

Hand Hygiene Compliance among Healthcare workers at Jigme Dorji Wangchuck National Referral Hospital, Thimphu, Bhutan

Chhimi Lhamo^{1*}, Zimba Lethro² and Gyan Prasad Bajgai³

¹Deputy Nursing Superintendent and Infection Control Focal of the Hospital, JDWNRH, Bhutan

²Deputy Program Officer, Medical Education and Research Unit, JDWNRH, Bhutan

³Oral Medicine Specialist and Infection Control Focal of the Dental Department, JDWNRH, Bhutan

Received Date: 31-05-2022

Published Date: 06-07-2022

Abstract

Introduction: Proper hand hygiene (HH) is a proven, simple, and most effective method to reduce healthcare-associated infections (HCAIs) in healthcare facilities. This study aimed to assess the compliance and the level of knowledge of the health care workers (HCWs) on HH at the apex health center in Bhutan.

Materials and Methods: This was an observational cross sectional study conducted from 1st to 31st October 2017. Two research instruments were developed and used 1) Self-administered structured questionnaire 2) HH compliance observation checklist. The data was coded, entered and analyzed using SPSS version 21.0. which Recruited 565 of HCWs employed at Jigme Dorji Wangchuck National Referral Hospital (JDWNRH). The compliance to HH was an observational assessment using the WHO standardized checklists for HH while the level of knowledge on HH was evaluated using self-administered structured questionnaires. Descriptive statistics was employed for data analysis and values of $p < 0.05$ were considered statistically significant.

Results: A total of 565 participants (nurses 57.7%; technicians/technologists 17.3%; doctors 10.3% and support staff 9.2 %) responded to assessment on knowledge about HH and 1102 opportunities were observed to assess the HH compliance on 380 (response rate 68.34%). Of the total 1102 observations, 20.5% performed HH by application of alcohol-based hand rub, 12.9% used soap and water, while 66.6% missed or did not perform HH; HH compliance rate stood at 33.5%. 76% of the participants possessed a moderate to low level of knowledge about HH; overall knowledge about HH was at a moderate level ($M = 7.31$, $SD = 1.95$).

Conclusion: The overall HH compliance rate in this study

population was found to be below average. Poor compliance rate and insufficient knowledge about the HH practice evident in this study is a concern and it calls for the need to strengthen HH practices at all levels.

Keywords: Hand Hygiene; Hand Hygiene Compliance; Healthcare Workers

Introduction

One of the most effective and established practices that helps to prevent healthcare-associated infections (HCAIs) that has gained great significance in this era is hand hygiene (HH). The hands of the healthcare workers (HCW) are the most common vehicle for transmission of HCAIs [1]. Pathogenic microorganisms can stay for 2-60 minutes on HCW's hands if HH is not performed. Evidence shows that for every 100 hospitalized patients at any given time seven in developed and 10 in developing countries will acquire at least one HCAIs [2,3]. Estimates revealed that the National Health Service spends billions of pounds each year treating HCAIs to which approximately 500 deaths each year are directly attributable [4].

The HCAIs are the most frequent threat to patient safety globally. HCAIs not only potentially complicate patient treatment and lead to life-threatening conditions, but they also burden patients and healthcare facilities economically

Corresponding author: Chhimi Lhamo

Deputy Nursing Superintendent and Infection Control Focal of the Hospital, JDWNRH, Bhutan; Ph. No: +975-17380033

E-mail: clhamu@jdwnrh.gov.bt

with prolonged hospital stays. Lack of HH has been identified as the main source of HCAIs. Studies show that HCWs perform HH less than half the time as often as they should. Several studies have been conducted to investigate the factors contributing to HH compliance and indicate that lack of HH compliance is a concern in hospital settings [4]. Studies have found that alcohol-based hand rub (ABHR) was positively associated with HH compliance; those who had access to ABHR in their wards had 6.5 times more likely to comply [5]. It was also found that the presence of individual towel/tissue paper in the working area was positively associated with hand hygiene practices among HCWs. HCWs with access to individual towel/tissue paper in the ward were two times more likely to comply with HH than those who did not have those access.

A point prevalence surveillance (PPS) carried out at the Jigme Dorji Wangchuck National Referral Hospital (JDWRH), in September 2016 reported that overall HCAIs rate was 9.2%. It revealed that surgical site infection (SSI) has higher prevalence followed by catheter-associated urinary tract infection (UTI). During the HCAIs outbreak in the Neonatal unit, it was found that there was microorganisms' growth from the culture taken from HCW hands [6]. HCAIs are closely linked to HH practice and HCWs are professionally and ethically accountable for the care and safety of their patients. HCWs should adopt effective HH practices, following five moments of hand hygiene. Effective HH compliances in hospitals play a key role in improving patient and provider safety, and in preventing the spread of HCAIs. Considering the nature of the interaction between the patients and the HCW, it is paramount for the HCWs to perform proper HH while caring for their patients. Owing to the paucity of information on HH practices in JDWRH and to strengthen the infection control measures, this study was conducted to assess HH compliance, barriers to compliance and to generate baseline data to explore HH compliance rates among health care workers in JDWRH, Thimphu. This was an observational, cross-sectional study carried out at the JDWRH, Thimphu in 2017. This study was carried in all the units as follows: Medicine, Medical Extension and Dermatology, Eye Ear Nose and Throat (EENT), Cabins, Surgery, Orthopedic, Pediatric, Maternity, Intensive care units (Adult, Pediatric and Neonate), Birthing, Neonatal, Psychiatry, Pulmonary, Emergency Department, Dialysis, Minor Operating Theater Unit, Endoscopy, Dental Department and Community Health Department. The study recruited all categories of HCW including doctors, nurses, technicians/technologists, ward boys/girls, and cleaners. Ethical clearance to conduct the study was obtained from the Research Ethics Board of Health (REBH) in the Ministry of Health, and the administrative approval was sought from the hospital management to carry out the study. For the assessment of knowledge on HH, participation was voluntary and informed consent of the participants was obtained prior to the distribution of self-administered questionnaires. The study adhered to the Declaration of Helsinki for human subject participation.

A pilot study was done with 25 HCWS to check for validity and reliability of the questionnaire; necessary modifications were made post-pilot. HH opportunities were observed

following WHO- recommended five moments of HH; 1) before patient contact, 2) before the aseptic procedure, 3) after patient contact, 4) after body fluid exposure and, 5) after touching the patient's surroundings. Whenever HH opportunities were noticed, the techniques and compliances were observed.

For the direct observation component of the study, we observed and recorded HH compliance among healthcare workers using the "WHO standard observational tool" based on the five moments of HH. HCW in each ward, unit and department were randomly observed as they carried out routine patient care in all three shifts (morning, evening, and night). HH compliance was considered to be performed correctly if the healthcare provider either washed or applied hand sanitizer to his or her hands before patient contact, before aseptic task, after patient contact, after body fluid exposure risk, after contact with patient surrounding, and also including before wearing gloves and after removing gloves. Hand washing was the preferred method if the hands were visibly soiled, however, either method was accepted as effective and it was conducted in an imperceptible manner to avoid affecting subjects' HH behavior. The observations were performed by two observers in every shift in all the inpatient departments.

A set of validated and structured self-administered questionnaire were used to evaluate the limitation of resources, knowledge, and awareness among the HCWs. Intensive training was given for both the data collectors and supervisors for a day which covered the following: how to approach study subjects, the use of observational checklists, and how to perform the concealed observation. Participants who refused to participate in the study were allowed to quit without any restriction and implication. However, for the HH compliance, HCWs in each department were randomly observed through concealed observation as they carried out routine care with patients at different times of the day. Compliance was observed using the standardized checklist. Supervision was done at the spot by investigators only for the self-administered questionnaires. Data from the various departments were collected by the eight (8) data collectors and data collected were checked for completeness, accuracy, and clarity by the supervisors. Data were cleaned and cross-checked to ensure completeness before data entry (this can be deleted as it is included in material and methods).

Materials and Methods

An observational cross-sectional study was conducted to evaluate availability of alcohol-based hand rub, test the knowledge and awareness of HH practices and observe the HH practices Thein JDWRH. Research instruments were developed and used. (1) Questionnaires and observation checklist. A pilot study was done with 25 HCWS to check for validity and reliability of the questionnaire; necessary modifications were made post-pilot. HH opportunities were observed following WHO- recommended five moments of HH; 1) before patient contact, 2) before the aseptic procedure, 3) after patient contact, 4) after body fluid exposure and, 5) after touching the patient's surroundings. Whenever HH opportunities were noticed, the techniques and compliances were observed.

Data Analysis

The coded data were entered and analyzed using SPSS version 21.0. Descriptive statistics and cross-tabulation were performed with crude and adjusted odds ratios of 95% CI to determine the strength of association between HH compliance and different professions. A $p < 0.050.05$ is considered statistically significant.

Ethical Consideration

Ethical clearance was obtained from the Research Ethic Board of Health (REBH) in the Ministry of Health. For the assessment of knowledge on HH compliance the participation was voluntary and informed consent of the participants were obtained prior to the distribution of self-administered questioners. The study adhered to declaration of Helsinki on human subject participation.

Results

Demographics

A total of 565 HCWs were observed for compliance to HH; however, only 380 questionnaires were collected to assess knowledge on HH (response rate 68.34%). A majority of the respondent HCWs were nurses (57.7 %) and technicians/technologists followed by doctors and subsequently by support staff. The data was collected from 16 units and departments of JDWNRH. The demographic characteristics of the participants are shown in **Table 1**. The results showed that almost 60% of the respondents had not received any formal training on hand hygiene in the last three years. Meanwhile, 82.3% of the respondents reported that ABHR is readily available in their workplace whilst 17.7% reported that it is not available.

Demographic Characteristics	n	%
Health care workers		
Doctors	58	10.3
Nurses	326	57.7
Technicians/Technologists	98	17.3
Support staffs	52	9.2
Others	31	5.5
Departments		
Medical	37	6.5
Eye and ENT	22	3.9
Orthopedic	20	3.5
Surgical	16	2.8
Gynae/Obs	52	9.2
Pediatric	17	3
Critical care	71	12.6
Emergency	42	7.4
Pharmacy	12	2.1
Physiotherapy	21	3.7
Laboratory	23	4.1
Psychiatry	15	2.7
Radiology	18	3.2
Community Health	16	2.8
Dental	16	2.8
Support staffs	17	3
Others	150	26.5

Level of education		
Certificate	131	23.2
Diploma	205	36.3
Bachelor's degree	157	27.8
Master's degree and higher	22	3.9
Others	50	8.8
Years of experience		
0-5 years	367	65
5-10 years	67	11.9
10-15 years	40	7.1
15-20 years	56	9.9
>20 years	35	6.2
Previous formal HH training		
Yes	240	42.5
No	325	57.5
Availability of ABHR		
Yes	465	82.3
No	100	17.7

Table 1: Demographic characteristics of HCW participating in this study.

Knowledge about HH

The overall knowledge about hand hygiene among HCWs in JDWNRH was at a moderate level ($M = 7.31$, $SD = 1.95$) with minimum and maximum scores of 0 and 12 respectively. **Table 2** shows that 68.0 % of HCWs possessed moderate levels of knowledge.

Knowledge level ($M = 7.31$, $SD = 1.95$)	n	%
Low (0-4)	45	8
Moderate (5-8)	384	68
High (9-12)	136	24
Total	565	100

Table 2: Frequency and Percentage of HCWs in each Category of knowledge Level ($n = 565$).

About 24 % of HCWs had a high level of knowledge and in contrast, 8.0 % had low levels of knowledge about hand hygiene.

Hand Hygiene Compliance

A total of 1102 opportunities for HH were observed to assess HH compliance during three days of data collection. Results of categories of HCWs observed for HH compliance. Observed 6 categories of healthcare workers for HH compliance following the five hand moments of HH as recommended by WHO. HCWs are also observed for HH before wearing gloves and after removing gloves [**Table 3**].

Healthcare workers	n	%
Doctors including residents and interns	87	22.89
Nurses	224	58.94
Technicians/technologists	21	5.53
Ward boys/girls	5	1.32
Cleaners	22	5.79
Others	21	5.53
Total	380	100

Hand Hygiene Moments		
Before patient contact	290	26.3
Before aseptic task	72	6.5
After patient contact	257	23.3
After body fluid exposure risk	54	5
After contact with patient surrounding	213	19.3
Before wearing gloves	104	9.4
After removing gloves	112	10.2
Total	1102	100

Table 2: The categories of HCWs observed for hand hygiene and HH opportunities observed following five moments of HH.

The majority of the HCWs observed for HH compliance were nurses, followed by the doctors, least observed were the ward boys and ward girls. A total of 1102 opportunities were observed during the data collection, 290 HH opportunities were observed before patient contact, followed by after patient contact (257) and after contact with patient surroundings (213).

All HCWs who washed hands or applied ABHR were considered as HH performed, those who didn't wash or apply ABHR were considered as HH not performed. Out of 1102 HH opportunities, 20.5% (n=66) HCWs performed HH by application of alcohol-based hand rub, 12.9% (n=142) performed HH by washing with soap and water, and 66.6% (n=734) of HCW missed or did not perform hand hygiene, making overall HH compliance rate of 33.5% as shown in **Figure 1**.

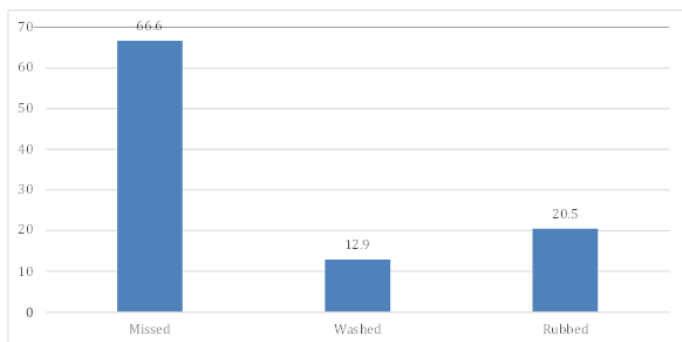


Figure 1: Hand hygiene performed and missed by HCWs (compliance rate).

Among the 209 HH methods observed, only 27.8% (n=66) HCWs performed HH following seven steps of the hand washing technique as per the Infection Control and Medical Waste Management (IC & MWM) guideline, while others failed to perform seven steps of HH.

Discussion

In light of the fact that HH practice is an important component of infection control measures in health facilities, this study assessed the HH compliance at the apex hospital in Bhutan. The HH compliance of HCW as measured by this study was found to be poor at 33.5% indicating a high risk of HCAs in the hospital. Furthermore, with only 27.8% of HCWs practicing recommended seven steps: 1) Rub hand Palm to palm 2) Right palm over left dorsum with interlaced finger and vice versa 3) Palm to palm with fingers interlaced 4) Back of the fingers to opposing palms with

fingers interlocked 5) Rotational rubbing of the left thumb clasped in right palm and vice versa 6) Rotational rubbing backwards and forwards with clasped fingers of right hand in the left palm and vice versa 7) Rotational rubbing of the left wrist in the right palm and vice versa of HH is a matter of concern. This information is critical from the aspect of quality assurance and standardization. However, the HH compliance is relatively higher compared to a study conducted in a Teaching Hospital in Ethiopia which found an overall HH compliance of 12% [7]. The observations from our study were comparable to studies in India which reported HH compliance at 33.4%; the findings might have been influenced by similar work settings [5]. Despite the high availability (82.3%) of ABHR in the health center, the poor HH compliance rate is concerning.

The first of its kind, this study shall serve as a national baseline on HH compliance and serve as indigenous baseline data for gauging the success of intervention programs and help aspiring researchers to further enhance the future research on HH and HCAs. The study found that compliance to HH is not significantly influenced by qualification or categories of HCW. The study recommends the need to improve HH compliance among HCWs to reduce HCAs transmitted through the HCW's hands. Appropriate resources, policies, and effective interventions are required specifically in line with infection control. Well-coordinated training based on guidelines from the Ministry of Health, CDC, or approved other centers' practices will help strengthen the HH [8-12].

This study is limited by fact that only regular staff of JDWNRH were recruited from the study. The inclusion of student nurses and other trainees is paramount as they constitute half of the working force and moreover, they will be the new face of HCWs in the future. Future studies could include prior knowledge of HH of study participants in order to better assess gaps and Correlations of participants' knowledge and practice. This study also did not assess the reason for poor compliance.

Considering the high availability of ABHR at JDWNRH but low HH compliance amongst all categories of HCWs, it is imperative for us to study and analyze reasons for low compliance the availability of opportunities. As an apex health center in the country, the formation of a dedicated infection prevention and control unit with competent professionals is highly recommended. Continuous strict monitoring and supervision of the infection control practices in the hospital could improve compliance and reinforce the practice of the staff at the ground level. There is an opportunity for JDWNRH to improve HH practices as a key performance indicator. It also revealed that almost 60% of the respondents had not received any formal training on hand hygiene in the last three years. A training program on a quarterly basis could also help the staff of all backgrounds to build compliance to HH.

Nursing administrators could play a great role in building collaboration with international agencies related to infection prevention and control to keep the staffs updated related to the advances in infection prevention and control practices as in the developed countries.

Conclusion

The study found that overall knowledge about hand hygiene among HCWs in JDWNRH was at a moderate level. Despite availability opportunities for HH, the HH practice was low amongst all categories of HCWs. Poor compliance rate and insufficient knowledge about the HH practice evident in this study is a concern and it calls for the need to strengthen HH practices at all levels. A high priority has to be given to bring the overall improvement in hand hygiene compliance so as to reduce the HAIs and emergence of drug resistance microbials through training of HCWs and establishing a strict inbuilt system of monitoring and evaluation. Insufficient knowledge and poor HH compliance evident in this study is a concern and it calls for the need to strengthen HH practices at all levels in Bhutan.

Acknowledgment

The authors thank all the participants for their time and co-operation and the hospital management for administrative support in the successful completion of this study.

Conflict of Interest

There is no conflict of interest among authors.

Authors' Contributions

Chhimi Lhamo: Conceptualization, data curation, formal analysis funding acquisition, investigation, methodology, software, supervision and writing original draft.

Dr. Gyan Prasad: Data curation, formal analysis, investigation and methodology.

Consent for publication

Not Applicable

Availability of data and materials, all relevant data within the manuscript and supporting data attached.

References

1. Allegranzi B, Pittet D. Role of Hand Hygiene in Healthcare-Associated Infection Prevention. *J Hosp Infect.* 2009;73:305-315.
2. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care. Geneva: World Health Organization; 2009.
3. MOH, National Infection Control and Health Care Waste Management Guidelines. Ministry of Health. Bhutan. 2006.
4. Guest JF, Keating T, Gould D, et al. Modelling the Annual NHS Costs and Outcomes Attributable to Healthcare-Associated Infections in England. *BMJ Open.* 2020;10:e033367.
5. Chavali S, Menon V, Shukla U. Hand Hygiene Compliance Among Healthcare Workers in An Accredited Tertiary Care Hospital. *Indian J Crit Care Med.* 2014;18:689.
6. Lam BC, Lee J, Lau YL. Hand Hygiene Practices in A Neonatal Intensive Care Unit: A Multimodal Intervention and Impact on Nosocomial Infection. *Pediatrics;*114:e565-571.
7. Abdella NM, Tefera MA, Eredie AE, et al. Hand Hygiene Compliance and Associated Factors Among Health Care Providers in Gondar University Hospital, Gondar, North West Ethiopia. *BMC Public Health.* 2014;14:1-7.
8. Agency for Health Protection and Promotion. Best Practices for Hand Hygiene in All Health Care Settings. Toronto, Ontario. Provincial Infectious Diseases Advisory Committee. 2014.
9. CDC: How-to Guide: Improving Hand Hygiene. Institute Healthcare Improvement. 2003, USA: CDC, 217-223.
10. World Health Organization: WHO guidelines on hand hygiene in health care. 2009, Geneva: WHO.
11. Chen YC, Sheng WH, Wang JT, et al. Effectiveness and Limitations Of Hand Hygiene Promotion on Decreasing Healthcare-Associated Infections. *PLOS One.* 2011;6:e27163.
12. The Joint Commission: Measuring Hand Hygiene Adherence: Overcoming the Challenges. 2009.

Copyright: © 2022 All copyrights are reserved by Chhimi Lhamo, published by Coalesce Research Group. This This work is licensed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Citation: Lhamo C and Bajgai GP. Hand Hygiene Compliance among Healthcare workers at Jigme Dorji Wangchuck National Referral Hospital, Thimphu, Bhutan. *Glob J Microbiol Infect Dis.* 2022;1:1-5.