

A Study to Assess Knowledge, Attitude and Practices of Five Moments of Hand Hygiene among Nursing Staff and Students at a Tertiary Care Hospital at Karad

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Abstract: *Background - Hand hygiene practices of health care workers has been shown to be an effective measure in preventing hospital acquired infections. The 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. This concept has been aptly used to improve understanding, training, monitoring, and reporting hand hygiene among healthcare workers Aim- To assess the knowledge, attitude, and practice of five moments of hand hygiene among nursing staff and students at teaching hospitals. Methods - A cross-sectional study was conducted among 100 nursing staff and 100 nursing students in a tertiary medical college in Karad. Knowledge was assessed using WHO hand hygiene questionnaire. Attitude and practices were evaluated by using another self-structured questionnaire. Z test was used to compare the percentage of correct responses between medical and nursing students. A P value less than 0.05 were considered significant. Results-The knowledge on hand hygiene was moderate (144 out of 200, 74%) among the total study population. The majority of students had poor attitudes with regard to hand hygiene. Nursing students had significantly ($P < 0.05$) better attitudes (52%) compared to nursing staff (12%). Student nurses had better five moments of hand hygiene practices than the staff nurses.*

Keywords: Hand Hygiene, Knowledge, Attitude, Nursing Staff

1. Introduction

Hand hygiene is recognized as the leading measure to prevent cross-transmission of microorganisms and to reduce the incidence of health care associated infections [1, 2]. Despite the relative simplicity of this procedure, compliance with hand hygiene among health care providers is as low as 40% [3-5]. 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. This concept has been aptly used to improve understanding, training, monitoring, and reporting hand hygiene among healthcare workers [6].

Nurses constitute the largest percentage of the health care workers (HCW) [7] and they are the "nucleus of the health care system" [8]. Because they spend more time with patients than any other HCWs, their compliance with hand washing guidelines seems to be more vital in preventing the disease transmission among patients.

Hospital acquired infections (Hospital acquired infections) are infections acquired in hospital by a patient who was admitted for a reason other than that infection [9]. Hospital acquired infections are one of the important public health problems in many countries throughout the world. A WHO study, have also shown that the highest prevalence of nosocomial infections occurs in intensive care units and in acute surgical and orthopedic wards [10].

Hospital acquired infections results in higher morbidity, mortality, and additional costs. It is well recognized that the risk of transmission of pathogens when providing medical care and the incidence of Hospital acquired infections can be kept low through appropriate standardized prevention procedures. However, it has been well documented that the level of compliance with the use of proven HAI measures by healthcare workers (HCWs) has been disappointing [11]. In order to overcome this problem it is vital to implement and practice prevention and control strategies with demonstrated value consistently and rigorously. Among the different strategies, the adherence to guidelines for disinfection is an essential ingredient for activities aimed at preventing the Hospital acquired infections.

The importance of hands in the transmission of hospital

infections has been well demonstrated [12], and can be minimized with appropriate hand hygiene [13]. However, compliance with hand washing is frequently suboptimal. In the Sri Lankan theatre settings a study demonstrated that only 60% of the doctors performed appropriate hand washing before entering the theatre. Non compliance with hand washing may be due to a variety of reasons, including: lack of appropriate facilities for hand washing, high staff-to-patient ratios, insufficient knowledge and attitudes of the staff, and allergies to hand washing products. Therefore it is important to address these issues in hospital infection control.

The prevalence of Hospital acquired infections is high in intensive care unit due to patient and environmental factors. The patients are critically ill and usually immune compromised which predispose them to acquire infections more easily. Critically ill patients requiring urgent and emergency interventions in ICU may cause difficulties to the health care workers to engage in recommended hand hygiene practices. There are several guidelines published by both international and local organizations such as WHO, CDC and the Sri Lankan college of microbiologists [14] on hand hygiene. It is important to carry out regular training programs and surveys to assess the hand hygiene practices among the health care workers in Sri Lanka, especially in the intensive care units in order to implement infection control measures.

In Asia there is a paucity of studies [7–15] exploring this subject, although the prevalence of health care associated infections is high in this region; especially medical and nursing student's knowledge of standard precautions is rarely compared [16]. The observance of hygiene by students is reported as being weak [17, 18]. Therefore, it is absolutely essential to investigate and know nurse's knowledge, attitudes, and practices about hand hygiene so that appropriate strategies can be developed to promote hand washing compliance.

2. Aim and Objectives

To assess the Knowledge, Attitude, And Practice of Five Moments of Hand Hygiene among Nursing Staff and Students at teaching hospitals.

3. Operational Definition

1. Hand Hygiene: Hand washing is simple, easy implemented and good practice can reduce the risk of cross infection.
2. Assessment: It is deliberate, systematic and logical collection of subjective and objective data are helpful to identify and define problem of the client before the nurse procedure to plan the.

3. Hospital: Hospital is an institution for the care, cure and treatment of the sick and wounded, for the study of the disease and for the training of the doctors and nurses.

4. Review of Literature

4.1 Hand Hygiene in Healthcare

Nurses' hands come into close contact with patients and are frequently contaminated during routine patient care: e.g. auscultation and palpation or while touching contaminated surfaces, devices or materials such as changing of dressing [19]. Therefore, hand hygiene is considered an essential, cheap and most effective means of preventing cross. This method is designed to save lives and provide a safe treatment atmosphere for all patients and HCWs, regardless of the setting [20]. use different terms for hand hygiene, such as hand antisepsis, disinfection, degerming, decontamination or sanitising, in this paper hand hygiene refers to either hand washing with antimicrobial soap or hand disinfecting with an alcohol-based hand-rub. The aim of hand hygiene is to remove dirt and limit the microbial counts on the skin, to prevent cross transmission of pathogens between patients [21]. Since nurses are present 24 hours a day, 7 days a week in the healthcare setting, it is essential to comply with hand hygiene policy and maintain patient safety. Furthermore, nurses are obliged by regulatory registration councils, such as in the U.K's Nursing and Midwifery Council (NMC), to safeguard patients and to act as the patient advocate. Nurses are professionally and ethically accountable for their actions. The NMC's 'Code of Standards and Conduct' requires nurses and midwives to 'provide a high standard of practice and care at all times' (NMC 2008, 2). Yet, despite the momentum for hand hygiene, some nurses are still presenting with low compliance because they perceive it as not their problem, that it is something to do with infection control staff and they have to deal with it [22]. Furthermore, Nazarko (2009) [23] indicates that nurses often fail to practise hand hygiene because they are busy and they feel hand hygiene takes up precious time. In addition, nurses often perceive that gloves can be used as an alternative to hand hygiene. They usually tend to remove the gloves without washing their hands or use the same gloves to deliver intended care to multiple patients. Even when they remove their gloves, only 20% of nurses actually clean their hands while study claim that nurses avoid hand hygiene because they are frightened that skin problems such as dermatitis could develop, especially with alcohol hand-rubs [23].

According to Collins [24] hand hygiene should be considered before invasive procedures, after contact with contaminated devices or materials, and with high risk, infectious patients. Moreover, Kampf claim that hand hygiene should be advocated before beginning work, at the end of work, and after visiting the rest room (toilet). However, Canham[25] argues that hand hygiene

requirements depend on the type of procedure, the degree of contamination and the persistence of antimicrobial action on the skin. Even when nurses spend a longer time on hand hygiene, their technique is often poor compared to other HCWs in terms of leaving large areas unwashed effectively, i.e. wrists, thumbs, nail beds and between fingers.

Collins claims that physicians generally have excellent hand hygiene skills compared to nurses. Karabay note that hand hygiene compliance is seen more in junior nurses and newly recruited staff, and Akyol claims that hand hygiene compliance is higher among nurses compared to physicians and other HCWs. Ott & French suggest that the attitudes and behaviour towards hand hygiene is a complex issue, involving the perception of its effectiveness, staff's values and beliefs and existing barriers. In order to achieve high compliance rates with hand hygiene, Cambell (2010) suggests that the defaulters should be disciplined as though they have violated hospital policy, starting with personal counselling to verbal warning and eventually to a written warning placed in their file. Hand hygiene is not only the nurses' responsibility, it is a shared responsibility between hospital administration, key leaders, patients and others stakeholders.

4.2 Effective Hand Hygiene Techniques

Effective hand hygiene involves the removal of visible soiling and the reduction of microbial colonisation of the skin. Healthcare workers' hands can be contaminated by two types of pathogens: transient (contaminating) and resident (normal or colonising) microorganisms (Mani et al. 2010). Resident flora colonise deeper skin layers and, compared to transient flora, is difficult to remove mechanically, i.e. by hand washing. Fortunately, resident flora tends to be less aggressive and is, therefore, less likely to cause serious infection. Negative staphylococci and Corynebacteria are examples of this group. These bacteria tend to grow in hair follicles and remain relatively inactive over time [25].

Transient flora, on the other hand, colonise the superficial skin layers for a short time. The hands of HCWs are often contaminated with transient flora by direct contact during daily patient care activities, environments or equipments. However, these micro-organisms are easily removed by mechanical methods, such as friction in hand washing. Staphylococcus aureus and Candida species are examples of transient flora. These bacteria have the ability to induce HAI among patients and HCWs [25]. Taking into consideration the above information regarding transient and resident bacteria, effective hand hygiene, either by hand washing with antimicrobial soap or alcohol based hand-rub, is evidently the way to minimise the cross infection risk. Effective hand washing is the application of a plain (non-antimicrobial) or antiseptic (antimicrobial) soap onto wet hands; then vigorous rubbing together of both hands to form

a lather, covering all the surface of the palms, tops of the hands, base of the fingers, between the fingers, back of the fingers, fingers tips, fingernails, thumb and wrists for one minute. Equally important is that fingernails should be short. Artificial fingernails or extenders are potential traps for bacteria and should be avoided. New nail polish on natural nails does not aggravate microbial load; however, chipped nail polish can harbour bacteria. Wearing jewellery, such as rings or hand watches, could lead to the bacterial colonisation on the skin underneath them. After soaping and rubbing, hands should be rinsed thoroughly to remove all the lather. Rinsing with hot water should be avoided, because it could cause skin dryness [19]. Study reports that hand position (hands up, hands down, hands lateral) during hand washing procedure and water flow showed no difference in microbial counts.

Hand drying is equally important to prevent cross infection, because microorganisms thrive in a damp environment. Moreover, proper hand drying is required before wearing gloves, as trapped moisture under gloves can cause skin irritation and increase the harbouring of bacteria. Paper towels are effective for drying hands plus the friction created by their use enhances organism removal from the skin. Taps should not be touched again by freshly washed hands; a paper towel can be used instead to turn the water off. Although a hand dryer is as good as hand towels, paper disposable hand towels are quicker and more effective. The friction generated by vigorous hand rubbing with soap and hand drying with paper towels removes dirt and loosely adherent flora, i.e. most transient flora and a small portion of resident flora from hands.

Alcohol based hand-rub is recommended for hand decontamination in all clinical settings apart from visibly soiled hands. Alcohol hand-rub uses alcohol instead of water. In contrast to the mechanical (friction) removal of flora in hand washing, alcohol works by killing the flora. Alcohol hand-rub differs from hand washing because it acts on the microorganisms by denaturing their proteins and thus has the ability to eradicate all transient flora and most resident flora. It also takes less time than hand washing, between 15 to 30 seconds. The process of alcohol hand-rub starts by applying a sufficient amount of the alcohol based hand-rub product (liquid, gel or foam) according to the manufacturer's recommendation. (Usually between 3 to 5 ml), and spreading it all over the hands, especially the areas between fingers, thumbs and fingernails. The effective concentration of alcohol should be 60% to 95%; concentrations of greater than 95% are not recommended because they have less water which is essential for the protein denaturation of microorganisms, thus making them less potent.

HCWs should adopt either procedure for hand hygiene, either alcohol hand-rub or hand washing with antimicrobial or non-antimicrobial soap, but use the latter if hands are

visibly soiled. Using both procedures simultaneously is not recommended, as it doubles both cost and time. Trampuz argue that using alcohol hand-rub immediately before or after hand washing could cause dermatitis and further recommend wearing powder-less gloves to avoid possible alcohol reaction with residual powder. However, Kampf & Löffler (2010) maintain that using alcohol hand-rub after hand washing could reduce irritation caused by hand washing detergents, since this method also removes detergent from the skin. Clearly, skin irritation and dermatitis are a professional hazard. Unfortunately, damaged skin can harbour bacteria and may contribute to cross infection further claim that hand washing removes lipids from the skin, while alcohol hand-rub only redistributes them. However, both procedures can induce skin dryness. Additionally, Collins [24] argue that frequent hand washing, hot water, harsh soap and rough hand paper towels are precipitating factors in skin dryness and subsequent skin infection. Therefore, skin protection products, such as hand lotions or creams, should be considered and used regularly in order to reduce dryness and promote regeneration of the skin cells.

4.3 Hand Hygiene and Infection Control Policies

Hand hygiene needs a multiple interventions approach in order to make it a sustainable practice within healthcare. Campbell[3] argues that hand hygiene is not only the responsibility of the Infection Control Department and recommends a multidisciplinary approach: hospital administration, other key leaders and nursing leaders are the key to success for hand hygiene compliance within a hospital. Moreover, Maxfield[29] suggest that HCWs' culture and hospital atmosphere should consider the Infection Control Department as a resource and partner rather than an enforcer. Thus, infection control staff can play a vital role in hand hygiene compliance by encouraging patients' monitoring of hand hygiene by observation. Ott & French[37] claim that hand hygiene adherence goes beyond education and training, as it involves continuous motivation towards change and how that change can be sustained.

4.4 Professional and Organisational Barriers

Many factors lie behind poor hand hygiene adherence among HCWs. Among nurses a lack of awareness and scientific knowledge regarding hand hygiene is considered significant claim that lack of proper infection control during training programmes, in which students observe their peers with patients, could lead to bad hand hygiene practice. Interestingly, Ott & French[37] found that nurses' attitudes and cultures at work have a great influence in students' clinical development and, in order to be accepted within that culture, they tend to follow their mentors and other HCWs. For instance, to be perceived as an efficient member of the team, students tend to perform hand hygiene inadequately,

because they want to appear as busy as their mentors and think they do not have adequate time for hand hygiene.

According to Ott & French [37], nursing students usually receive training on standard infection control precautions during the first seven weeks. However, the training benefits decline from the first to the third year of study. Therefore, it is essential to emphasise infection control knowledge in every year of study. Nazarko found that pre-registration nursing students do not receive a broad education programme in infection control. Takahashi report that education and seminars are fundamental in promoting hand hygiene and help staff to comply with the institutional protocols of infection control. Although 90% of the NHS trusts provide induction training in infection control for their staff, many trusts fail to provide annual updates [23]

Misconceptions regarding hand hygiene are also believed to contribute to low compliance; for instance, when gloves are used as an alternative to hand hygiene, or the notion that skin irritation arises from frequent hand hygiene practice[21]. In addition, increased workloads, understaffing, limited time, lack of role models among colleagues or seniors, lack of organisational pledge to good hand hygiene practice, disagreement with guidelines and protocols and lack of motivation have all contributed to poor compliance with hand hygiene and infection control measures [26].

Lack of hand hygiene products and facilities, such as running water, sinks, antiseptic or non-antiseptic soaps, alcohol hand-rubs and hand paper towels, can also play a major role in poor hand hygiene practice [26]. Unavailability of facilities is even worse in developing countries. Ogunisola[27] report that most wards in Nigerian hospitals lack adequate facilities for effective hand hygiene and use the bucket and bowl method as an alternative to running water. Likewise [28] report that insufficient or inconveniently positioned sinks, inadequate access to soap and water, unavailability of hand paper towels or electrical dryers are obstacles which hinder appropriate hand hygiene practice.[26]

4.5 Strategies to Improve Compliance of Hand Hygiene

To improve HCWs compliance with hand hygiene, it is then necessary to consider the hindering factors mentioned above and attempt to turn them to enhancer factors. For example, staff education and proper follow up training in hand hygiene practice is important to identify situations where hand hygiene is reasonable; the infection control team can be involved in attaining this. Equally important is to clarify nurses' misconceptions in terms of glove usage and skin problems in order to achieve a better adherence to hand hygiene practice. The unit or ward manager is responsible for ensuring that hand hygiene products are always available

and are in accessible places: inside and outside of every patient room, nursing station, offices etc [19].

Promotional material, such as posters, can be placed in noticeable areas of the hospital to remind HCWs, patients, and visitors about the importance of hand hygiene practice. Additionally, videos can be used on the wards to show patients the significance of hand hygiene in preventing cross infection and to ask or remind HCWs to practise hand hygiene before healthcare delivery. Placing proper hand hygiene technique illustrations above sinks or near to alcohol hand-rub dispensers can be helpful as well. Maxfield[29] point out that every nurse should be held responsible for reminding co-workers to practise hand hygiene, thereby raising the sense of accountability between the working team. Moreover, nurses with good hand hygiene could gain recognition by, for example, announcement in the hospital newsletter, an accolade which may encourage others to do likewise. Messages about hand hygiene practice could also be set on computer screen savers to motivate computer users.

In terms of improved practice, there is also much evidence for recommending alcohol hand-rub, because of its clinical benefits and cost effectiveness. Collins [30] explain that the potential for hand washing to wash away skin's oils and fats essential for healthy skin is less likely to occur with alcohol hand-rub usage. In other words, alcohol hand-rub redistributes the lipids in the skin layers. Moreover, alcohol hand-rub dispenses with paper towels. Canham[25] finds that alcohol hand-rub contains various emollients which are better tolerated by HCWs than hand washing. Factors such as colour, odour and consistency of alcohol hand-rub products could influence HCWs acceptance of the product. Additionally, alcohol hand-rub dispensers can be readily positioned and easily accessed: at the patients' bed side, waiting areas, inside and outside of patients' rooms, in the nursing stations and next to computers.

Mani [31] claims that alcohol hand-rub is suitable for use in countries where resources are limited. In addition, alcohol hand-rub increases the potential of economic benefits by reducing annual costs, especially in countries where water has to be refined. There are also hidden costs: water decontamination, power for water heating and water drainage [32].

Effective use of alcohol hand-rub means that HCWs must strictly adhere to the manufactures instructions, especially in terms of the amount used and the time needed to evaporate completely from the hands. Alcohol impregnated wipes are not as effective as alcohol hand-rub and not recommended for routine hand hygiene [33]

Despite the magnitude of HAI problems and the importance of adherence to infection control policies, hand hygiene practice has remained unacceptably low. Hand hygiene

compliance rates in different developed countries rarely exceed 50% [31].

Momen[34] report that in Canada approximately 8 thousand patients die from HAI annually. Canadian hospitals spend up to \$100 million per year treating patients with HAI. European countries also have a high percentage of HAI: in the UK, for example, each year approximately 9% of people admitted to hospital contract HAI; this is one of the highest percentages in Europe [33]. The situation is even worse in developing countries, where resources and facilities are limited. According to Ogunsola[35] the results from a survey conducted across 14 developing countries to evaluate the problem size of HAI, showed a wide range of nosocomial infection, from 3 – 13.4% in an individual hospital. However, Devnani[28], from another study conducted in developing countries, have reported a higher rate of HAI, 6 – 27%. Sadly, more than 1.4 million people worldwide become seriously ill from HAI at any time in their hospitalisation.

Hand hygiene practice among HCWs is considered to be the single most clinical and cost effective measure to prevent HAI, a view recognised internationally [34]. The World Health Organisation (WHO) strongly emphasise the essential need for hand hygiene during healthcare delivery, to avoid possible infection and subsequent complications; hence, the 'Clean Care is Safe Care' programme, launched by WHO in 2005 as part of the 'First Global Patient Safety Challenge'. This programme offers new guidelines on hand hygiene training, observation and performance reporting in healthcare settings.

5. Research Methodology

The research methodology indicates the general pattern to valid and reliable data for the problem under investigation.

5.1 Research Approach

A qualitative approach is used in the study to assess the Knowledge, Attitude, And Practice of Five Moments of Hand Hygiene among Nursing Staff and Students at teaching hospitals.

5.2 Research Design

The research design used in the study is a cross sectional design.

5.3 Research Setting

The study was conducted at krishna institute of medical sciences deemed university's Krishna hospital and medical research center karad.

5.3.1 Population: The population selection for the study is staff nurses and student nurses from Krishna institute of medical sciences deemed university's Krishna hospital and medical research center Karad.

5.3.2 Sample Size: The 100 samples selected was a staff nurse and 100 student nurses from Krishna institute of medical sciences deemed university's Krishna hospital and medical research center Karad.

5.3.3 Sample Technique: Convenient sampling technique was used.

5.3.4 Sampling Criteria:

5.3.4.1 Inclusion criteria:

1. Staff Nurses and student nurses. RGNM, Basic Bsc and PBBsc Nursing.
2. Staff nurses and student nurses who willing to participate in the study.
3. Staff nurse and student nurse who are available during the period of data collection.

5.3.4.2 Exclusion Criteria:

Who are not willing to participate in the study.

5.4 Data Collection Tool

Knowledge was assessed using WHO's hand hygiene questionnaire for health care workers. This proforma of 25 questions includes multiple choice and "yes" or "no" questions. Attitude and practice were assessed using another self-structured questionnaire which consists of 10 and 25 questions, respectively. Respondents were given the option to select on a 1- to 7-point scale between strongly agree and strongly disagree. A score of 0 was given for negative attitudes and puny practices. 1 point was given for each correct response to positive attitudes and good practices so that maximum score for attitude is 10 and for practice it is 25. A score of more than 75% was considered good, 50-74% moderate, and less than 50% was taken as poor. Data was analyzed using SPSS version software. Descriptive statistics was used to calculate percentages for each of the responses given. Z test was used to compare the percentage of correct responses between nursing staff and students. A P value less than 0.05 was considered significant.

5.5 Analysis and Interpretation

This chapter Deals with the analysis and interpretation of the data gathered. Analysis is the process of organizing data in such way that research question may be answered and hypothesis tested.

Analysis could be rightly said as a critical examination of the assembled and grouped data for studying the characteristics of the object under study and for determining the patterns of relationship among the variables relating to it. The results were computed by using descriptive and inferential statistics.

Table 1: Distribution of demographic variables among study samples

Sr. No	Variables	Nursing staff n=100		Nursing Students n=100	
		Frequency	%	Frequency	%
1.	Age (Staff)				
	19 to25	44	44	90	90
	26 to35	36	36	10	10
	36 to45	12	12	0	0
	46 to65	08	08	0	0
2.	Gender				
	Male	22	22	4	4
	Female	78	78	96	96
3.	Education				
	RGNM	64	64	72	72
	Bsc	20	20	15	15
	PBBsc	5	5	13	13
	ANM	11	11	0	0

Majority 44% of staff nurses were belonging to the age group 19-25 years, 36% of staff nurses were belonging to the age group 26-35 years, 12% of staff nurses belonging to the age group 36-45 year and 8% age group 45-65 year. While 90% of student nurses were belonging to the age group of 19-25 years and 10% of student nurses were belonging to the age group 26-35 years. 78% staff female staff nurses and 22% of male staff nurses, whereas 96% of female student nurses and 4% of male student nurses.

Table 2: Comparison of knowledge of hand hygiene among nursing staff and students

Sr. No	Items	Nursing staff n=100	Nursing Students, n=100	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)	75(75%)	76(76%)	NS
2.	What is the most frequent source of germs responsible for health care associated infections? (germs already present on or within the patient)	41(41%)	26(26%)	0.0025
Which of the following hand hygiene actions prevents transmission of germs to the patient?				
3.	Before touching a patient (yes)	91(91%)	97(97%)	NS

4.	Immediately after risk of body fluid exposure (yes)	82(82%)	84(84%)	NS
5.	After exposure to immediate surroundings of a patient (no)	26(26%)	28(28%)	NS
6.	Immediately before a clean/aseptic procedure (yes)	80(80%)	86(86%)	NS
Which of the following hand hygiene actions prevents transmission of germs to the health care worker?				
7.	After touching a patient (yes)	94(94%)	99(99%)	0.02
8.	Immediately after a risk of body fluid exposure (yes)	86(86%)	90(90%)	NS
9.	Immediately before a clean/aseptic procedure (no)	49(49%)	61(61%)	0.05
10.	After exposure to the immediate surroundings of a patient (yes)	71(71%)	77(77%)	NS
Which of the following statements on alcohol-based hand rub and hand washing with soap and water is true?				
11.	Hand rubbing is more rapid for hand cleansing than hand washing (true)	70(70%)	79(79%)	NS
12.	Hand rubbing causes skin dryness more than hand washing (false)	30(30%)	20(20%)	NS
13.	Hand rubbing is more effective against germs than hand washing (false)	45(45%)	34(34%)	0.01
14.	Hand washing and hand rubbing are recommended to be performed in sequence (false)	46(46%)	24(24%)	NS
15.	What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (20 seconds)	38(38%)	28(28%)	NS
Which type of hand hygiene method is required in the following situations?				
16.	Before palpation of the abdomen (rubbing)	27 (27%)	38(38%)	0.02
17.	Before giving an injection (rubbing)	25 (25%)	31(31%)	NS
18.	After emptying a bed pan (washing)	68 (68%)	79(79%)	0.02
19.	After removing examination gloves (rubbing/washing)	65 (65%)	78(78%)	NS
20.	After making a patient's bed (rubbing)	30 (30%)	12(12%)	0.0005
21.	After visible exposure to blood (washing)	46 (46%)	57(57%)	0.03
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?				
22.	Wearing jewellery (yes)	77 (77%)	96 (96%)	0.0001
23.	Damaged skin (yes)	95(95%)	93 (93%)	NS
24.	Artificial fingernails (yes)	80 (80%)	90 (90%)	0.04

25.	Regular use of a hand cream (no)	54 (54%)	67 (67%)	NS
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Table 3: Comparison of hand hygiene practice among nursing staff and students

Sr. No	Statement	Nursing staff	Nursing students	P value
1	I adhere to correct hand hygiene	21 (21%)	61 (61%)	<0.001
2	I have sufficient knowledge about	35 (35%)	74 (74%)	<0.001
3	Sometimes I have more important	20 (20%)	35 (35%)	0.004
4	Emergencies and other priorities	76 (76%)	5 (5%)	NS
5	Wearing gloves reduces the need	25 (25%)	38 (38%)	0.01
6	I feel frustrated when others omit	27 (27%)	54 (54%)	<0.001
7	I am reluctant to ask others to	21 (21%)	16 (16%)	NS
8	Newly qualified staff has not been properly instructed in hand	26 (26%)	49 (49%)	<0.001
9	I feel guilty if I omit hand hygiene	39 (39%)	68 (68%)	<0.001
10	Adhering to hand hygiene	27 (27%)	46 (46%)	0.008

Table 4: Comparison of observed five moments of hand hygiene among nursing staff and students

Five moments	Staff Nurses (100)		Student Nurses (100)	
	Yes	No	Yes	No
Before touching patient	02	98	0	100
Before clean/ Aseptic procedure	02	98	1	99
After Body Fluid Exposure Risk	04	96	01	99
After touching patient unit	03	97	08	92
After touching patient surroundings	01	99	02	98

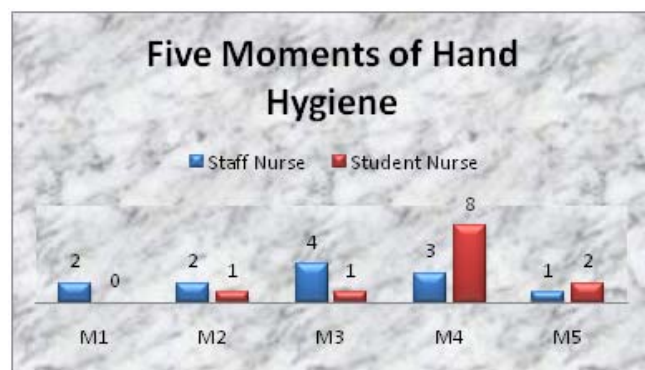


Figure 1: Bar diagram shows frequency of Nurses who does five moments of Hand Hygiene.

The above figure show that 8% of student nurses and 4% of staff nurses are doing five moments of hand hygiene.

Table 5: Comparisons between observed practices of five moments of hand hygiene among nursing staff and students

Sr. No	Items	Nursing staff n=100	Nursing students n=100
1.	Before touching patient		
	Before shaking hand.	44	55
	Before assisting a patient in personal care activities to move, to take a bath, to get dressed.	55	70
	before delivering care and other non invasive treatment: applying oxygen mask, giving a massage;	33	56
	Before performing a physical non invasive examination: taking pulse, blood pressure, chest auscultation, recording ECG	23	50
2.	Before clean/ Aseptic procedure		
	Before brushing the patient teeth instilling eye drops, performing a digital vaginal or rectal examination, examining mouth, nose, ear with or without instrument, inserting suppository / pessary / suctioning mucosa.	72	73
	Before dressing wound with or without instrument, applying ointment on vesicle, making a percutaneous injection/puncture	43	72
	Before inserting an invasive medical device 9 nasal canula, nasogastric tube, endotracheal tube, urinary probe percutaneous catheter, drainage	50	71
	Before preparing a food, medication, pharmaceutical product, sterile material	67	58
	After Body Fluid Exposure Risk		
3.	When the contact with mucous membrane and with non intact skin ends	86	75
	After per cutaneous injection or puncture, after inserting an invasive medical device (vascular access, catheter tube, drains etc.)	63	80
	After disrupting and opening an invasive circuit	56	68
	After removing an invasive medical device	72	91
	After removing an any form of marital offering protection (napkin, dressing, gauze, sanitary towel etc.	72	82

4.	After handling a sample containing organic matter, after cleaning any contaminated surface and soiled material (soiled bed linen, denture, instrument, urinal, bed pan lavatories etc.)	85	65
	After touching patient unit		
	Before shaking hand	48	62
	After assisting a patient in personal care activates to move, to take a bath, to get dressed	82	85
	After delivering care and other non invasive treatment: changing bed linen as the patient is in applying oxygen mask, giving massage	88	75
5.	After performing physical non invasive examination: taking pulse, blood pressure, chest auscultation, recording ECG	32	51
	After touching patient surroundings		
	After an activity involving physical contact with patient immediate environment: changing bed linen with the patient out of the bed. Holding a bed trail, clearing a bed table	93	17
	After a care activity: adjusting perfusion speed, clearing a monitoring alarm	9	60
	After other contact with surface or inanimate objects: learning against a bed, learning against a night table/ beside table.	76	32

6. Results

6.1 Demographic Variables

Majority 44% of staff nurses were belonging to the age group 19-25 years, 36% of staff nurses were belonging to the age group 26-35 years, 12% of staff nurses belonging to the age group 36-45 year and 8% age group 45-65 year. while 90% of student nurses were belonging to the age group of 19-25 years and 10% of student nurses were belonging to the age group 26-35 years. 78% staff female staff nurses and 22% of male staff nurses. Whereas 96% of female student nurses and 4% of male student nurses.

6.2 Knowledge of Hand Hygiene among Nursing Staff and Students

The knowledge on hand hygiene was moderate (144 out of 200, 74%) among the total study population. Only 9% of

participants (18 out of 200) had good knowledge regarding hand hygiene. Nursing students had significantly better knowledge than nursing staff. ($P = 0.023$)

6.3 Attitudes to five moments of hand Hand Hygiene

The majority of students had poor attitudes with regard to hand hygiene. Nursing students had significantly ($P < 0.05$) better attitudes (52%) compared to nursing staff (12%).

6.4 Practices of five moments of hand hygiene among nursing staff and students

Majority 70% student nurses and 54% of staff nurses were practicing first moment of hand hygiene, while 73% student nurses and 72 % of staff nurses were practicing second moments of hand hygiene. Majority 91% student nurses and 86% of staff nurses were practicing third moment of hand hygiene, while 88% of staff nurses and 85% of student nurses were practicing fourth moments of Hand Hygiene. Majority 93% of staff nurses and 83% of student nurses were practicing fifth moment of hand hygiene. Student nurses had better practices than the staff nurses.

7. Discussion

In our study, both study groups had moderate knowledge on hand hygiene, which was a positive finding. Feather et al. [17] studied the hand hygiene practices of 187 candidates during final MBBS OSCE (Objective Structured Clinical Examination) at The Royal London Hospital School of Medicine and Dentistry in UK and found that only 8.5% of candidates washed their hands after patient contact, although the figure rose to 18.3% when hand hygiene signs were displayed. The situation in healthcare centers of developing countries is even more unacceptable [36]. In an earlier study from Saudi Arabia [6], adherence to hand hygiene was seen in 70% of medical students, 18.8% of nurses, and 9.1% of senior medical staff, but the technique was suboptimal in all. Like most previous studies, our study showed that the overall compliance of hand hygiene by HCWs was less than 50% [5]. However, compliance with hand hygiene practice differed among different professional categories of HCWs. Compliance among the physician category was low, compared to nursing groups. Study compared the hand hygiene knowledge, beliefs, and practices between nursing and medical students. They found that the nursing students hand hygiene knowledge was significantly higher than that of nursing staff ($P < 0.01$) which is consistent with our study.

Hand hygiene is a simple procedure which is instrumental in reducing hospital acquired infections and cross transmission of pathogens in the hospitals. The present study shows that majority of the respondents had moderate knowledge; while approximately half of the respondents had good attitudes while majority had poor hand hygiene practices. Despite the

fact that hand hygiene is considered as the single best measure for infection control, compliance of health care workers regarding hand hygiene remains consistently poor.

Our results suggest that there is wide scope for improvement in hand hygiene practices in Teaching hospital.

8. Future Scope

Routinely conducting hand hygiene training programmes using the teaching materials from WHO and making the health care workers knowledgeable on hand hygiene guidelines put forth by the WHO. It is also important to encourage the infection control team to play a more active role in hand hygiene awareness and training in the hospitals. They should be encouraged to interact with the staff members and thereby exert a positive influence on their attitudes and practices regarding hand hygiene. The hospital does not have displays of infection prevention notices/ five moments of hand hygiene. Therefore it is possible that by introducing these notices to the teaching hospitals it is possible to increase hand hygiene knowledge and compliance among the attending staff members.

9. Conclusion

In our study highlights the urgent need for introducing measures in order to increase the knowledge, attitudes, practices Teaching Hospital, which may play a very important role in increasing hand hygiene compliance among the staff and reducing cross transmission of infections among patients.

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