These indicators are based on evidence and expert consensus and have been framed as questions with defined answers (either "Yes/No," multiple options or Likert scale) to facilitate self-assessment.

The second questionnaire was fulfilled by infectious control staff to assess infrastructure and practice of participants regarding handwashing by observation and decided whether these items either met or not met the proper situation.

Regarding knowledge score, right answers were given a score of "1" while wrong answers or missing answers were given a score of "0." Total knowledge score was computed by adding scores of all knowledge items. Thus, the score ranged between 0 and 23. Total knowledge score was categorized according to the mean knowledge score into four categories: insufficient (mean score < 60%), good (mean score 60%– <75%), very good (mean score 75%–<85%), and excellent (mean score ≥85%). Score = No. of true answer/No. of responder* 100.

Regarding practices score, practices that met the criteria for proper handwashing were given a score of "1," while those who did not meet such criteria were given a score of "0." Total practice score was computed by adding scores of all infrastructure and practice items. Thus, the score ranged between 0 and 22.

A permission from Joint Program of Family Medicine to conduct the research was obtained. Individual consents were filled by participants before filling the questionnaire.

Data entry and analysis was performed using the Statistical Package for Social Sciences (SPSS version 20.0) software. Descriptive statistics were computed in the form of frequency and percentage for categorical data, and measures of central tendency (median and mean rank) and measures of dispersion (interquartile range "IQR") for continuous variables. Analytic statistics where Kolmogrov–Smirnov (K–S) test was performed for total knowledge and practice score to test their normal distribution. The date was abnormally distributed as evidenced by significant K–S test. Therefore, nonparametric statistical tests were applied. Mann–Whitney statistical test was utilized for comparison of two groups and Kruskal–Wallis test for comparison of more than two groups. Differences were considered as statistically significant when the *p* value was less than 0.05.

Result

Of 360 HCWs invited to be included in the study, 347 responded giving a response rate of 96.4%. The study included 347 HCWs working in Taif Armed Forces Hospitals. Table 1 presents their demographics. The age of 45.2% of

Table 1: Demographics of HCWs, Taif Armed Forces Hospitals (n = 347)

Personal characteristics	Number	Percentage
Age in years		
≤30	157	45.2
31–40	123	35.5
>40	67	19.3
Gender		
Male	85	24.5
Female	262	75.5
Profession		
Nurse	186	53.6
Physician	35	10.1
Technician	68	19.6
Others	58	16.7
Facility		
Al-Hada Armed Forces Hospital	189	54.5
Prince Sultan Hospital	50	14.4
Prince Mansour Community Hospital	66	19.0
Rehabilitation center	42	12.1
Department		
Internal medicine	44	12.7
Surgery	19	5.5
Intensive care unit	40	11.5
Emergency unit	43	12.4
Obstetrics	9	2.6
Pediatrics	14	4.0
Long term/rehabilitation	34	9.8
Outpatient clinic	26	7.5
Others	118	34.0
Work experience at the hospital in months		
≤3	92	26.5
>3	255	73.5

them was ≤ 30 years while that of 35.5% of them ranged between 31 and 40 years. Most of them (75.5%) were female subjects. More than half of them (53.6%) were nurses, while 10.1% and 19.6% of them were physicians and technicians, respectively. More than half of them (54.5%) were recruited from Al-Hada Armed Forces Hospital. HCWs working in internal medicine, emergency unit, and intensive care unit represent 12.7%, 12.4% and 11.5% of the participants, respectively. Regarding work experience in the current health facility, most of the respondents (73.5%) worked for more than 3 months.

Knowledge of Hand Hygiene

Most of surveyed HCWs (83.3%) reported getting formal training in hand hygiene in the last 3 years. Table 2 presents the responses of HCWs to questions exploring their knowledge regarding various aspects of hand hygiene. More than half of them (59.1%) knew correctly that HCWs' hands when not clean is the main route of cross-transmission of potentially harmful germs between patients in a healthcare facility. Only 28% of them recognized correctly that germs already present on or within the patient is the most frequent source of germs responsible for HCAIs. Most of HCWs knew correctly that before touching a patient (92.8%), immediately after a risk of body fluid exposure (83.6%), and immediately before a clean/aseptic procedure (84.4%) are the hand hygiene actions that prevent transmission of germs to the patient, while only 62.5% of them responded correctly that after exposure to the immediate surroundings of a patient is the hand hygiene action that prevents transmission of germs to the patient. Most of HCWs knew correctly that before touching a patient (79%) and after exposure to the immediate surroundings of a patient (81.6%) are the hand hygiene actions that prevent transmission of germs to the HCWs. Almost half of them (50.7%) and slightly less than half of them (47%) knew correctly that immediately after a risk of body fluid exposure and immediately before a clean/aseptic procedure, respectively, are the hand hygiene actions that prevent transmission of germs to the HCWs. Most of HCWs (82.1%) recognized correctly that alcohol-based hand rubbing is more rapid for hand cleansing than handwashing with soap and water, while majority of them (97.1%) reported correctly that alcohol-based hand rubbing does not cause skin dryness more than handwashing with soap and water and that handwashing with soap and water and alcohol-based hand rubbing are not recommended to be performed in sequence (94.2%). Contrary to that, only 8.1% of HCWs knew correctly that alcohol-based hand rubbing is not more effective against germs than handwashing with soap and water. Most of HCWs (82.1%) recognized correctly that 20 s is the minimal time needed for alcohol-based hand rub to kill most germs on your hands. Regarding the type of hand hygiene method required before palpation of the abdomen, 58.8% of HCWs answered correctly that it is alcohol-based rubbing. While before giving an injection, after removing examination gloves, and after visible exposure to blood, 64%, 71.2%, and 72.9% of them, respectively, responded correctly that it is handwashing. Regarding the issues that should be avoided, as associated with increased likelihood of colonization of hands with harmful germs, most of HCWs knew correctly that these are wearing jewellery (87%), damaged skin (83.6%), and artificial fingernails (81.6%), while 51.3% responded wrongly that regular use of a hand cream should be avoided, as associated with increased likelihood of colonization of hands with harmful germs.

As shown in Table 3, the highest hand hygiene knowledge score was reported among HCWs in Al-Hada Armed Forces Hospital (mean rank was 203.7), while the lowest score was reported among those working in the Rehabilitation center (mean rank was 153.7). The difference was not statistically significant, $p < 0.001$. Hand hygiene knowledge score was significantly higher among HCWs who joined the Armed Forces Hospitals in Taif since more than 3 months compared with those who joined them since 3 months or less (mean ranks were 180.2 vs. 156.8, $p = 0.049$). Other factors were not significantly associated with hand hygiene knowledge.

Table 2: Knowledge of hand hygiene among HCWs, Taif Armed Forces Hospitals (*n* = 347)

Knowledge of hand hygiene questions	Right answer	
	N	%
Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a healthcare facility?		
Health-care workers' hands when not clean	205	59.1
What is the most frequent source of germs responsible for healthcare associated infections?		
Germs already present on or within the patient	97	28.0
Which of the following hand hygiene actions prevents transmission of germs to the patient?		
Before touching a patient	322	92.8
Immediately after a risk of body fluid exposure	290	83.6
After exposure to the immediate surroundings of a patient	217	62.5
Immediately before a clean/aseptic procedure	293	84.4
Which of the following hand hygiene actions prevents transmission of germs to the healthcare worker?		
After touching a patient	274	79.0
Immediately after a risk of body fluid exposure	176	50.7
Immediately before a clean/aseptic procedure	163	47.0
After exposure to the immediate surroundings of a patient	283	81.6
Which of the following statements on alcohol-based hand rub and handwashing with soap and water are true?		
Hand rubbing is more rapid for hand cleansing than handwashing—True	285	82.1
Hand rubbing causes skin dryness more than handwashing—False	337	97.1
Hand rubbing is more effective against germs than handwashing—True	28	8.1
Handwashing and hand rubbing are recommended to be performed in sequence—False	327	94.2
What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?		
20 s	285	82.1
Which type of hand hygiene method is required in the following situations?		
Before palpation of the abdomen—Rubbing	204	58.8
Before giving an injection—Washing	222	64.0
After removing examination gloves—Washing	247	71.2
After visible exposure to blood—Washing	253	72.9
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?		
Wearing jewellery—Yes	302	87.0
Damaged skin—Yes	290	83.6
Artificial fingernails—Yes	283	81.6
Regular use of a hand cream—No	169	48.7

Practice of Hand Hygiene

As illustrated in Table 4, majority of infrastructures for hand hygiene were met according to infection control staff `observation as all handwashing facilities were equipped with running water in 96.5% of cases and a poster depicting handwashing/alcohol hand rub technique was present beside lavatory sinks in 96.3% of cases. In addition, alcohol hand rub solution or gel was available in the unit among 96% of cases, and dispensers were functioning and in good repair among 95.4% of cases. All handwashing facilities were equipped with liquid soap, handwashing sinks were conveniently accessible to staff, and handwashing sinks were available in all patients' rooms among 94.8%, 93.4%, and 91.9% of cases, respectively.

One dispenser per patients' room in general wards and clinics, one per bed in critical areas and the emergency room, and one in every nursing station met the guidelines in 91.1% of cases, while all handwashing facilities were equipped with disposable towel/tissue in 87.6% of cases.

Among almost two-thirds of cases (64.6%), hand moisturizing cream was available as a tube form.

Regarding staff practice, majority of HCWs practice met the recommended guidelines regarding the following:

- Access to hand wash sinks was clear (96%).
- The hand wash sinks were free from used equipments and inappropriate items (95.1%).
- Written policies and procedures on appropriate hand hygiene were available (93.7%).
- Staff was aware about hand hygiene practice, adopted from the WHO (92.8%).
- There was an appropriate temperature control to provide suitable hand wash water at all sinks (92.2%).

Table 3: Factors associated with hand hygiene knowledge score among HCWs in Taif Armed Forces Hospitals

	Knowledge score (1–23)			*p* value
	Median	IQR	Mean rank	
Sex				
Males (*n* = 85)	15.5	13.25–16.75	162.7	0.226*
Females (*n* = 262)	16	14–17	177.7	
Age				
≤30 (*n* = 157)	16	14–17	169.9	0.272**
31–40 (*n* = 123)	16	14–17	185.1	
>40 (*n* = 67)	15	14–17	163.3	
Profession				
Nurse (*n* = 186)	16	14–17	183.8	0.187**
Physician (*n* = 35)	15	14–16	154.0	
Technician (68)	16	13–16	159.0	
Others (58)	16	14–18	172.4	
Department				
Internal medicine (*n* = 44)	16	14–18	185.0	0.572**
Surgery (*n* = 19)	16	15–17	190.4	
Intensive care unit (40)	16	14–14	176.9	
Emergency unit (43)	16	14–17	179.0	
Obstetrics (*n* = 9)	15	11–17	145.6	
Pediatrics (*n* = 14)	16	14–18	204.2	
Long term/rehabilitation (*n* = 34)	15	13–16	142.6	
Outpatient clinic (*n* = 26)	16	13–17	171.4	
Others (*n* = 118)	16	14–17	172.6	
Healthcare facility				
Al-Hada Hospital (*n* = 189)	17	14–18	203.7	<0.001**
Prince Mansour Community Hospital (*n* = 66)	16	14–18	201.7	
Prince Sultan Hospital (50)	16	15–18	192.1	
Rehabilitation center (42)	15	14–16	153.7	
Duration since joining the hospital (months)				
≤3 (*n* = 92)	15	13–16	156.8	0.049*
>3 (*n* = 255)	16	14–17	180.2	
Formal training in hand hygiene				
No (*n* = 58)	15	14–16	162.3	0.326*
Yes (*n* = 289)	16	14–17	176.3	

IQR, Interquartile range.

**p* value of Mann–Whitney test; ***p* value of Kruskal–Wallis test.

- Soap dispensers and tissue holders were clean and not empty (91.4%).
- Staff was observed washing hands with soap and water if visibly contaminated with blood or body fluids (91.4%).
- Staff performed hand hygiene after patient care and between procedures for the same patient (85.9%).
- Staff was aware about (5 MOMENTS) indications of hand hygiene (85.3%).
- Staff performed handwashing after removal of gloves (85%).
- Staff performed hand hygiene before patient contact (83.9%).

However, 62.8% of staff was observed using his/her own hand moisturizing cream.

From Table 5, it is evident that the practice score of hand hygiene was significantly higher among female than male HCWs (mean ranks were 185.2 vs. 139.6, $p < 0.001$). The highest hand hygiene practice score was reported among nurses (mean rank was 192.8), while the lowest score was reported among physicians (mean rank was 126.9). The difference was statistically significant, $p = 0.001$. The highest hand hygiene practice score was reported among HCWs of obstetrics department (mean rank was 249.6), while the lowest score was reported among those of other departments (e.g., respiratory therapy, radiology, social workers, etc.) and emergency department (mean ranks were 136.4 and 144, respectively). The difference was statistically significant, $p < 0.001$. The highest

Table 4: Assessement practice of hand hygiene among HCWs in Taif Armed Forces Hospitals

Practice of hand hygiene	Met *N* (%)
Infrastructure for handwashing	
Handwashing sinks are available in all patients' rooms	319 (91.9)
Handwashing sinks are conveniently accessible to staff	324 (93.4)
One dispenser per patients' room in general wards and clinics, one per bed in critical areas and the emergency room, and one in every nursing station	316 (91.1)
Dispensers are functioning and in good repair	331 (95.4)
Alcohol hand rub solution or gel is available in the unit	333 (96.0)
All handwashing facilities are equipped with	
Liquid soap	329 (94.8)
Running water	335 (96.5)
Disposable towel/tissue	304 (87.6)
Hand moisturizing cream is available as a tube form	224 (64.6)
A poster depicting handwashing/alcohol hand rub technique is present beside lavatory sinks	334 (96.3)
Staff handwashing practice	
Staff aware about (5 MOMENTS) indications of hand hygiene	296 (85.3)
Written policies and procedures on appropriate hand hygiene are available	325 (93.7)
Staff perform hand hygiene before patient contact	291 (83.9)
Staff perform hand hygiene after patient care and between procedures for the same patient	298 (85.9)
Staff perform handwashing after removal of gloves	295 (85.0)
Staff are observed washing hands with soap and water if visibly contaminated with blood or body fluids	317 (91.4)
Staff are observed using his/her own hand moisturizing cream	218 (62.8)
Soap dispensers and tissue holders are clean and not empty	317 (91.4)
Staff are aware about hand hygiene practice, adopted from the WHO	322 (92.8)
The hand wash sinks are free from used equipments and inappropriate items	330 (95.1)
Access to hand wash sinks is clear	333 (96.0)
There is appropriate temperature control to provide suitable hand wash water at all sinks	320 (92.2)

hand hygiene practice score was reported among HCWs in Al-Hada Armed Forces Hospital (mean rank was 217.6), while the lowest score was reported among those working in the Rehabilitation center (mean rank was 125.1). The difference was not statistically significant, $p < 0.001$. Other factors were not significantly associated with practice of hygiene knowledge.

Overall, hand hygiene knowledge score was very good among 19% of HCWs, while it was good among 60% of them. Excellent level of knowledge was not reported among any of the investigated HCWs. On the other hand, practice score was excellent among more than three-quarters of the participants (76.1%). Insufficient hand hygiene knowledge and practice were reported among 21% and 3.2% of HCWs, respectively [Figure 1].

Barriers of Hand Hygiene

Table 6 demonstrates the following regarding barriers for following required hand hygiene among HCWs:

- About 42.9% of them either strongly agreed or agreed that emergency and other priorities make hand hygiene more difficult at times.
- Almost a third of them (30.3%) either strongly agreed or agreed that the frequency of required hand hygiene make it difficult for them to carry it out as often as necessary.
- More than a quarter of them (28.3%) either strongly agreed or agreed that there are some practical barriers to hand hygiene because of their particular job/role.
- Almost a quarter of them either strongly agreed or agreed that it is difficult for them to attend hand hygiene courses owing to time pressure (27.1%), newly qualified staff have not been properly instructed in hand hygiene in their training (25.9%), facilities are inadequate for hand hygiene in their area of work (25.9%), sometimes they have more important things to do than hand hygiene (24.2%), their professional group is less likely to engage in hand hygiene than others (23.9%), and finally hand hygiene guidelines are not easily accessible (22.2%).

Discussion

HCAI is a very important health issue globally, and hand hygiene is an effective method of infection control. The methods of hand hygiene are widely publicized and simple.[5] Recent studies have found low awareness level regarding hand hygiene among certified healthcare providers.[6–10] However, few studies have been undertaken in the Middle East, including Saudi Arabia regarding the hand hygiene practices among healthcare providers.[1]

Table 5: Hand hygiene practice score among HCWs in Taif Armed Forces Hospitals according to their sex

Sex	Practice score (1–22)			*p* value
	Median	IQR	Mean rank	
Sex				
Males (*n* = 85)	19	18–21	139.6	<0.001*
Females	20	19–22	185.2	
Age				
≤30 (*n* = 157)	20	19–22	179.5	0.513**
31–40 (*n* = 123)	20	18–22	166.0	
>40 (*n* = 67)	20	19–22	175.9	
Profession				
Nurse (*n* = 186)	20	19–22	192.8	0.001
Physician (*n* = 35)	19	15–21	126.9	
Technician (68)	20	19–21	157.2	
Others (58)	20	18–22	161.8	
Department				
Internal Medicine (*n* =44)	21	19–22	198.1	<0.001
Surgery (*n* = 19)	20	18–22	155.8	
Intensive care unit (40)	21	20–22	222.4	
Emergency unit (43)	19	18–21	144.0	
Obstetrics (*n* = 9)	22	20–22	249.6	
Pediatrics (*n* = 14)	21	20–22	216.3	
Long term/rehabilitation (*n* = 34)	19	18–20	162.3	
Outpatient clinic (*n* = 26)	20	18–22	193.8	
Others (*n* = 118)	19	18–20	136.4	
Healthcare facility				
Al-Hada Hospital (*n* = 189)	21	20–22	217.6	<0.001**
Prince Mansour Community Hospital (*n* = 66)	20	18–22	167.4	
Prince Sultan Hospital (50)	21	19–22	193.3	
Rehabilitation center (42)	19	18–20	125.1	
Duration since joining the hospital (months)				
≤3 (*n* = 92)	20	18-21	158.0	
>3 (*n* = 255)	20	19-22	179.8	0.070*
Formal training in hand hygiene				
No (*n* = 58)	20	19–21	171.6	0.836*
Yes (*n* = 289)	20	18–22	174.5	

IQR, Interquartile range.
**p* value of Mann–Whitney test; ***p* value of Kruskal–Wallis test.

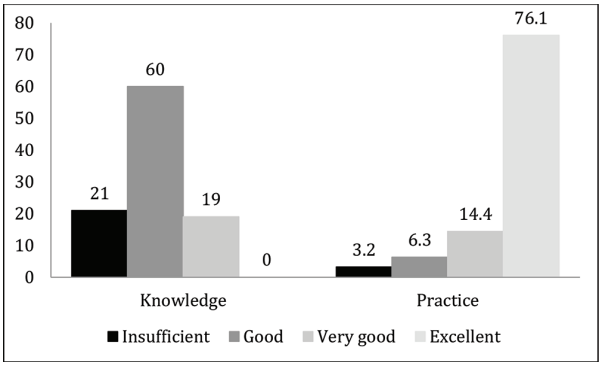

Figure 1: Overall hand hygiene knowledge and practice levels among HCWs, Taif Armed Forces Hospitals

This study was aimed to fill this gap and assess the HCWs' knowledge and compliance for hand hygiene. The group studied was HCWs that frequently perform activities which must require proper hand hygiene in order not to jeopardize patient's health.

The knowledge of hand hygiene was good or above 79% of our HCWs. Similar to this finding, Jumaa[11] and Yuan et al.[12] suggested that participants are aware of the importance of proper hand hygiene practice. The high number of our participants who indicated personal compliance with hand hygiene practices is of interest.

The direct observations by infection control staff in this study showed that compliance of surveyed HCWs with hand hygiene working at Taif Armed Forces Hospitals was excellent among almost three-quarters of them. This level of hand

Table 6: Barriers for required hand hygiene practice from perspectives of HCWs

Statements	Stronglyagree, N (%)	Agree, N (%)	Not sure, N (%)	Disagree, N (%)	Strongly disagree, N (%)
The frequency of hand hygiene required makes it difficult for me to carry it out as often as necessary	63 (18.2)	42 (12.1)	26 (7.5)	102 (29.4)	114 (32.9)
Hand hygiene guidelines are not easily accessible	50 (14.4)	27 (7.8)	15 (4.3)	99 (28.5)	156 (45.0)
Emergencies and other priorities make hand hygiene more difficult at times	65 (18.7)	83 (23.9)	48 (13.8)	75 (21.6)	76 (21.9)
Newly qualified staff have not been properly instructed in hand hygiene in their training	65 (18.7)	25 (7.2)	44 (12.7)	78 (22.5)	135 (38.9)
There are some practical barriers to hand hygiene because of my particular job/role	54 (15.6)	44 (12.7)	41 (11.8)	115 (33.1)	93 (26.8)
It is difficult for me to attend hand hygiene courses owing to time pressure	59 (17.0)	35 (10.1)	29 (8.4)	118 (34.0)	106 (30.5)
Sometimes I have more important things to do than hand hygiene	59 (17.0)	25 (7.2)	32 (9.2)	105 (30.3)	126 (36.3)
My professional group is less likely to engage in hand hygiene than others	58 (16.7)	25 (7.2)	26 (7.5)	122 (35.2)	116 (33.4)
Facilities are inadequate for hand hygiene in my area of work	59 (17.0)	31 (8.9)	16 (4.6)	84 (24.2)	157 (45.2)

hygiene compliance is comparable to that reported among healthcare staff in most European settings;[13] however, it is higher than that reported in another Saudi study conducted in Riyadh,[8] Kuwait,[14] Spain,[13] or Italy.[15] This acceptable rate of proper practice of hand hygiene could be attributed to the fact that hand hygiene course is a mandatory one in Taif Armed Forces Hospitals to renew contracts of healthcare staff in addition to the availability of a separate department for infection control with highly qualified nursing and medical staff participating in hand hygiene activities on regular basis for all HCWs at Taif Armed Forces Hospital.

In this study, the compliance by direct observation and knowledge of the healthcare staff showed significant variation between the four capered hospitals, which may reflect variation in the institutional conditions that encourage safety [16,17] as the headquarter of infection control present al Al-Hada Hospital which showed the highest hand hygiene knowledge and practice scores. Another source of variation could be in the type of patient care as the lowest hand hygiene knowledge and practice was observed in Rehabilitation center where patients are usually hospitalized for years.

Regarding variations between departments, the compliance was much lower in the emergency department in comparison with intensive care units, medical, pediatric, or surgical departments. This is consistent with findings from other studies, which have suggested that compliance with hand hygiene worsens when the demand for hand hygiene is high.[14,18,19]

Van de Mortel et al. in 2010[20] compared the hand hygiene knowledge, beliefs, and practices between nursing and medical students. They found that the nursing students hand hygiene knowledge was significantly higher than that of medical students ($p < 0.01$). Furthermore, nursing students showed more positive beliefs about hand hygiene ($p = 0.005$). In agreement with the aforementioned finding, our study proved that hand hygiene knowledge and practice scores were higher among nurses than medical staff, although this was significant regarding practice but not significant regarding knowledge. Contrary to these findings, Sharma et al.[21] in their study conducted in India reported that compliance with hand hygiene was more in doctors (50.8%) than nurses (41.3%). In another study of the 5,639 opportunities for hand hygiene, 3,383 (59.9%) were properly performed, and overall rates of compliance were 66.1% for doctors, 60.7% for nurses, and 38.6% for paramedical staff.[22]

Indeed, in this survey, the commonly reported obstacles for following guidelines of hand hygiene as mentioned by HCWs were that emergency and other priorities make hand hygiene more difficult at times, the frequency of required hand hygiene make it difficult for them to carry it out as often as necessary, and that there are some practical barriers to hand hygiene because of their particular job/role. In another study conducted in southern and eastern Mediterranean hospitals,[23] most respondents considered improvement of hand hygiene facilities and products to be the most pressing need to achieve better hand hygiene compliance. In our study, this barrier came after the aforementioned barriers. Nevertheless,

it should be pointed out that improved hand hygiene facilities do not necessarily translate into better practices, however. Many complex behavioral issues are involved,[24] which often are intricately linked with the culture of the institution, country, and region.[23]

In this study, the formal training of the healthcare staff in hand hygiene appeared not improving the knowledge and practice of hand hygiene among staff. The same has been reported by others.[15,17] This finding stresses the importance of improving the quality of such training.

Our study has some strength points. Because it was carried out on a systematic random sampling and not on voluntary basis, selection bias is minimized. Furthermore, information on hand hygiene practice was obtained by observation and not by self-reporting as respondents tend to overscore socially desirable behavior, which can lead to adherence's being overestimated by up to three times.[25,26] Respondents can also have unrealistic estimations of their own behavior[27–29] as shown by the discrepancy between the HCWs' perceived adherence to hand hygiene in the hospital and the reported personal adherence to hand hygiene as reported by Ciofi degli Atti et al.[2] Moreover, HCWs can believe that they wash their hands when necessary even when observations indicate otherwise.[30,31]

Among our study limitations, we did not use a structured observation in order to determine the participants' handwashing skills. Logistic concerns were the main reason for this approach. The major limitation of this study is the cross-sectional design which limits the interpretation of the direction of the associations. Finally, this study was conducted among HCWs in military hospitals, so we could not generalize the results over Taif hospitals.

Conclusion

Overall, hand hygiene knowledge score was good and above among 79% of HCWs in Taif Armed Forces Hospitals. On the other hand, practice score was excellent among more than three-quarters of the participants. Insufficient hand hygiene knowledge was reported among a considerable proportion of HVWs (21%).

References

1. Al Kadi A, Salati SA. Hand hygiene practices among medical students. Interdiscip Perspect Infect Dis 2012; 2012:679129.
2. Ciofi degli Atti ML, Tozzi AE, Ciliento G, Pomponi M, Rinaldi S, Raponi M. Healthcare workers' and parents' perceptions of measures for improving adherence to hand-hygiene. BMC Public Health 2011; 11:466.
3. Ergin A, Bostanci M, Onal O, Bozkurt AI, Ergin N. Evaluation of students' social hand washing knowledge, practices, and skills in a university setting. Cent Eur J Public Health 2011;19(4):222–6.
4. World Health Organization. *Clean Care is Safer Care. Perception Survey for Health-Care Workers*. Available at: http://www.who.int/gpsc/5may/Perception_Survey_for_Health_care_Workers.doc (revised August 2009; last accessed May 12, 2011).
5. Mathur P. Hand hygiene: back to the basics of infection control. Indian J Med Res 2011;134(5):611–20.
6. Qushmaq IA, Heels-Ansdell D, Cook DJ, Loeb MB, Meade MO. Hand hygiene in the intensive care unit: prospective observations of clinical practice. Pol Arch Med Wewn 2008;118(10):543–7.
7. Bukhari SZ, Hussain WM, Banjar A, Almaimani WH, Karima TM, Fatani MI. Hand hygiene compliance rate among healthcare professionals. Saudi Med J 2011;32(5):515–9.
8. Basurrah MM, Madani TA. Handwashing and gloving practice among health care workers in medical and surgical wards in a tertiary care centre in Riyadh, Saudi Arabia. Scand J Infect Dis 2006;38(8):620–4.
9. Duroy E, Le Coutour X. [Hospital hygiene and medical students]. Med Mal Infect 2010;40(9):530–6.
10. Feather A, Stone SP, Wessier A, Boursicot KA, Pratt C. 'Now please wash your hands': the hand washing behaviour of final MBBS candidates. J Hosp Infect 2000;45(1):62–4.
11. Jumaa PA. Hand hygiene: simple and complex. Int J Infect Dis 2005;9(1):3–14.
12. Yuan CT, Dembry LM, Higa B, Fu M, Wang H, Bradley EH. Perceptions of hand hygiene practices in China. J Hosp Infect 2009;71:157–62.
13. Moret L, Tequi B, Lombrail P: Should self-assessment methods be used to measure compliance with handwashing recommendations? A study carried out in a French university hospital. Am J Infect Control 2004;32(7):384–90.
14. Al-Wazzan B, Salmeen Y, Al-Amiri E, Abul A, Bouhaimed M, Al-Taiar A. Hand hygiene practices among nursing staff in public secondary care hospitals in Kuwait: self-report and direct observation. Med Princ Pract 2011;20(4):326–31.
15. Novoa AM, Pi-Sunyer T, Sala M, Molins E, Castells X. Evaluation of hand hygiene adherence in a tertiary hospital. Am J Infect Control 2007;35(10):676–83.
16. Pittet D. Improving adherence to hand hygiene practice: a multidisciplinary approach. Emerg Infect Dis 2001;7(2):234–40.
17. Cantrell D, Shamriz O, Cohen MJ, Stern Z, Block C, Brezis M. Hand hygiene compliance by physicians: marked heterogeneity due to local culture? Am J Infect Control 2009; 37:301–305.
18. Pittet D. Compliance with hand disinfection and its impact on hospital-acquired infections. J Hosp Infect 2001;48 Suppl A:S40–6.
19. O'Boyle CA, Henly SJ, Larson E. Understanding adherence to hand hygiene recommendations: the theory of planned behavior. Am J Infect Control 2001;29(6):352–60.
20. Van de Mortel TF, Apostolopoulou E, Petrikkos G. A comparison of the hand hygiene knowledge, beliefs, and practices of Greek nursing and medical students. Am J Infect Control 2010;38(1):75–7.
21. Sharma S, Sharma S, Puri S, Whig J. Hand hygiene compliance in the intensive care units of a tertiary care hospital. Indian J Community Med 2011;36(3):217–21.
22. Sahay S, Panja S, Ray S, Rao BK. Diurnal variation in hand hygiene compliance in a tertiary level multidisciplinary intensive care unit. Am J Infect Control 2010;38(7):535–9.
23. Borg MA, Benbachir M, Cookson BD, Ben Redjeb S, Elnasser Z, Rasslan O, et al. Health care worker perceptions of hand hygiene practices and obstacles in a developing region. Am J Infect Control 2009;37(10):855–7.
24. Whitby M, McLaws ML, Ross MW. Why healthcare workers don't wash their hands: a behavioral explanation. Infect Control Hosp Epidemiol 2006;27(5):484–92.
25. Ajzen I. *Attitudes, Personality, and Behavior*. Chicago, IL: Dorsey, 1988.

26. Ronk LL, Girard NJ. Risk perception, universal precautions compliance. A descriptive study of nurses who circulate. AORN J 1994;59(1):253–66.
27. Siegel JD, Rhinehart E, Jackson M, Chiarello L, Healthcare Infection Control Practices Advisory Committee. *2007 Guidelines for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings.* Available at: http://www.cdc.gov/hicpac/2007IP /2007isolationPrecautions.html (last accessed May 12, 2011).
28. McGuckin M, Taylor A, Martin V, Porten L, Salcido R. Evaluation of a patient education model for increasing hand hygiene compliance in an inpatient rehabilitation unit. Am J Infect Control 2004;32(4):235–8.
29. McGuckin M, Waterman R, Storr lJ, Bowler IC, Ashby M, Topley K, Porten L. Evaluation of a patient-empowering hand hygiene programme in the UK. J Hosp Infect 2001;48(3):222–7.
30. Broughall JM, Marshman C, Jackson B, Bird P. An automatic monitoring system for measuring handwashing frequency in hospital wards. J Hosp Infect 1984;5(4):447–53.
31. McLane C, Chenelly S, Sylwestrak ML, Kirchhoff KT. A nursing practice problem: failure to observe aseptic technique. Am J Infect Control 1983;11(5):178–82.

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