

Knowledge and Practice of Healthcare Workers about Hand Hygiene in Khartoum Oncology Hospital, 2021

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Abstract

Background: Hand hygiene is widely recognized as a simple way to prevent infection transmission to patients or among health care providers and adherence to its measures is associated with a significant reduction in mortality and morbidity. Despite this, many studies conclude that hand hygiene compliance is suboptimal. This study aims to assess compliance of healthcare workers to hand hygiene measures in Khartoum oncology hospital.

Method: A cross-sectional hospital-based descriptive study was conducted during the period from December 2021 to July 2022 on a sample of 109 health care workers [doctors and nurses]. Hand hygiene knowledge and practice of health care workers were measured using a structured, pretested, administered questionnaire, modified from the WHO standardized questionnaire for HH knowledge and observation technique with a checklist was used to collect data on the practice. The data is analyzed by frequency tables. The Chi-square test is used to determine associations among categorized variables. All statistical tests were considered significant when the *p* value was 0.005.

Result: Of the 109 participants, 56% had not received formal hand hygiene training in the last three years. 18.3% did not use alcohol for hand hygiene in their practice. Regarding participants' knowledge of the importance of hand hygiene, 97.2% considered it an important tool for infection prevention. Practice wise, 60% of participants did not wash their hands before touching the patients, while 20% of them used the same glove for more than one patient. A significant statistical association was found between the routine use of alcohol and receiving formal training in hand hygiene in the last three years (*p*-value 0.004).

Conclusion: The overall use of alcohol-based hand rub for hand hygiene was high, in spite of low training programs in the last three years. There is a huge shortage of soap and alcohol in working places. Developing a training program will help magnify the use of alcohol for hand hygiene.

Keywords: Knowledge and Practice of Hand Hygiene, Healthcare Associated Infections, Hand Hygiene Training Program

Background

The word "hygiene" generally refers to practices, approaches, and procedures done to maintain health and prevent diseases, in particular through cleanliness [1]. Recently, the link between poor HH and the incidence of HAIs and their complications is clearly

recognized [2]. Several studies have shown that HH is the most effective, simple, and cheapest measure to prevent HAIs, which cause a lot of morbidity and mortality According to WHO, there are several ways to achieve HH, either through alcohol-based hand rubbing, using antimicrobial soap, antiseptic agents, or any other

hand hygiene products [3, 4]. The former procedures gained their importance because hands play a central role in the transmission of infection, especially in healthcare institutions, the community, and in domestic settings. Therefore, healthcare workers' compliance with HH practice is highly recommended as low compliance is considered a major cause of health care associated infections (HAIs) and is estimated to contribute to around 40% of the HAI incidence. Using alcohol-based hand rubs (ABHR) by health workers could lower HAI rates by 40% [5]. Compared to the ideal times for hand cleansing, healthcare providers clean their hands half the time. Another study on the same topic concluded that hand washing with soap reduces diarrheal diseases and respiratory infections by 40% and 23%, respectively. There are special circumstances where healthcare workers have to wash their hands before and after to reduce the spread of HAIs. These are immediately before touching patients, before aseptic procedures, after being exposed to body fluids, and after touching a patient's surroundings. Unfortunately, healthcare workers' compliance with recommended hand hygiene procedures is extremely low, estimated to be 38.7 percent on average [6].

The United States Center for Disease Control and Prevention conducted a survey and found out that nearly 1.7 million hospitalized patients each year acquire HAI, and more than 98,000 patients died, relying on the results of a survey conducted on 100 hospitalized patients [7]. It has also been estimated that seven patients in developed countries and ten in developing countries were affected by HAI [8]. Africa has also seen significant rates of HAI, ranging from 3–15% and up to 19% in some countries (Pan-American health organization, 2018).

In a study done in Ain-Shams University hospitals to evaluate healthcare workers' compliance, they ended up with a lower compliance among doctors of around 37% and even lower among other workers [9].

In an attempt to assess factors and obstacles that affect hand hygiene compliance, failure to comply with these procedures exposes patients to infections, and thus increases morbidity, treatment cost and mortality [6, 10]. As far as researchers were able to search, very few studies were conducted to evaluate or address that issue. Estimation of HWS' level of HH compliance can help suggest programs and courses to improve their knowledge and practice of the measures.

Therefore, it is clear that healthcare providers should be directed towards increasing compliance with HH. This research will find out if the compliance of HWs is optimal or not. The study can be a reference for infection control professionals to improve patient safety and reduce healthcare-related infections in hospitals.

Methodology

Study Design and Population:

A descriptive cross-sectional hospital-based study was conducted in Khartoum oncology hospital, Khartoum, Sudan, during the period from December 2021 to July 2022 on a purposive convenient

sample of 109 HCW (doctors and nurses). Data on knowledge was collected through a structured, pretested, administered questionnaire, modified from the WHO standardized questionnaire for HH knowledge. An observation technique with a checklist is used to collect data on the practice of healthcare workers. Collected data included demographic characteristics, knowledge and practice of hand hygiene.

The ethical approval was obtained from the Research Department, Khartoum State Ministry of Health, and voluntary, informed, and written consent was obtained from each participant before any data was collected.

Participants have the right to no harm, privacy and confidentiality are ensured, and the data will not be used for any other studies. The questionnaire was filled while interviewing the participants during their rest time without any interruption to their work, and all COVID-19 precautions and preventive measures were ensured while the data was collected from participants.

Statistical Analysis

The data was entered into Microsoft Excel Office for analysis and then exported to the Statistical Package of Sciences (SPSS) in order to summarize the data numerically (mean, standard deviations, median) and graphically (frequency tables). The association between categorical variables was determined through the Chi-squared test. A binary logistic regression was performed to determine the relationship of receiving formal hand hygiene training in the last three years and routine use of alcohol, based hand rub for hand hygiene. All statistical tests were considered significant when p-value <0.05.

Results

Of the 109 participants from Khartoum oncology hospital who were recruited randomly, 33% were male and 76% were female. Regarding their hand hygiene training 56% did not receive formal hand hygiene training in the last three years. Furthermore, 18.3% of respondents did not use alcohol for hand hygiene (table 1). Hand rubbing, according to 31.2% of participants, is no more effective against germs than hand washing. 48.6% of them saw that the minimum time needed for alcohol to kill most germs on your hands is 20 seconds, while 5.5% chose 3 seconds. Regarding the main route of cross-transmission of potentially harmful germs between patients in a healthcare facility, 49.5% chose healthcare workers' hands when not clean, while only 11% chose the air circulating in the hospital. 42.2% of the participants demonstrated that action prevents transmission of germs to the patients is cleaning hands before touching a patient, while 18.3% chose the four actions as a method of prevention. Regarding the actions that prevent the transmission of germs to healthcare workers, 34.9% chose cleaning after touching a patient, while 20.2% chose the four actions (table.2). 36.7% of participants considered patients the most frequent source of health care-associated infection, while 29.4% considered the environment the main one. 56% of the participants considered regular use of hand cream to be associated with an increased risk of hand colonization with germs, and so there is no

need to avoid it. 4.6% said wrists should not be washed during hand washing, while 83.5% said it should be done and 11.9% said it should not always be done. Regarding participants' knowledge of the importance of hand hygiene, 97.2% considered it an important tool for infection prevention (table.3). 3.7% of participants demonstrated no need for hand hygiene after emptying a bedpan or before giving injections, while 22.9% chose washing as a method of hand hygiene after visible blood exposure (table.4). 55 participants' practices were surreptitiously observed; 47.3% of soap was not available in hand washing points, and alcohol was not available in an estimation of 52.7%. 60% of participants did not wash their hands before touching the patients, while 20% of them used the same glove for more than one patient (table.5). Cross-tables

were created and tested using the chi-squared test to determine the relationship between routine use of alcohol-based hand rub for hand hygiene and demographic characteristics. A significant statistical association was found between the routine use of alcohol and receiving formal training in hand hygiene in the last three years (PV 0.004), see table (6). Cross-tables were done in an attempt to detect the relationship between receiving formal hand hygiene training in the last three years and age, profession, and table (7). Binary logistic regression was done to test the strength of receiving formal hand hygiene training in the last three years and the routine use of alcohol-based hand rub for hand hygiene. Table 8 shows that (95% CI of OR = 1.5–21.1), table (8).

Table [1]: Demographic characteristics of participants. (n = 109)

Count (%)	Variable
Age Group	
4 (3.7)	20 - 25
25 (22.9)	26 - 30
25 (22.9)	31 - 35
27 (24.8)	36 - 40
28 (25.7)	> 40
Ward	
21 (21.4)	Derdiry
6 (6.1)	Fox
63 (64.3)	Tower
8 (8.2)	Hematology
Gender	
33 (30.3)	Male
76 (69.7)	Female
Profession	
52 (47.7)	Doctor
57 (52.3)	Nurse
Hand hygiene training status	
61 (56.0)	No
48 (44.0)	Yes
Routine use of alcohol	
20 (18.3)	No
89 (81.7)	Yes

Table [2]: rubbing & washing comparison

Variable	Count (%)
Rubbing causes skin dryness more than washing	
FALSE	20 (18.3)
TRUE	80 (81.7)
Rubbing is more rapid than washing	
FALSE	22 (20.2)

TRUE	88 (79.8)
Rubbing is more effective against germs than washing	
FALSE	34 (31.2)
TRUE	75 (68.8)
Washing and rubbing are recommended to be performed in sequence	
FALSE	18 (16.5)
TRUE	91 (83.5)
Minimal time needed for alcohol to kill most germs on your hands	
20 seconds	53 (48.6)
10 seconds	33 (30.3)
3 seconds	6 (5.5)
1 minute	17 (15.6)
The main route of cross-transmission of germs between patients	
Health-care workers' hands when not clean	54 (49.5)
Sharing non-invasive objects	18 (16.5)
Air circulating in the hospital	12 (11.0)
Patients' exposure to colonized surfaces	25 (22.9)
Actions prevents transmission of germs to the patients	
Immediately before a clean/aseptic procedure	5 (4.6)
Before touching a patient	46 (42.2)
After exposure to the immediate surroundings of a patient	3 (2.8)
Immediately after a risk of body fluid exposure	2 (1.8)
the four answer together	20 (18.3)
Other	33(30.3)
Actions prevents transmission of germs to the health care workers	
Immediately before a clean/aseptic procedure	5 (4.6)
After touching a patient	38 (34.9)
After exposure to the immediate surroundings of a patient	8 (7.3)
Immediately after a risk of body fluid exposure	3 (2.8)
The four answer together	22 (20.2)
Other	33 (30.2)

Table [3]: actions should be avoided as it increases the risk of skin colonization

Variable	Count (%)
The source of germs responsible for health care-associated infections	
Patients	40 (36.7)
Environment	32 (29.4)
Instruments	9 (8.3)
Hands	8 (7.3)
Other	20 (18.3)
Avoid Wearing jewelry as it increases risk of skin colonization	
No	13 (11.9)
Yes	96 (88.1)
Avoid damaged skin as it increases risk of skin colonization	

No	1 (.9)
Yes	108 (99.1)
Avoid artificial fingernails as it increases risk of skin colonization	
No	3 (2.8)
Yes	106 (97.2)
Avoid regular use of hand cream as it increases risk of skin colonization	
No	61 (56.0)
Yes	48 (44.0)
Hand hygiene prevents spread of infection to patients	
No	1 (.9)
Yes	106 (97.2)
Small effect	2 (1.8)
Wrist should be washed during hand washing	
No	5 (4.6)
Yes	91 (83.5)
Not always	13 (11.9)
Rings and watch should be removed during hand washing	
No	6 (5.5)
Yes	96 (88.1)
Not necessarily	7 (6.4)

Table [4]: type of hand hygiene required in different situations.

Variable	Count (%)
Type of hand hygiene method required Before palpation of the abdomen	
Rubbing	54 (49.5)
Washing	20 (18.3)
None	3 (2.8)
Rubbing, Washing	32 (29.4)
Type of hand hygiene method required Before giving an injection	
Rubbing	47 (43.1)
Washing	31 (28.4)
None	4 (3.7)
Rubbing, Washing	27 (24.8)
Type of hand hygiene method required after emptying a bedpan	
Rubbing	21 (19.3)
Washing	36 (33.0)
None	4 (3.7)
Rubbing, Washing	48 (44.0)
Type of hand hygiene method required after removing examination gloves	
Rubbing	36 (33.0)
Washing	54 (49.5)
None	1 (.9)
Rubbing, Washing	18 (16.5)
Type of hand hygiene method required after making patient bed	

Rubbing	30 (27.5)
Washing	42 (38.5)
None	1 (.9)
Rubbing, Washing	36(33.0)
Type of hand hygiene method required after visible exposure to blood	
Rubbing	17 (15.6)
Washing	25 (22.9)
Rubbing, Washing	67 (61.5)

Table [5]: practice table

Variable	Count (%)
Available and accessible hand hygiene materials	
Yes	23 (42.6)
No	20 (37.0)
Not always	11 (20.4)
Available soap in hand washing points	
Yes	20 (36.4)
No	26 (47.3)
Not always	9 (16.4)
Available alcohol in sufficient amount in each ward and patient care point	
Yes	16 (29.1)
No	29 (52.7)
Not always	10 (18.2)
Available gloves in sufficient amount in each ward and patient care point	
Yes	44 (80.0)
No	5 (9.1)
Not always	6 (10.9)
There is a wall poster in the ward demonstrating hand hygiene steps	
Yes	49 (89.1)
No	5 (9.1)
Not always	1 (1.8)
Washing hands before touching patients	
Yes	7 (12.7)
No	33 (60.0)
Not always	15 (27.3)
Wearing gloves while caring with patients	
Yes	49 (89.1)
No	4 (7.3)
Not always	2 (3.6)
Changing the glove for every individual patient	
Yes	42 (76.4)
No	7 (12.7)
Not always	6 (10.9)
Using the same glove for more than one patient	

Yes	11 (20.0)
No	36 (65.5)
Not always	8 (14.5)

Table [6]: association between routine uses of alcohol based hand rub for hand hygiene and demographic characteristics of the respondents.

Variable	Routine use of alcohol for hand hygiene		P value
	Yes (%)	No (%)	
Age group			
20 - 25	4 (100.0)	0 (0.0)	0.582
26 - 30	18 (72.0)	7 (28.0)	
31 - 35	21 (84.0)	4 (16.0)	
36 - 40	22 (81.5)	5 (18.5)	
>40	24 (85.7)	4 (14.3)	
Profession			
Doctor	43 (82.7)	9 (17.3)	0.789
Nurse	46 (80.7)	11 (19.3)	
Formal training in last three years			
Yes	45 (93.8)	3 (6.3)	0.004
No	44 (72.1)	17 (27.9)	

Table [7]: Association between receiving formal hand hygiene in last three years and age, profession.

Variable	Receive formal hand hygiene training in last three years		P value
	Yes (%)	No (%)	
Age group			
20 - 25	2 (50.0)	2 (50.0)	0.212
26 - 30	6 (24.0)	19 (76.0)	
31 - 35	11 (44.0)	14 (56.0)	
36 - 40	14 (51.9)	13 (48.1)	
>40	15 (53.6)	13 (46.4)	
Profession			
Doctor	22 (42.3)	30 (57.7)	0.728
Nurse	26 (45.6)	31 (54.4)	

Table [8]: Binary logistic regression

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Training	1.757	.661	7.063	1	.008	5.795	1.586	21.176
Constant	.951	.286	11.089	1	.001	2.588		

Discussion

Our findings indicate that the respondents' level of receiving hand hygiene training in the last three years is low (44%). On the other hand, Gayatri et al. study reports that 74.2% of HCW hands received training [1].

Our study found that the routine use of alcohol-based hand rub for hand hygiene is reported to be (81.7%). This was higher than the sub-optimal one that was reported by Mohammed S. Omar study and 20% by Ana M. Novoa et al study [6].

49.5% considered the main route of cross-transmission of potentially harmful germs between patients in a health-care facility is

healthcare workers' hands when not clean. This was less than the percentage of V Anargh et al.'s study (73%) [8].

Almost half of respondents (48.6%) report that the minimum time needed for alcohol to kill most germs on their hands is 20 seconds, which is the recommended time by the WHO. In addition, 20.2% chose the four actions recommended by the WHO as the main means to prevent transmission of germs to healthcare workers.

The practices of 55 participants were surreptitiously observed. 47.3% of soap was not available in hand washing points and alcohol was not available in an estimation of 52.7%, which is attributed to a lack of support from the responsible authority. More than half of participants (60%) did not wash their hands before touching the patients, while in V Anargh et al.'s study, it was expressed to be 21% [8] which was assumed to be due to non-availability, inaccessibility of facilities, and heavy workload. 20% of them use the same glove for more than one patient, and this is thought to be due to the massive workload and large number of patients. This study's findings highlight the need for increased training programs and increased HCW knowledge and concepts about hand hygiene; they could also be used as a guide to spread posters and workshops in an attempt to increase the adherence rate. In practice, it is quietly stated that the availability of soaps and alcohol must be increased, and a reward chart can be used to improve compliance.

The limitations of the study are that it uses a cross-sectional study design to collect the data; a longitudinal study design will give us the opportunity to assess the practice in a better manner. The lower number of studies regarding hand hygiene makes it difficult to compare our finding with other research from Khartoum.

Suggestions are to carry out much research in order to assess the progress in compliance and the effectiveness of workshops and training programs, and to detect any deficiency in hand hygiene materials.

Conclusion

This study highlight the shortage of soap and alcohol in the working places, which is attributed to authority problems, also our study declare that most of the HCW did not receive hand hygiene training in the last three years and we suggest that for the responsible authorities to increase hand hygiene training program in order to enhance safe medical practice.

Abbreviations

ABHR: Alcohol-based hand rubs; HAIs: Health care associated infections; HH: Hand hygiene; HW: Healthcare workers.

Authors' contribution

MAI, NMA, SGA, ASM, EMY; Designed and implemented the research. MAI, ASM, SGA, NMA conducted the data collection. MAI conducted the data analysis. AIA supervised the research. All authors reviewed the manuscript.

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