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RESEARCH ARTICLE

HAND HYGIENE: KNOWLEDGE, ATTITUDE AND PRACTICEE AMONG REGISTERED NURSES AND STUDENTS IN A REFERRAL HOSPITAL

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ABSTRACT

Aims and objectives: To evaluate the knowledge, attitude and practice on hand hygiene among registered nurses and nursing students in a referral hospital. ***Background of study****:* HCAIs is associated with increased morbidity, mortality, prolonged hospital stay, increased health care costs, and antibiotic resistance in both acute and long term care facilities. Based on recommendations from WHO and the Centers for Disease Control, HH is the most important and easy way for the control of hospital infections. The five moments of hand hygiene opportunities by WHO is a simple schema which can be remembered and put into practice by prudent nurses. ***Design****:* A quantitative survey approach was used to collect data from the registered nurses and students of a referral hospital. ***Results:*** The mean knowledge of entire sample (registered nurses and students) on WHO hand hygiene questionnaire in our study was 13.9 (moderate knowledge) and the percentage was 60.8. Moreover there was no significant difference among the registered nurses and students in their knowledge level. Furthermore a positive attitude and practice was observed among registered nurses and students. ***Conclusion:*** The study highlights the importance of regular services of in-service education for registered nurses which can help to prevent health care associated infections to a great extent. The nurse educators and practitioners should serve as role models and emphasize the importance of hand hygiene to budding as well as registered nurses for improved patient care outcomes.

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INTRODUCTION

Health care associated infections (HCAI) are ranked by World Health Organization (WHO) as one of the top 10 causes of hospital deaths worldwide (WHO, 2009). WHO defines HCAIs, also referred to as "nosocomial" or "hospital" infection, as an infection occurring in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission." HCAI, is associated with increase morbidity, mortality, prolonged hospital stay, increased health care costs, and antibiotic resistance in both acute and long term care facilities (Shah and Singhal, T. 2013). Based on recommendations from WHO and the Centers for Disease Control, HH is the most important and easy way for the control of hospital infections. (Park *et al.,* 2014; Sharma, 2013). Despite the relative simplicity of this procedure, compliance with hand hygiene among health care providers is as low as 40% (Longtin *et al.,* 2011; Tibballs, 1996; Pittet *et al.,* 2000). To address this problem, continuous efforts are being made to identify effective and sustainable strategies. One of such efforts is the introduction of an evidence-based concept of "My five moments for hand hygiene" by World Health Organization.

These five moments that call for the use of hand hygiene include the moment before touching a patient, before performing aseptic and clean procedures, after being at risk of exposure to body fluids, after touching a patient, and after touching patient surroundings. (Fig 1) This concept has been aptly used to improve understanding, training, monitoring, and reporting hand hygiene among healthcare workers (Pittet *et al.,* 2000). HH has been performed traditionally by health workers especially nurse, doctors and paramedical staff. Among the HCW; nurses contribute the major work force delivering round the clock patient services so any faulty measures from the part of nurses will result in grave consequences to the patient in the form of HCAI. Moreover the student nurses are the future generations representing the entire nursing population. Nurses need to take the opportunity to be leaders in this area and say to others before you touch my patient wash the hands for that nurses and nursing students should have good knowledge and attitude towards HH. Henceforth the current study was undertaken to assess the knowledge, attitude and compliance among student nurses and staff nurses.

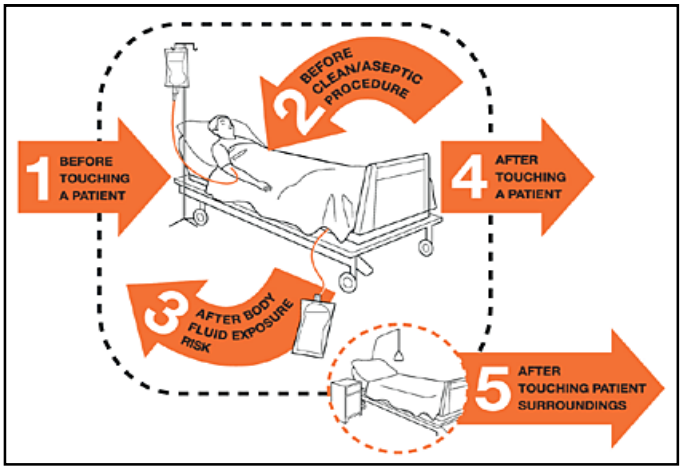

Fig. 1. W.H.O Five moments for hand hygiene

METHODS

a) **Design and setting:** A quantitative survey approach was used to collect data from registered nurses and students of a referral hospital. The various sites in the hospital for the research setting included Coronary care unit, Cardiothoracic and vascular surgery unit, Critical ICU, Various wards-Cardiology, Neurosurgery, Nephrology, Pulmonary, Neurosurgery, eye, oncology and nursing college of Bhopal Memorial Hospital And Research centre serving for the victims of Bhopal Gas tragedy.

b) **Participants, recruitment and data collection:** The study sample comprised of the registered nurses with RN/RM having more than one year experience in the current setting and student nurses belonging to different courses-Diploma, Graduation and bridging course for graduation –Post Basic B. Sc nursing. A simple random sampling was carried out among registered nurses and student nurses after the detailed enumeration yielding a net sample of two hundred and forty among which thirty three sample could not be taken up as they were not available during collection or have refused to participate in the study. The study was carried out in a final sample of two hundred and seven (ninety staff nurses and one hundred seventeen nursing students).The data was collected through self administered questionnaires and sufficient precautions were taken to get back the questionnaire as soon as possible to prevent data contamination. The data from all the collected questionnaires were entered in the personal system of researcher maintaining the anonymity of participants. Moreover the filled questionnaires were kept in locked cupboard.

Measurements: The measurement tool entailed four parts-The part A is Demographic and preliminary information related to sample-Gender, Age, profession, experience, six questions related to the satisfaction with regard to availability of preliminary items for hand hygiene, part B is WHO hand hygiene knowledge questionnaire-twenty five questions, part C is an attitude rating scale comprising ten statements against which the participants were asked to rate along a continuum ranging from strongly agree, agree, uncertain, disagree and strongly disagree, part D is a hand washing practice rating scale encompassing six statements and hand washing compliance checklist with twenty one sub statements under the main headings of WHO five moments of hand hygiene.

Ethics

The protocol was approved by the institutional ethics committee and scientific committee of Bhopal Memorial Hospital and Research Centre vide IEC/06/Nursing college/15.Written informed consent was obtained from all participants after being briefed on the study purpose and confidentiality issues.

Data Analysis: The data were analyzed using statistical package SPSS 17.0 version. Descriptive statistics i.e. frequency, percentage, mean, standard deviation, range and inferential statistics i.e. independent t-test, were used for analysis of data. Level of significance was set as $p < 0.05$.

RESULTS

Baseline Demographic characteristics: The mean age of entire sample is 26.10+/_6.17 years. However for better understanding; the sample characteristics of groups-Nursing staff and nursing students are presented in table 1. Majority (93.2%) of staff nurses are in the age group 26-35 years while 70.1% of student nurses are in the age group 18-25 years. More than half (72%) of sample population belongs to the female gender. Majority of nursing students (98.9%) and registered nurses (74.4%) were having diploma qualification.

Knowledge on WHO hand hygiene questionnaire: The knowledge of registered nurse and nursing students are being presented in Table 2. The registered nurses had significant knowledge over nursing students in various aspects of questionnaire such as the main route of transmission of potentially harmful germs between patients (97.7%), most frequent source of germs responsible for health care associated infections (67.7%), need for hand hygiene: after touching a patient (98.8%), after exposure to immediate surroundings of a patient (100%) while student nurses had significant knowledge over registered nurses with regard to certain statements such as performing hand hygiene before palpation of abdomen(61.5%) and after emptying a bed pan (85%).

Attitude towards Hand hygiene

The student nurses had significantly better attitude towards hand hygiene as compared to registered nurses. The nursing students had significantly sufficient knowledge about hand hygiene (98.2%) as compared to nursing staff. The nursing students had significantly more important things to do than hand hygiene (36.3%) as compared to registered nurses. The registered nurses significantly felt emergencies as a hindrance towards hand hygiene (18.8%) as compared to nursing students (Table 3).

Knowledge of staff nurses and students on five moments of hand hygiene

More than 50% of the group belonging to staff nurses and students were having knowledge on the first four components of five moments of hand hygiene (before patient contact, before aseptic task, after body fluid exposure risk, after patient contact) while there was only 30% and 40% who scored correctly for performing hand hygiene after touching patient surroundings by the staff nurses and student nurses respectively (Fig 2).

Table 1. Baseline demographic characteristics

S.No.	Variables	Nursing staff N=90	Nursing students N=117
1	**Age**		
	18-25	Nil	82(70.1)
	26-35	83(93.2%)	35(29.9)
	36-45	7(7.7%)	0
2	**Gender**		
	Male	23(25.6)	35(29.9)
	Female	67(74.4)	82(70.1)
3	**Education**		
	GNM	89(98.9)	87(74.4)
	Post Basic BSC	0	14(11.9)
	BSC	1(1.1)	18(15.4)

Table 2. Knowledge of staff nurses and student nurses on hand hygiene questionnaire

Sl/No.	Statement	Nursing Staff n=90	Nursing students n=117	P value
1	Which of the following is the main route of transmission of potentially harmful germs between patients? (health care workers hands when not clean)	88(97.7)	84(71.8)	.000
2	What is the most frequent source of germs responsible for health care associated infections? (germs already present on or within the patient	61(67.7)	44(37.6)	.02
	Which of the following hand hygiene actions prevents transmission of germs to the patient?			
3	Before touching a patient (yes)	90(100)	115(98.3)	NS
4	Immediately after risk of body fluid exposure (yes)	89(98.8)	109(93.2)	NS
5	After exposure to immediate surroundings of a patient (no)	20(22.2)	60(51.3)	.03
6	Immediately before a clean/aseptic procedure (yes)	89(98.8)	111(94.9)`	NS
	Which of the following hand hygiene actions prevents transmission of germs to the health care worker?			
7	After touching a patient (yes)	89(98.8)	81(69.2)	.04
8	Immediately after a risk of body fluid exposure (yes)	90(100)	106(90.6)	NS
10	Immediately before a clean/aseptic procedure (Yes)	1(1.1)	16(13.7)	NS
11	After exposure to the immediate surroundings of a patient (yes)	30(33.3)	35(29.9)	NS
12	Which of the following statements on alcohol-based hand rub and hand washing with soap and water is true?			
13	Hand rubbing is more rapid for hand cleansing than hand washing (true)	88(97.8)	85(72.6)	NS
14	Hand rubbing causes skin dryness more than hand washing (false)	60(66.7)	70(59.8)	NS
15	Hand rubbing is more effective against germs than hand washing (false)	25(27.7)	40(34.2)	NS
16	Hand washing and hand rubbing are recommended to be performed in sequence (false)	21(23.3)	47(40.2)	NS
17	What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (20 seconds)	2(2.2)	14(11.9)	NS
	Which type of hand hygiene method is required in the following situations?			
18	Before palpation of the abdomen (rubbing)	11(12.2)	72(61.5)	.02
19	Before giving an injection (rubbing)	14(15.5)	33(28.2)	NS
20	After emptying a bed pan (washing)	80(88.8)	100(85.4)	.02
21	After removing examination gloves (rubbing/washing)	90(100)	117(100)	NS
22	After making a patient's bed (rubbing)	22(24.4)	35(29.9)	NS
23	After visible exposure to blood (washing)	70(77.7)	83(70.9)	NS
	Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs			
24	Wearing jewellery (yes)	38(41.3)	106(90.5)	.02
25	Damaged skin (yes)	88(97.7)	100(85.4)	NS
26	Artificial fingernails (yes)	68(75.5)	92(78.6)	NS
27	Regular use of a hand cream (no)	22(24.4)	55(47)`	.03

Table 3. Attitude towards hand hygiene among registered nurses and nursing students

Sl. No.	Variables	Nursing staff (%) n=90	Nursing students (%) n=117	P value
1.	I adhere to correct hand hygiene	87(96.7)	114(97.4)	1
2.	I have sufficient knowledge about hand hygiene	70(77.7)	115(98.2)	.00
3.	I feel frustrated when others omit hand hygiene	90(100)	103(88)	.001
4.	I feel guilty if I omit hand hygiene	90(100)	101(86.3)	.001
5.	Adhering to hand hygiene practices is easy in the current set up	86(95.5)	112(95.7)	1
6.	Sometimes I have more important things to do than hand hygiene	12(13.3)	46(36.3)	.00
7.	Emergencies and other priorities make hygiene more difficult at times.	22(18.8)	50(55.5)	.00
8.	Wearing gloves reduce the need for hand hygiene	9(10)	33(28.2)	.002
9.	I am reluctant to ask others to engage in hand hygiene	23(25.5)	22(18.8)	.3
10.	Newly qualified staff has not been properly instructed in hand hygiene in their training	7(7.7)	34(29.1)	.00

Table 4:Comparison between registered nurses and students

Variable	Student	Registered Nurses	P value
Knowledge(Total Score-25)	14.5+/-2.2	13.3+/-1.7	.2
Attitude(Total Score-10)	7.03 +/-1.5	6.8+/-.61	..04
Practice(Total Score-6)	3.9+/-1.25	2.6+/-.29	.26

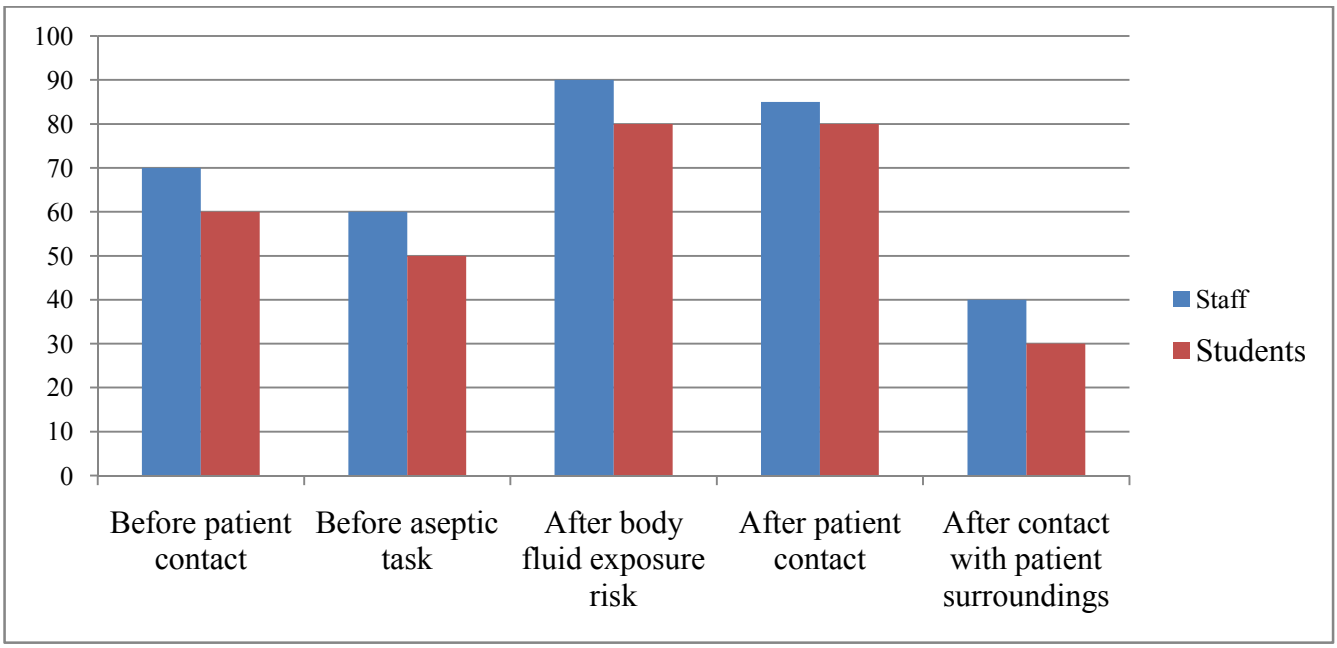

Fig. 2. Bar diagram showing Knowledge of staff nurses and students on five moments of hand hygiene

Comparison of knowledge, attitude and practice on hand hygiene: There was no significant difference among the mean score for knowledge, attitude and practice among staff nurses and students (Table 4) to be changed as There was no significant difference among the mean score for knowledge and practice among staff nurses and students except the component of attitude.(Table 4)

DISCUSSION

Nosocomial or hospital acquired infections transpire throughout the world- impinging both the developed and low income nations. Infections acquired in health care settings are the primary causal factor for large-scale morbidity and mortality of patients. The recommendation by Dr. Semmelweis to use chlorinated water solution before each vaginal examination was a major breakthrough in the practice of hand washing with particular reference to the care of patients (Semmelweiss, 1988). The emergence of multidrug resistant gram negative organisms in ICUS pose a threat to the safety of patients and public health throughout the world and a low adherence to hand hygiene by health care personnel has been quoted as a primary reason for the same (Strich and Palmore, 2017). The mean knowledge of entire sample (registered nurses and students) on WHO hand hygiene questionnaire in our study was 13.9 (moderate knowledge) and the percentage was 60.8.Moreover there was no significant difference among the registered nurses and students in their knowledge level. The findings are consistent with various other studies(Cruz and Bashtawi 2016; Paudel *et al.,* 2016; Shinde and Mohite, 2014; Nair *et al.,* 2014; Ariyarathne *et al.,* 2013; Rao *et al.,* 2012).Obviously more than fifty percent of the sample had knowledge on hand hygiene moments before and after patient contact similar to other study (Celik and Kocasli, 2008; Foote and El Masri, 2015).A tremendous knowledge on hand hygiene certainly correlates with a decreased risk of spreading infection among health care personnel (McLaughlin *et al.,* 2005). Knowledge to hand hygiene can also definitely have an impact on hand hygiene compliance, practice and beliefs (Sharma *et al.,* 2011; Van de Mortel, 2012). The knowledge on minimum time required for hand was as reported by a bare minimum percent of the sample (2.2% and 11.9%) respectively by students and staff nurses) in contrary to a study done by Celik and Kocasli,2008 wherein 70.9% of students washed their hands one minute or longer. Compliance to hand hygiene after contact with body fluids was high among both the registered nurses (90.6) and students (100).However trivial practices were observed in areas such as hand hygiene before a clean and aseptic procedure and after exposure to surroundings of patient by both the groups1.1%, 13.7% and 33.3 %, 29.9 % respectively. The results are consistent with the study done by Liz Kingston *et al.,* 2017 and Souza *et al.,* 2014. Converely a major proportion of the sample had good knowledge on the effective use of hand rub, soap and water for hand hygiene in comparison with the study done by Kingston *et al.,* 2017 and this could be due to a mixed sample of students belonging to different curricular structure of nursing course and registered nurses. ornaments and other jewelers worn by nurses during clinical patient care contributes substantially to the harboring of microorganisms and our study found a negligible proportion of registered nurses (41.3%) believing jewelers as a shelter for microorganisms leading to hospital acquired infections among patients. The hand hygiene attitude is generally positive among staff nurses and students similar to other studies (Maheshwari *et al.,* 2014, Shinde, 2014; Nair, 2014: Ariyarathne *et al.,* 2013; Kingston *et al.,* 2017) Positive attitude favoring hand hygiene subsequent to patient contact are independently associated with good observed hand hygiene performance (Pittet *et al.,* 2014; Sax *et al.,* 2007). The hand hygiene compliance can be increased by various measures such as continuous written advise, motivation, role model by clinical instructors and nurse managers, reprimand or discipline (Foote and El Masri, 2015; Avila-Aguero *et al.,* 1998)

Conclusion

The study highlights the importance of upbringing awareness among registered nurses and students related to their pivotal responsibility in preventing the emergence and hauling of health care associated infections through simple and basic measures such as hand hygiene. The nurse educators and practitioners should serve as role models and emphasize the

importance of hand hygiene to budding as well as registered nurses for improved patient care outcomes. The WHO five moments of hand hygiene opportunities are a simple basic schema which can be easily remembered and put into practice.

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Author contributions: Study concept and design, literature review, statistical analysis, data interpretation and manuscript preparation: Abin Varghese: concept and design, data collection, data interpretation and preparation of manuscript: Gigini George.

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