

Hand Hygiene Compliance among Healthcare Workers, Ministry of Health Hospitals, the Kingdom of Saudi Arabia for the Year 2018

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Abstract Background: Microorganisms are mostly transmitted through the hands of healthcare workers in any healthcare setting. This transmission can be from healthcare workers to the patients and from their surrounding environment. This ultimately leads to increased healthcare-associated infections and to the resistance against the antimicrobials and the cost of healthcare-associated infections increases accordingly. **Objectives:** To observe the practice of hand hygiene and to calculate the hand hygiene compliance rate among healthcare workers of Ministry of Health Hospitals in the Kingdom of Saudi Arabia. **Methods:** The hand hygiene practice of healthcare workers in 318 Ministry of Health hospitals was observed by direct observation during the year 2018. This was done as a part of the National Hand Hygiene Program during the year 2018. The data was collected using the World Health Organization Hand Hygiene observation form. The compliance rate was calculated among different healthcare professionals, hospital departments and work shifts. **Results:** A total of 511,079 opportunities were observed over a period of one year. The overall hand hygiene compliance rate was found to be 70%. The compliance was found to be highest after the blood/body fluids exposure (85%), followed by after touching the patients (76%), followed by clean aseptic procedures (75%), after touching the patient's surroundings (66%), and before touching the patients (64%). The overall hand hygiene compliance was found to be higher in nurses (73%) as compared to the doctors which was 67%. **Conclusion:** Our findings confirm that hand hygiene compliance is higher in the nurses as compared to the physicians and the rest of the health care workers in MOH health care settings. Initiatives such as improved monitoring and training healthcare facilities are needed to improve hand hygiene compliance in future.

Keywords: hand hygiene, healthcare-associated infection, compliance, five moments, antimicrobials

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1. Introduction

Healthcare-associated Infections (HAIs) are a major threat to patients all over the world and an important cause of morbidity, mortality, disability, reduced quality of life and increased healthcare cost in healthcare settings. Most HAIs are transmitted directly or indirectly through the hands of Healthcare Workers (HCWs) in a healthcare setting. [1] The transmission of pathogens can be from patient to patient or from the healthcare environment by the hand of Healthcare Workers. Compliance of hand hygiene is usually low among healthcare workers. Improving HCWs Hand Hygiene (HH) is a rational and cost-effective way to prevent HAIs and restrict the transmission of microorganisms. [2] If adequate hand

hygiene protocols were strictly followed by HCWs, it would significantly reduce the number of cases of HAIs. [3] HH is not only a cornerstone of standard and transmission-based precautions, but it is also an important component of prevention bundles (central line bundle, Foley's catheter bundle, ventilator bundle, surgical site bundle as well as dialysis bundle). [4] HH rates worldwide are variable. The compliance with recommended instructions is usually suboptimal as it is documented in some studies. [5]

It has been observed that HH multimodal interventions are very effective to improve hand hygiene compliance and reduce HAIs rates. [6] Direct observation and feedback to health care workers about HH practices has shown significant improvement in compliance. [7,8] Educational programs of HH have shown effective improvement in HH compliance in the emergency

department. [9] The visitors who did not do hand hygiene before entering the ICU commonly showed pathogenic organisms and they posed a risk for ICU patients and increased multidrug resistance. [10] HH is a technique that should be followed by all healthcare workers all the time regardless of the unit in the healthcare facility as well as infectious status of the patient. It should not be optional in the patient zone; it should be mandatory. It must be practiced accurately to decrease the incidence of HAIs and to improve patient safety. When the COVID-19 outbreak started, hand hygiene became critical for frontline healthcare workers who are responsible to take care of the patients. [11]

As the compliance of HH in the Ministry of Health (MOH) hospitals has not been published earlier and there is no benchmark available for the HH compliance. The aim of this study is to observe the practice of HH and to calculate its compliance rate among healthcare workers of the Ministry of Health Hospitals (MOH), in Kingdom of Saudi Arabia. Rates to be categorized according to the departments, professions, work shifts, and indications.

2. Methodology

A structured instrument (WHO Observation tool) was used, with information related HH opportunities according to the Five Moments for HH and the type of HH performed (hand rubbing or hand washing). HH compliance was calculated by aggregating the total number of hand hygiene actions for one year and dividing the value by the total number of hand hygiene opportunities times 100.

2.1. Setting

A total of 318 Ministry of Health Hospitals were included in this study. Healthcare workers in different departments were observed directly for hand hygiene compliance.

2.2. Type of Study

Observational study.

2.3. Duration

One year from 1st of January to 31st of December 2018.

3. Materials and Methods

In 2005, the World Health Organization (WHO) launched the first Global Patient Safety Challenge and in 2009 introduced the 5 moments of HH to reduce the burden of HAIs. By Using WHO 5 Moments of HH, the HCWs were observed for the recommended HH practices including handwashing with soap and water, or hand rub with an alcohol-based solution. A trained team (observers from infection control departments in the hospitals, regional directorates, and general directorate of MOH) was dedicated for observing HCWs in each hospital during the morning, evening and night shifts. Healthcare Workers were observed randomly (without informing

them) as they carried out routine patient care activities at different times of the day. Hand washing was considered a preferred method in case the hands were visibly soiled or contaminated and hand rub in case there was no visible contamination. They Include Moment 1 (Before touching a patient), Moment 2 (before a clean or aseptic procedure), Moment 3 (after body fluid exposure risk), Moment 4 (after touching a patient), and Moment 5 (after touching patient surroundings) [12].

The HCWs observed were doctors, nurses, and others including healthcare assistants and paramedical staff. The data was collected using the WHO HH observation form, and then the data was analyzed using the Microsoft Excel. Four categories of the different departments were included Intensive Care Units (ICUs), Emergency, Hemodialysis and others. Data was collected depending on Hospital bed capacity (Large equal to or more than 200 beds, Medium equal to or more than 100 beds, Small with less than 100 beds). Large hospitals were supposed to collect the data monthly, medium, and small hospitals were supposed to collect the data on a quarterly basis. The idea of this study was to observe directly the HH practice by the HCWs during their clinical practice. Large hospitals were supposed to observe at least 300 opportunities or more per month, medium hospitals were supposed to observe at least 150 or more, and small hospitals were supposed to observe 50 opportunities or more according to WHO Standards. The data collected from all hospitals were compiled to calculate the HH compliance across different departments and different HCWs.

Inclusion criteria of healthcare workers involved in the study:

All the clinical staff (doctors, nurses, healthcare assistants, and other paramedical staff) directly involved in the patient care were included in the study of included departments.

4. Statistical Analysis

Data collected from the WHO hand hygiene observation form was analyzed using Microsoft Excel and SPSS version 27. The Friedman test was used to determine statistically significant differences between different departments, professions, indications, and work shifts. The P-value of <0.05 was considered statistically significant.

5. Results

During the year 2018, hand hygiene (HH) compliance in 318 hospitals in Saudi Arabia was assessed by regular hand-hygiene observations and applying WHO 5 moments of Hand Hygiene. A total of 511,079 opportunities were observed. The overall hand hygiene compliance rate among the healthcare workers was found to be 70.3% (359,504/511,079).

When comparing the compliance rate in hospitals across different regions of the country, hospitals in the eastern region had the highest rate of 71.8%, followed by central and western regions of around 71%, then the northern region at 70.3%, and the southern region at 67.9%.

A positive relationship has been observed between the bed capacity of the hospitals and the HH compliance rate. Hospitals with higher HH adherence were larger in terms of higher bed capacity. Among professions, nurses had the highest rate of compliance at 73.3%, followed by doctors at 67.3%, while other allied HCWs had the lowest rate at 66.1%. When comparing between hospitals' units, the hemodialysis unit had the highest compliance rate at 75.2%, followed by the intensive care unit at 72.9%, then other units at 69.4%, and the emergency unit at 66.9%.

HH compliance rates were very similar among all work shifts (morning, afternoon, and night) at on average, 70% (Table 1).

Compliance rate differed significantly (P -value= <0.001) among the five moments of HH. The highest compliance was observed after exposure to body fluids (84.9%), followed by after patient contact (76.2%), and before aseptic tasks (75.0%). Lower levels of compliance were found after touching the patient's surroundings (66.1%) and before patient contact (63.8%) (Table 2) (Figure 1).

Table 1. Hand Hygiene Practices among HCWs (Total Number of Hand Hygiene Opportunities= 511,079)

Variables	No. of opportunities	HH Performed (Actions)	Compliance rate	P-value
Bed capacity				
≥200	239502	171242	71.5%	
≥100 - <200	106313	74944	70.5%	<0.001
<100	165264	113318	68.6%	
Professions				
Doctor	159001	106954	67.3%	
Nurse	276763	202801	73.3%	<0.001
Other	75315	49749	66.1%	
Units				
ER	174864	116974	66.9%	
ICU	132684	96709	72.9%	
Hemodialysis	78624	59091	75.2%	<0.001
Other	124907	86730	69.4%	
Shifts				
Morning	398411	280718	70.5%	
Afternoon	80015	55740	69.7%	<0.001
Night	32653	23046	70.6%	

Table 2. Hand hygiene compliance by indications among HCWs

Hand hygiene indications	No. of opportunities	HH Performed	Compliance Rate	P-value
Before touching a patient	179118	114319	63.80%	
Before clean/aseptic procedures	81908	61432	75.00%	
After body fluid exposure/risk	67518	57386	85.00%	<0.001
After touching a patient	149515	113871	76.20%	
After touching patient surroundings	85544	56581	66.10%	

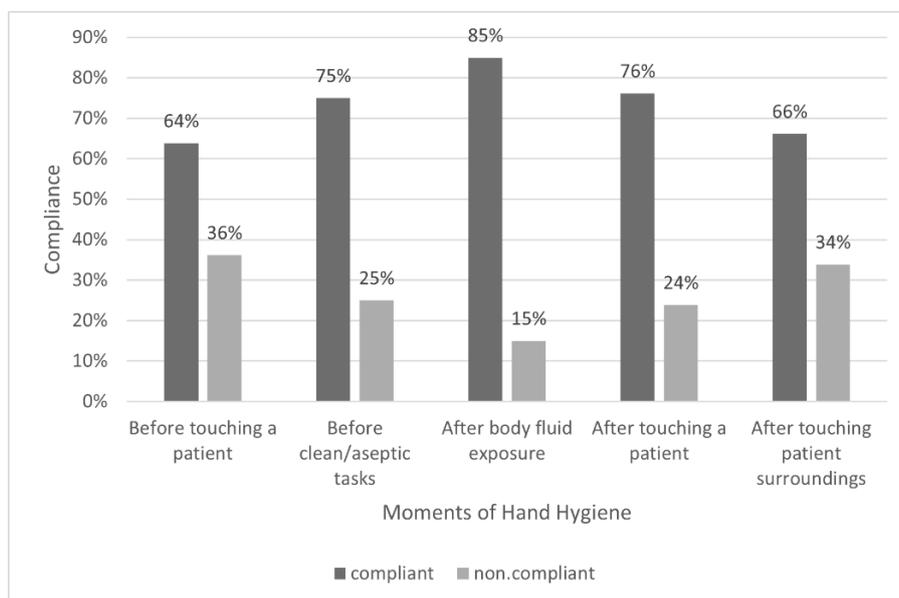


Figure 1. Hand hygiene compliance by indications among HCWs

6. Discussion

Hospital-acquired infections are a leading cause of morbidity and mortality and affect the patients physically, psychologically as well as financially. The hands of healthcare workers are the most important vehicle of transmission of microorganisms in any healthcare setting. Appropriate HH is one of the most important strategies to prevent HAIs. Studies have shown that poor HH leads to an increase in the number of HAIs [1]. The main aim of the study was to assess the adherence to hand hygiene among the HCWs in different units of MOH hospitals. Our study revealed that there is a significant difference in the compliance of HH. The findings were variable from higher to lower compliance in professions, departments, and work shifts. The overall HH compliance in our study is found to be 70%, which appears to be good but still needs improvement especially among doctors (67%).

In a study in a large central hospital in Vietnam, physicians had the lowest rate of compliance at 14.6%, while nurses had the highest rate of compliance at 38.8%. When compared among departments, the intensive care unit had the highest rate of compliance at 40.5%, followed by pediatrics at 34.5%, and internal medicine at 16.4%. [13]

In our study, the highest compliance was observed in nurses (73.3%), followed by doctors (67.3%) and the rest of the medical staff (66.1%). The highest compliance was observed in hemodialysis units (75.2%), followed by ICUs (72.9%), other departments (69.4%), and emergency departments (66.9%).

A study conducted in a Tertiary Hospital of Southeast Nigeria, HH compliance in HCWs per type of indication is found to be 9.90% before touching a patient, 3.5% before clean or aseptic procedures, 33.1% after the body fluid exposure, 16.9% after touching the patient and 67.7% after touching the patient surroundings. The HH compliance is found to be higher in nurses (28.10%) as compared to doctors (19.20%). [14]

In our research HH compliance in healthcare workers per type of indication is found to be 64% before touching a patient, 75% before clean or aseptic procedures, 85% after the body fluid exposure, 76% after touching the patient, and 66% after touching the patient surroundings.

In a study by Chavali *et al*, conducted in a tertiary care hospital, the overall HH compliance was found to be 78%. Nurses had a compliance rate of 63%, allied staff compliance was 86%. The HH adherence was 93% after patient contact compared to 63% before patient contact. [15]

A full year of data collection on HH compliance was recorded in 109 German hospitals. The overall compliance was 73%. The results revealed that compliance among nurses was better than physicians. The overall rates of HH adherence were significantly higher after patient contact than before. [16]

Onyedibe KI *et al* revealed that HH compliance is found to be 21% before patient contact, 23% before the aseptic procedure, 63% after blood and body fluid exposure, 41% after the patient contact, and 61% after the contact with patients' surroundings. [17]

In another study by Irek EO *et al* compliance of HH among healthcare workers in a tertiary health facility, southwest Nigeria. Out of the 174 opportunities for HH

observed, compliance rates were 42.37%, 55.81%, and 68.97% among doctors, nurses, and ward attendants, respectively. [18]

In another study by Omiye JA, nurses were found to be more compliant (33.2%) to hand hygiene as compared to the doctors (29%). [19] In a study by Mahfouz AA *et al* conducted in a governmental hospital in Aseer Region of Saudi Arabia, it was found that hand hygiene compliance is 59%. [20]

There are certain external and internal factors leading to low hand hygiene compliance among the HCWs. They include lack of time, workload, forgetfulness, shortage of staff due to overcrowding of the patients, sometimes inadequate supply, lack of training and education, fear of skin being damaged (due to alcohol based hand rub), and HCWs attitude [14].

As a large number of MOH hospitals were involved in the study and being first of its kind to represent hand hygiene compliance in MOH hospitals, there are certain limitations of this study. Like many other studies, it was an observational study to assess HH compliance according to WHO gold standard. Direct observation leads to the Hawthorne effect. A response of being conscious leads to the improvement in performance due to the awareness of being observed. [21] The association between hand hygiene compliance and reduction in the HCAs was not estimated. It is recommended to study the association in future.

7. Conclusion

In conclusion, the overall HH compliance rate was found to be 70%. The physicians have a lesser compliance rate as compared to nurses and the rest of the medical and paramedical staff. Achieving high levels of HH compliance in HCWs has been a big challenge. In addition to the limitations of resources sometimes, workload, overcrowding, behavior, and attitude of HCWs also affect hand hygiene compliance in any healthcare setting. Changing workload structure, enhancing resources, frequent reminders, patients' involvement, regular audits, infrastructure and efficient training and education sessions (theoretical as well as practical) may improve compliance. Hospitals should ensure adequate supplies and institute a vigilant monitoring and feedback program to evaluate hand hygiene compliance. It should be a continuous process to achieve maximum results. Further research is needed to investigate the reasons associated with hand hygiene non-compliance, and to design and improve HH compliance initiatives.

Ethical Consideration

Institutional Review Board (IRB) approval of this research has been obtained. Principles of research ethics have been taken into consideration.

Abbreviations

ICU: Intensive Care Unit

HAI: Healthcare associated Infection

HCW: Healthcare Worker
 HH: Hand Hygiene
 MOH: Ministry of Health
 WHO: World Health Organization

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