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Knowledge and practice of hand hygiene among the doctors of Patan Hospital, Nepal

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Abstract

Introduction: Hand hygiene is the most effective infection prevention measure. This research aims to find out the knowledge and practice of hand hygiene among the doctors of major departments of Patan Hospital.

Method: A cross-sectional study was conducted among doctors of selected departments of Patan Hospital, Lalitpur, Nepal. The knowledge of hand hygiene was assessed using a WHO knowledge questionnaire. The practice was assessed using a WHO observation checklist. The data was recorded in Epi-info and the analysis was done for knowledge score and compliance with practice using SPSS v15. A p-value of <0.05 was considered statistically significant.

Result: A total of 104 (98%) of the participants completed each part (knowledge and practice) of the study. The overall mean score (\pm SD) was 64% \pm 8 on knowledge questions about hand hygiene. Knowledge of hand hygiene was not significantly different among departments ($p=0.351$) and gender ($p=0.994$). Out of 1022 opportunities, the compliance of hand hygiene among the doctors was 532(52%). The highest compliance for hand hygiene was after exposure to body fluids 93%. The mean time taken for hand rub was 8 seconds and the mean steps performed were 4 out of 8. Compliance with hand hygiene was statistically significant among departments ($p=0.001$). However, it was not statistically significant among gender ($p=0.198$).

Conclusion: Participants performed relatively well with a moderate score (64%) on knowledge questions but it was not reflected in practice (overall compliance 52%). The majority performed hand hygiene after body fluid exposure (93%) and after touching patients (64%).

Keywords: hand hygiene, hand rub, hand wash, knowledge, and practice

Introduction

Two major groups of microorganisms are found on the skin: organisms that normally reside on it (resident flora) and contaminants (transient flora).¹ Transient flora cause most hospital infections, can be easily removed by hand hygiene.^{2,3} Hand hygiene such as handwashing or hand disinfection decreases transient flora. Hand washing is done with unmedicated detergent and water or water alone.⁴ Hand disinfection uses an antiseptic solution, either medicated soap or alcohol. The most common organisms resulting in hospital-acquired infections are *Escherichia coli*, Methicillin-resistant *Staphylococcus aureus* (MRSA), enterococci, *Pseudomonas aeruginosa*, *Salmonella*, *Streptococcus*, *Staphylococcus*, *Candida*, *Clostridium difficile*, etc.^{5,6}

Hand hygiene is the single most important and effective infection prevention and control measure to prevent the spread of hospital-acquired infections. Despite the importance of hand hygiene practice, its adherence is unacceptably low among health care providers.⁷ However, a study done in a teaching hospital in Kathmandu among health care workers found that more than 90% of them washed their hands after exposure to hospital instruments, blood, or other body fluids and 36.7 % of doctors washed their hands before and after the patient examination.⁸

This study aims to find out the knowledge and practice of hand hygiene in various situations among the doctors of major departments of Patan Hospital.

Method

This was a cross-sectional study of prospectively collected data among doctors working in selected departments of Patan Hospital, Patan Academy of Health Sciences (PAHS) Lagankhel, Lalitpur, Nepal. Doctors from the Department of General Surgery, Medicine, Orthopedics, Pediatrics, Emergency

and Obstetrics and Gynaecology were included in the study. The study was conducted from the 1st of June to 30th of August 2017.

Ethical approval was obtained from IRC, PAHS. Initially, hand hygiene practice was assessed by directly observing the randomly selected doctors of the major departments during their actual contact with the patient such as in the outpatient department (OPD), morning round, and during patient examination. The participants were unaware of being observed by the researchers.

Knowledge assessment was done on a separate occasion, which may or may not include the participants who were observed for hand hygiene practice. Written consent was obtained and the confidentiality of the participant was assured.

All the doctors from the selected department for this study, who were working and present during the study period were included in the sample frame of the study. The doctors included: medical officers, MD residents, lecturers, and consultants (assistant professor, associate professor, and professor). The participants who did not give consent were excluded.

Two sets of pre-validated and pre-tested structured questionnaires developed by WHO were used.⁹ A knowledge questionnaire was used to assess the knowledge and the observation questionnaire was used to record the hand hygiene practice. Pertinent demographic characteristics were collected at the beginning of both the questionnaires. The observation questionnaire included the gender, designation, and the ward. The knowledge questionnaire included the ward, age, gender, designation, and working experience.

The knowledge questionnaire consisted of 10 questions to assess the knowledge of hand hygiene. The questions mainly focused on knowledge on the major route and most frequent source of germ transmission, duration of hand rubbing, prevention of

transmission of germs to both the patients and doctors and the best method for hand hygiene under variable circumstances. Scores for the knowledge questionnaire were expressed in percentage; an overall score of >75% were considered as good, 50–74% as moderate, and <50% as poor knowledge.¹⁰

The practice questionnaire assessed the type of hand hygiene method used and the five indications for performing hand hygiene. The five indications being before touching a patient, before clean/aseptic procedure, after body fluid exposure risk, after touching patient surroundings, and after touching a patient. From this questionnaire, the compliance of hand hygiene was calculated as total hand hygiene action (hand rub and hand wash) performed out of all the valid indications. Compliance = Hand hygiene action (hand rub + hand wash)/ total indication.⁹

The hand hygiene practice was observed for each of the randomly selected individuals during the actual contact with the patient. Each of the participants was observed for hand hygiene action for at least 30 minutes, and all the indications which demanded hand hygiene actions were recorded in the questionnaire. For each indication of hand hygiene; the participants' response was recorded as hand rub, hand wash, missed, or gloves. If the hand hygiene action performed was hand rub then the total steps of hand rub performed & average duration taken for it was recorded and compared as with WHO protocol.

After creating a sample frame of all the doctors, stratified random sampling was used for the proportional representation of departments. To get the maximal sample size, the proportion was taken as 0.5. With the inclusion of 10% non-respondents and 5% marginal error, the total sample size was taken as 106. The data were entered in Epi-info the analysis was carried out on SPSS v15.

Result

In hand Hygiene knowledge, out of 106 participants, 104(98.11%) of them completed the knowledge questionnaire. Sixty-three (60.6%) were male and 41(39.4%) were female. The median age of the participants was 28 years (range 24-51 years) and the mean was 30.33±6.48. As per proportionate sampling, participants from the Emergency department were 30(28.8%) followed by Medicine and Gynaecology and Obstetrics 19(18.3%) from each, Pediatrics 16(15.4%), Surgery 13 (12.5%), and Orthopedics 7(6.7%). The majority of them were medical officers 64(61.5%) followed by lecturers 19(18.3%), MD residents 12(11.5%), and consultants (assistant professor, associate professor, professor) 9(8.7%).

Twenty-three (22.1%) out of 104 participants have taken formal training in hand hygiene. Eighty-nine (85%) participants have reported the routine use of alcohol-based hand rub (ABHR) for hand hygiene. The overall mean score was 64% ± 8 on knowledge questions about hand hygiene. Sixty-eight (65.4%) participants agreed 'health care worker's hands when not clean' is the main route of the cross-transmission of potentially harmful germs between patients in a health care facility. Only 34 (32.7%) recognized 'germs already present on or within the patient' as the most frequent source of germs responsible for healthcare-related infections. Most of them thought 'the hospital environment' is the most frequent source of germs.

The majority of participants recognized correct hand hygiene action before touching a patient (94%) and Immediately after the risk of body fluid exposure" (97.1%) and "After exposure to the immediate surroundings of a patient" (54.8%) prevents the transmission of germs to the patient. When asked about the minimal time needed for alcohol-based hand rub to kill most germs on your hand, only 44(42.3%) of the participants gave correct responses (i.e., 20 seconds). Forty-five participants (43.2%) think minimal time needed is 10 seconds or less and 15(14.4%) think minimal time needed is one minute.

Ninety-four (90.4%) participants gave a correct response to the method of hand hygiene required “before palpation of the abdomen” and “after visible exposure to blood,” Table 1.

There were three questions with a single best answer: “the main route of the cross-transmission of potentially harmful germs between patients in health care facility”, “the most frequent source of germs responsible for healthcare-associated infections” and “the minimal time needed for alcohol-based hand rub to kill most germs on your hands”.

Overall, 22(21.2%) out of 104 participants gave a correct response to none of the three questions specified and only 14(13.5%) participants gave a correct response to all three questions, Table 2. There is no significant variation of responses depending upon gender and departments; however, consultant doctors gave proportionately more correct responses compared to others.

In hand hygiene practice, 104 participants (98%) were observed for hand hygiene action when there was any indication. There were 39(36.8%) females and 65(63.2%) male participants. The highest number of the participants were the Medical Officers 63(59.7%), followed by registrars/lecturers 26(25.8%), and then the consultants 15(14.5%).

The most common indication for hand hygiene action was “after touching the patient” and the action performed was Hand Rub, Table 3.

The most common type of hand hygiene practiced among the participants was the alcohol-based hand rub 38(36.5%) followed by the handwashing 16(15.4%). Male participants were more compliant towards hand hygiene practice with compliance 36(55.3%) than the female participants 19(48.7%). But the difference in hand hygiene compliance based on gender was not statistically significant ($p=0.198$).

The doctors of the pediatrics department were the most compliant group of doctors towards hand hygiene practice with a compliance of 78% and the least compliant department was Gynaecology and Obstetrics with compliance of 38%. The inter-departmental variation was statistically significant, Table 4.

Compliance of hand hygiene among consultants, lecturers, and medical officers was 56%, 51%, and 52% respectively, the difference was not statistically significant.

Out of the total eight steps of hand rub, as stated by WHO, the mean steps performed by the participants were four steps. The minimum number of steps for hand rub was two and the maximum was eight. Among those who used alcohol-based hand rub, the total mean duration of the hand rub action was 8 seconds. The minimum time for the hand rub was 4 seconds but the maximum time was 60 seconds.

Table 1. Response to the type of hand hygiene method in different situations, N=104

Situation	Correct method	Correct response N(%)
Before palpation of the abdomen	Hand rub	94(90.4%)
Before giving an injection	Hand rub	44(42.3%)
After emptying a bedpan	Hand wash	8(7.7%)
After removing examination gloves	Hand rub/wash	27(26.0%)
After making a patient's bed	Hand rub	57(54.8%)
After visible exposure to blood	Hand wash	101(97.1%)

Table 2. Correct responses regarding hand hygiene to three knowledge questions based on gender, designation, and department

		Correct response to the question				Total	p-value
		None	One	Two	Three		
Gender	Female	12	11	9	9	41	0.994 Mann-Whitney U test
	Male	10	27	21	5	63	
	Total	22	38	30	14	104	
Ward	ER-GP	6	15	7	2	30	0.351 Kruskal-Wallis test
	Gynaecology and Obstetrics	3	7	4	5	19	
	Medicine	6	7	3	3	19	
	Orthopedics	0	2	4	1	7	
	Pediatrics	4	3	6	3	16	
	Surgery	3	4	6	0	13	
	Total	22	38	30	14	104	
	Designation	Consultant*	0	4	2	3	
MD resident	5	1	4	2	12		
Medical officer	16	28	17	3	64		
Lecturer	1	5	7	6	19		
Total	22	38	30	14	104		

* consultants – assistant professor, associate professor, and professor

Table 3. Common indications, hand hygiene actions, and their compliance, N=1022

Indication	HH action				Total Frequency	Total Compliance (%)
	Gloves	HR	HW	Missed		
After touching patient	2	195	38	131	366	64
After touching pt. surrounding	2	46	9	124	181	30
Before clean/aseptic procedure	51	8	20	10	89	31
Before touching a patient	15	113	7	144	279	43
After body fluid exposure risk	3	11	89	4	107	93
Total	73	373	163	413	1022	52

Note: HH- hand hygiene, HR- hand rub, HW- hand wash

Table 4. Hand hygiene compliance across departments

Department	Compliance (%)	p-value
Gynaecology and Obstetrics	38	0.05
Medicine	46	
Emergency/General Practice	46	
Orthopedics	49	
Surgery	59	
Pediatrics	78	

Discussion

The result of this study shows the majority of participant doctors (77.9%) had not received any formal training on hand hygiene. An Iranian study found no significant difference in the level of knowledge of participants who had received formal training and those who had not.¹⁰ Two similar studies were done among undergraduate medical students and doctors

in India (54.9% and 57%) and health care providers in Ethiopia (58.2%) also found HCWs had not received any formal training on hand hygiene.¹¹⁻¹³ In contrast, studies were done among medical and nursing students in India and health care workers in Pakistan have demonstrated the majority of them receiving formal training on hand hygiene 79% and 54.3% respectively.^{14,15} The health care

workers who received training were more compliant with hand hygiene in those studies.

In this study, hand rub was found to be the preferred method of hand hygiene (36.5%) followed by hand washing (15.9%). However, studies from India and Egypt found routine hand washes as the preferred method of hand hygiene over hand rub.^{16,17} The difference in hand rub use could be due to differences in accessibility and availability.

Although HCWs have moderate (50-75%) to good (>75%) knowledge scores, studies around the globe have shown they have overall poor compliance with hand hygiene, and more so among doctors compared to nurses.^{10,11,14,18,19} This study has shown slightly better overall compliance (52%). A similar study conducted in a tertiary care center in Nigeria showed 48.2% compliance with hand hygiene.²⁰ Contrast to this finding, in the study conducted in a teaching hospital in Nepal, only 16% of the doctors did not perform hand wash despite the valid indication.⁸ Only 31% of participants in this study washed their hands before the clean/aseptic procedure which is low as compared to 68% in another similar Nigeria study.²¹ The studies from Ethiopia and Nigeria found participants who had received training on hand hygiene, had adequate supplies of soap and water, individual/wall-mounted alcohol-based hand rub, and a positive attitude toward hand hygiene were more likely to have good hand hygiene compliance than their counterparts.^{13,21}

This research included only the doctors of major departments of Patan Hospital. Had we been able to include all the doctors, the outcome would have been more comparable and could be generalized. This study didn't assess barriers to hand hygiene, which could have given some insights into factors associated with poor compliance.

Conclusion

Participants performed relatively well on knowledge questions (64%) about hand hygiene but the compliance was comparatively

low (52%). The majority of participants performed hand hygiene after body fluid exposure (93%) and after touching patients (64%) though they missed several other indications.

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Conflict of Interest

None

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None

Author Contribution

PRB and TK designed the research and did a literature review, all authors collected and analyzed the data. UP, PRB, and TK prepared the manuscript, and all authors revised and agreed with the final draft.

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Supplement

Knowledge Questionnaire

Instruction: Please encircle the answers which are true for you or fill in the blanks.

Ward: _____ Date: _____
Gender: Female / Male, Age in years: _____
Profession: Nurse / Doctor
Designation:
Work experience: years

For official use only. official use only
Personal ID: _____

1. Did you receive formal training in hand hygiene in the last three years? Yes / No
2. Do you routinely use an alcohol-based handrub for hand hygiene? Yes / No
3. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (*tick one answer only*)
 - a. Health-care workers' hands when not clean
 - b. Air circulating in the hospital
 - c. Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)
 - d. Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients
4. What is the most frequent source of germs responsible for health care-associated infections? (*tick one answer only*)
 - a. The hospital's water system
 - b. The hospital air
 - c. Germs already present on or within the patient
 - d. The hospital environment (surfaces)
5. Which of the following hand hygiene actions prevents transmission of germs to the patient?
 - a. Before touching a patient Yes / No
 - b. Immediately after a risk of body fluid exposure Yes / No
 - c. After exposure to the immediate surroundings of a patient Yes / No
 - d. Immediately before a clean/aseptic procedure Yes / No
6. Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?
 - a. After touching a patient Yes / No
 - b. Immediately after a risk of body fluid exposure Yes / No
 - c. Immediately before a clean/aseptic procedure Yes / No
 - d. After exposure to the immediate surroundings of a patient Yes / No
7. Which of the following statements on alcohol-based hand rub and handwashing with soap and water is true?
 - a. Handrubbing is more rapid for hand cleansing than handwashing True / False
 - b. Handrubbing causes skin dryness more than handwashing True / False
 - c. Handrubbing is more effective against germs than handwashing True / False
 - d. Handwashing and handrubbing are recommended to be performed in sequence- True / False
8. What is the minimal time needed for alcohol-based handrub to kill most germs on your hands? (*tick one answer only*)
 - a. 20 seconds
 - b. 3 seconds
 - c. 1 minute
 - d. 10 seconds
9. Which type of hand hygiene method is required in the following situations?
 - a. Before palpation of the abdomen Rubbing / Washing / None

A. Hand Hygiene Technique with Alcohol-Based Formulation⁹

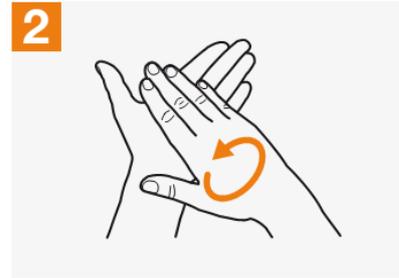
Observe whether the doctor or nurse rub their hands. If they do, please tick on each steps performed.



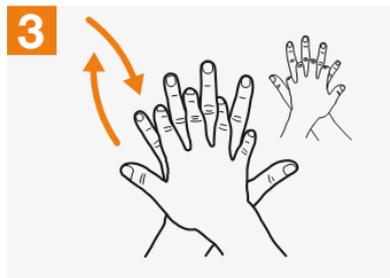
1a Apply a palmful of the product in a cupped hand, covering all surfaces;



1b Rub hands palm to palm;



2 Rub hands palm to palm;



3 Right palm over left dorsum with interlaced fingers and vice versa;



4 Palm to palm with fingers interlaced;



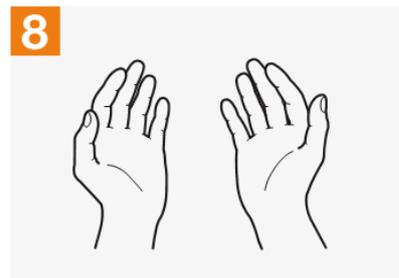
5 Backs of fingers to opposing palms with fingers interlocked;



6 Rotational rubbing of left thumb clasped in right palm and vice versa;



7 Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



8 Once dry, your hands are safe.

<p>Total steps performed:</p> <p>Duration of the entire procedure (in seconds):</p>

B. Hand Hygiene Technique with Soap and Water⁹

Observe whether the doctor or nurse washes their hands. If they do, please tick on each steps performed.



Wet hands with water;



Apply enough soap to cover all hand surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



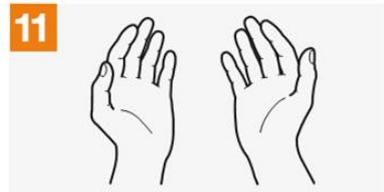
Rinse hands with water;



Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.

<p>Total steps followed:</p> <p>Duration of the entire procedure (in seconds):</p>
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