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Abstract

Health care associated infections are major causes of morbidity and mortality especially among the vulnerable groups and a majority of these infections are due to contamination of healthcare workers (HCWs) hands. Hand hygiene is a simple cost effective measure for preventing infections related to healthcare. Morbidity and mortality resulting from healthcare associated infections (HCAIs) can greatly be reduced by adherence to the recommended hand hygiene guidelines. Objectives The objectives of this study were to determine the hand hygiene practices among healthcare workers (HCWs) in the Rizgary Teaching Hospital. Study design A descriptive cross sectional study where HCWs were observed using a standard WHO observation tool to assess hand hygiene practices and later a questionnaire administered to assess knowledge and attitudes as well as barriers to effective hand hygiene. Conclusion The overall knowledge on hand hygiene was good. The common barriers to effective hand hygiene noted were 53/80 (66.2 %) opted to use gloves, 45/80 (56.2%) forgetfulness, and 43/ 80(53.7%) lack of alcohol based hand rub and lack of towels. Recommendations Due to the close relationship between hand hygiene and the transfer of microbes to the inpatients by the health care workers. This study recommends adherence to the WHO guidelines for washing and disinfecting hands before and after contact with the patients and holding regular educational training courses for the health care workers, finally, provision of educational posters and alcohol based hand rubs in the hospital units.



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ABSTRACT

Health care associated infections are major causes of morbidity and mortality especially among the vulnerable groups and a majority of these infections are due to contamination of healthcare workers (HCWs) hands. Hand hygiene is a simple cost effective measure for preventing infections related to healthcare. Morbidity and mortality resulting from healthcare associated infections (HCAIs) can greatly be reduced by adherence to the recommended hand hygiene guidelines.

Objectives

The objectives of this study were to determine the hand hygiene practices among healthcare workers (HCWs) in the Rizgary Teaching Hospital.

Study design

A descriptive cross sectional study where HCWs were observed using a standard WHO observation tool to assess hand hygiene practices and later a questionnaire administered to assess knowledge and attitudes as well as barriers to effective hand hygiene.

Conclusion

The overall knowledge on hand hygiene was good. The common barriers to effective hand hygiene noted were 53/80 (66.2 %) opted to use gloves, 45/80 (56.2%) forgetfulness, and 43/ 80(53.7%) lack of alcohol based hand rub and lack of towels.

Recommendations

Due to the close relationship between hand hygiene and the transfer of microbes to the inpatients by the health care workers. This study recommends adherence to the WHO guidelines for washing and disinfecting hands before and after contact with the patients and holding regular educational training courses for the health care workers, finally, provision of educational posters and alcohol based hand rubs in the hospital units.

Keywords: *Hand hygiene, Healthcare workers, Rizgary teaching hospital, Erbil city.*

1. INTRODUCTION

Health Care Workers' (HCW) hands become progressively colonized with commensal flora as well as with potential pathogens during patient care; contaminated hands could be vehicles for the spread of certain viruses and bacteria [WHO, 2009].

Hand hygiene is recognized as the leading measure to prevent cross-transmission of microorganisms and to reduce the incidence of health care associated infections [Pittet et al, 2000, Boyce and Pittet, 2002]. 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], to addresses this problem; continuous efforts are being made to identify effective and sustainable strategies [Pittet et al, 2000]. 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 [Basurrah and Madani, 2006].

Hospital acquired infections are one of the important public health problems in many countries throughout the world [WHO, 2002]. Nurses constitute the largest percentage of the health care workers (HCW) [Buerhaus et al, 2007] and they are the “nucleus of the health care system”. 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 [Abualrub, 2007].

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 [Kampf and Loffler, 2010]. 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 [Nazarko, 2009].

In this study 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 [Karabay et al, 2005]. Health care-associated infection (HCAI), also known as nosocomial infection is a significant cause of morbidity and

mortality in hospitalized patients [Ofori et al, 2010].

Hospital acquired infections are infections acquired in hospital by a patient who was admitted for a reason other than that infection [WHO, 2001]. The World Health Organization (WHO) estimates that at any time, over 1.4 million people worldwide suffer from infections acquired in health-care settings [WHO, 2009]. Nosocomial infections constitute a major challenge of modern microorganisms from the hands of Health Care Workers. Health care workers (HCWs) are the main cause of nosocomial infections, and hand washing remains the most important preventive measure [Haley et al, 1985].

A review on Hand hygiene practices suggests that the compliance of HCW to recommended hand hygiene procedures ranges from 5% to 89% with an average compliance rate of less than 50% [WHO,2009]. Reasons for noncompliance may be individual (lack of knowledge, skin sensitivity) or situational (heavy workload, overcrowding, complexity of care, and lack or inaccessibility of hand hygiene resources) [Erasmus et al, 2010].

There is evidence that hand antiseptics reduce the transmission of health care associated pathogens and the incidence of Health Care Associated Infection (HCAI). Despite the emphasis on importance of effective hand washing in prevention of nosocomial infection, not all health care workers are compliant to it where they either fail to wash their hands or fail to follow the correct steps in the effective hand washing [Guinan et al, 1997].

Normal human skin is colonized with bacteria with different areas of the body having varied total aerobic bacterial counts. Bacteria recovered from the hands can be divided into two categories namely, transient or resident [price, 1983]. These micro-organisms colonize the superficial layers of the skin and are more amenable to removal by routine hand hygiene. They are often acquired by HCWs during direct contact with patients or contaminated environmental surfaces adjacent to the patient and are the organisms most frequently associated with HCAI. These micro-organisms are attached to deeper layers of the skin and are therefore more resistant to removal [Montes and Wilborn, 1969]. In general, resident flora is less likely to be associated with infections, but may cause infections in sterile body cavities, the eyes, or on non-intact skin [lark et al, 2001].

The objective of the study is to know the knowledge of health care workers (HCWs) with regard to hand washing techniques ,choice of agents used for antisepsis before and after contact with patients and to identify the barriers for practicing hand hygiene.

2. METHODOLOGY

A cross-sectional survey was carried out in a Rizgary Teaching Hospital in Erbil city. A total sample of 80 HCWs was studied. Sampling frame consisted of all HCWs involved in patient care, from which requisite

sample was drawn by simple random sampling. A questionnaire was prepared based on WHO and CDC guidelines and available studies on hand washing covering various aspects like knowledge about cross transmission of pathogens, recommended steps for hand washing, materials used, attitudes and hand hygiene practices and the availability of facilities in their ward/department. A database was created in MS Excel and appropriate statistical analysis was carried out.

2.1. Study design

This was a descriptive cross-sectional study carried out over two months from February to March 2017.

2.2. Study population

The study population included all health care workers at Rizgary Teaching Hospital in direct contact with the patients.

2.3. Study area

This study was carried out in the all of the hospital wards.

2.4. Sample size

80 Health care workers.

3. RESULTS

Table 1: Distribution of demographic variables among study samples

Variable		Frequency n=80	%
Age	20-29	39	48.8
	30-39	26	32.5
	40-49	15	18.7
Gender	Male	45	56.3
	Female	35	43.7
Certificate	Diploma	57	28.7
	Bachelor	23	71.3
Profession	Nurse	58	72.5
	Physician	22	27.5
Years of experience	≤ 5	31	38.7
	6- 10	21	26.2
	11-20	22	27.5
	≥ 30	6	7.5
Previous training program	No	19	23.8
	Yes	61	76.2
Routinely use an alcohol for hand hygiene	No	10	12.5
	Yes	70	87.5
Do the wearing of jewelry increase likelihood of colonization of hands with harmful germs?	No	19	23.8
	Yes	61	76.2

The majority of (48.8%) of participants were from the 20-29 age groups. (32.5%) of participants were in the 30-39 age groups, and (18.7%) were aged 40-49. While (56.3%) are male and (43.7%) are female. Majority (76.2%) had received training either during their graduation or on the job. Most (87.5%) of them were using an alcohol for hand hygiene. About (76.2%) of health care workers think that the wearing of jewelry increase likelihood of colonization of hands with harmful germs.

Table 2: knowledge of hand hygiene among health care workers

Sr. No	Items	Frequency n=80	%
1	What is the most frequent source of germs responsible for health care- associated infections? The hospital environment(surface)	45	56.3
2	Which of the following hand hygiene actions prevents transmission of germs to the health care workers?		
	a. use of gloves.	77	96.2
	b. use alcohol hand rubs.	76	95.1
	c. after exposure to the immediate surroundings of a patients.	75	93.7
3	Which type of hand hygiene method is required in the following situations?		
	a. before palpation of the abdomen/ rubbing with alcohol based hand rubs.	31	38.7
	b. before giving injection/ none.	29	36.2
	c. after removing examination gloves/ hand washing.	22	27.5
	d. after visible exposure to blood/ rubbing with alcohol based hand rubs.	33	41.2
4	In general, what is the impact of a health care- associated infection on a patient's clinical outcome? High	33	41.2
5	What is the effectiveness of hand hygiene in preventing health care-associated infection? High	42	52.5
6	What factors prevent you from performing hand hygiene as recommended?		
	a. lack of time/ too busy.	41	51.2
	b. lack of alcohol- based hand rub.	43	53.7
	c. forgetfulness	43	53.7
	d. nobody else does	27	33.7
	e. its not important	25	31.2
	f. use gloves instead	53	66.2
	g. lack of towels	45	56.2
	h. short patient contact	42	52.5
7	Did you receive formal training in hand hygiene in the last three years?		
	Yes	31	38.7

	No	49	61.3
8	To what degree you think there is a relationship between good hand hygiene practice and hospital acquired infections? Strong	34	42.5
9	Rate your satisfaction with hand hygiene practice (including glove practice) currently used in your hospital? Satisfied	27	33.7
10	Has the use of an alcohol- based hand rub made hand hygiene easier to practice in your daily work?		
	Yes	46	83.8
	No	34	16.2
11	Is the use of alcohol- based hand rubs well tolerated by your hands?		
	Yes	34	42.5
	No	46	57.5
12	Do you consider that the administrators in your institution are supporting hand hygiene improvement?		
	Yes	46	57.5
	No	34	42.5
13	Do you feel that you can improve your compliance with hand hygiene?		
	Yes	61	76.2
	No	19	23.8

The majority of the HCWS 45(56.3%) thought that the hospital environment was the most common source of hospital infections. Most respondents 33 (41.2 %) believed that HCAI had high effect on clinical outcomes of patients and a vast majority 42 (55.5%) considered hand hygiene to be highly effective in preventing HCAI.

Health workers were more likely to report rubbing with alcohol based hand rubs after visible exposure to blood 33 (41.2%), hand washing after removing examination gloves 22 (27.5%) and before administering injections 29 (36%). Conversely, participants reported that the use of alcohol-based hands was more frequent before exercise (38.7%) compared with hand washing.

The majority of the HCWS cited lack of resources as factors which prevented their performance of hand hygiene with 66.2% opted to use gloves, as the major contributor, 53.7% was due to forgetfulness, 53.7% citing lack of alcohol hand rub, 56.2% due to lack of towels to wipe hands, 51.2% due to lack of time.

Majority 61(76.2%) of the participating felt that they could improve individual compliance with hand hygiene practices.

Table 3: Hand hygiene indications -hand washing or hand rub for different indications.

Procedure	Indications for hand hygiene	
	Yes	No
Before touching a patient	55(68.7%)	25(31.3%)
Immediately after a risk of body fluid exposure	63(78.7%)	17(21.3%)
After exposure to the immediate surroundings of a patient	66(82.5%)	14(17.5%)
Immediately before a clean/ aseptic procedure	63(78.7%)	17(21.3%)

The majority of the health care workers identified the above as indications for hand hygiene either by hand washing or use of alcohol based hand rub with 66(82.5 %) reporting the need for hand hygiene after exposure to the immediate surroundings of a patient. After a risk of body fluid exposure and immediately before a clean/ aseptic procedure was at 78.7 % and before touching a patient was at 68.7%.

Table 4: HCWs attitudes regarding effectiveness of the measures for improving hand hygiene

Hand hygiene measure	Not effective	Very effective
Each health worker receives education on hand hygiene	22(27.5%)	58(72.5%)
Clear and simple instructions for hand hygiene are made visible for every health care worker	13 (16.2%)	67 (83.8%)
Leaders and senior managers at your institution support and openly promote hand hygiene	13 (16.2%)	67 (83.8%)
The health-care facility makes alcohol-based hand rub always available at each point of care	31(38.7%)	49(61.3%)

At least one-half of health workers felt that each of the proposed strategies presented in table 4 could effectively improve hand hygiene. Institutional and senior management support and promotion of hand hygiene practice was the most frequently mentioned strategy for achieving effective hand hygiene, 67(83.8%).

4. DISCUSSION

Hand hygiene is a relatively simple and cost effective measure that has been instituted in several facilities to prevent HCAI.

The primary objective of this study was to have a baseline evaluation of the current hand hygiene practices at Rizgary Teaching Hospital in order to develop appropriate and targeted interventions for improving their practices.

The WHO recommends use of alcohol based hand rubs as the gold standard for hand hygiene [Pittet and Donaldson, 2005] but despite this fact it was not availed in the different units although the pharmacy had sufficient stock which was not distributed to the different units. None of the study subject was also noted to have personal pocket Alcohol Based Hand Rub (ABHR) which would make the process of hand hygiene faster and more convenient

It was also noted that compliance to hand hygiene was highest after patient procedures i.e. 82.5% after touching the patient surrounding, 78.7% after exposure to body fluids and before a clean/ aseptic procedure respectively, and 68.7 % before touching the patient. The lowest compliance rate was seen before touching a patient and this behavior was suggestive of self-protection rather than patient safety thus predisposing the patients to HCAI as previous studies have shown that transmission of infections is highest through contaminated HCWs hands [lark et al, 2001].

The majority of HCWs 45(56.3%) thought the hospital environment was the most common source of hospital infections as has been shown by previous studies[Sanderson and Weissler, 1992-lucet et al, 2002].In regards to the attitudes towards hand hygiene it was clear that all HCWs in this study felt they could improve hand hygiene with simple measures such as regular feedback on hand hygiene performance, simple and clear instructions on hand hygiene, and support from the senior management team of the hospital as has been proposed through the WHO global guideline on hand hygiene.

The majority of the health workers use gloves instead of hand hygiene with 66.2%. 56.2% of them due to lack of towels to clear their hands as a major contributor, 53.7% of them due to lack of hand rub on alcohol and forgetfulness respectively, 52.5% due to short patient contact, 51.2% due to very short time / busy, These factors are associated with those in previous studies specifically in limited resource settings [lark et al, 2001].

The HCWs in our study preferred hand washing with soap and water over alcohol based rubs and this was in contrast with the study carried out in tertiary care centre in Chennai [Sureshkumar et al, 2011]. The compliance to the WHO guidelines regarding adequate hand hygiene was higher in our study (91% for hand washing with soap and water and 64% for alcohol based rubs) than the study done in Ludhiana

(41.3%) among nurses working in ICU settings of tertiary care hospital [Sharma et al, 2011] Lower compliance with alcohol hand wash may be explained by their perception that 83.8% HCWs in our study considered that hand rubbing with alcohol based rubs to be more rapid than hand washing with soap and water.

However, 81% considered hand washing with soap and water to be superior to hand rubbing with alcohol based solutions for effectiveness against germs in contrast to survey findings amongst HCWs in US who preferred alcohol based solutions over hand washing with aqueous solutions or soap and water and showed an overall hand hygiene compliance rate of 38.4% with aqueous and 79.4% with alcohol [Wandel et al, 2010]

Lack of complete understanding of guidelines can be deduced from the fact that 81% perceived it as non essential to turn off the hand operated faucet with towel after performing hand washing. [WHO, 2005] This may be due to the fact that paper towels are not available in our health care system. Similar to our findings, in a study in US among HCWs, the mean self reported compliance rate was 84% but when missing out on occasions was accounted for, the overall compliance rate was only 38.4% [Larson et al, 2005].

The factors for non-compliance in this study are in consonance with a review conducted to assess barriers to appropriate hand hygiene [pittet, 2001] The low availability of alcohol based rubs (53.7%) found in our study, needs to be looked into in order to improve compliance as availability of these has been shown to be directly associated with improved compliance [Creedon, 2005].

5. CONCLUSION

To conclude, this study has clearly shown the requirement of an in-depth appraisal of important issues of compliance and patient safety.

Though the Health Care Workers have a general awareness about the Health Work Practices they lack specific information.

The common barriers to effective hand hygiene noted were opted to use gloves, lack of alcohol based hand rub, forgetfulness. The study done on Hand hygiene compliance shows that the training and awareness programme should be promoted and its continuity is the key to success.

6. RECOMMENDATIONS

Due to the close relationship between hand hygiene and the transfer of microbes to the inpatients by the health care workers. This study recommends adherence to the WHO guidelines for washing and disinfecting hands before and after contact with the patients and holding regular educational training

courses for the health care workers, finally, provision of educational posters and alcohol based hand rubs in the hospital units.

REFERENCES

1. Abualrub R.F, "Nursing shortage in Jordan: what is the solution?" Journal of Professional Nursing, vol. 23, no. 2, pp. 117-120, 2007.
2. Basurrah M and Madani T, "Hand washing and gloving practice among health care workers in medical and surgical wards in a tertiary care centre in Riyadh, Saudi Arabia," Scandinavian Journal of Infectious Diseases, vol. 38, no. 8, pp. 620-624, 2006.
3. Buerhaus P.I, Auerbach D.I, and Staiger D.O, "Recent trends in the registered nurse labor market in the U.S.: short-run swings on top of long-term trends," Nursing Economics, vol. 25, no. 2, pp. 59-66, 2007.
4. Boyce J.M and Pittet D, "Guideline for hand hygiene in health-care settings. Recommendations of the healthcare infection control practices advisory committee and the HIC- PAC/SHEA/APIC/IDSA hand hygiene task force," Morbidity and Mortality Weekly Report, vol. 23, no. 12, pp. S3-S40, 2002.
5. Creedon S.A. Healthcare workers' hand decontamination practices: compliance with recommended guidelines. J Adv Nurs. 2005; 51(3):208–216.
6. Duckro AN, Blom DW, Lyle EA, et al. Transfer of vancomycin-resistant Enterococci via health care worker hands. Archives of Internal Medicine, 2005, 165:302–307.
7. Erasmus V, Dahan T, Brug H, et al. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infection Control and Hospital Epidemiology 2010;31(3):283-94
8. Guinan ME, McGuckin-Guibab M, Severeid A. Who washes hands after using the bathroom? AJIC 1997; 25:424-425.
9. Haley RW, Culver DH, White JW, Morgan WM, Emori TG, Munn VP, (1985) . The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. Am J Epidemiol; 121:185- 205.
10. Karabay O., et al. 2005. 'Compliance and efficacy of hand-rubbing during in hospital practice. Medical Principles and Practice', International Journal of the Kuwait University 14:5, 313-317.
11. Kampf, G. & Löffler, H. 2010. 'Hand disinfection in hospitals-benefits and risks', Journal of the German Society of Dermatology 8:12, 978-983.

12. Lark RL, Vander Hyde K, Deeb GM et al. An outbreak of coagulase-negative staphylococcal surgical-site infections following aortic valve replacement. *Infection Control and Hospital Epidemiology*, 2001, 22:618–623.
13. Larson E.L., Albrecht S., O’Keefe M. Hand hygiene behavior in a pediatric emergency department and a pediatric intensive care unit: comparison of use of 2 dispenser systems. *Am J Crit Care*. 2005;14(4):304–311.
14. Longtin Y, Sax H, Allegranzi B, Schneider F, and Pittet D, “Videos in clinical medicine. Hand hygiene,” *The New England Journal of Medicine*, vol. 364, article e24, 2011.
15. Lucet JC, Rigaud MP, Mentre F, et al. Hand contamination before and after different hand hygiene techniques: a randomized clinical trial. *Journal of Hospital Infection*, 2002, 50:276 -280.
16. McFarland LV, Mulligan ME, Kwok RYY, et al. Nosocomial acquisition of *Clostridium difficile* infection. *New England Journal of Medicine*, 1989, 320:204–210.
17. Montes LF, Wilborn WH. Location of bacterial skin flora. *British Journal of Dermatology*, 1969, 81:23–26.
18. Nazarko, L. 2009. ‘Potential pitfalls in adherence to hand washing in the community’, *British Journal of Community Nursing*. 14:2, 64-68.
19. Ofori AO, Jennings R, Burges J, et al. Assessing Hand Hygiene Resources and Practices at a Large African Teaching Hospital. *Infect Control Hosp. Epidemiology* 2010; 31:802-808.
20. Pittet D, Donaldson L. Clean care is safer care: the first Global Challenge of the World Health Organization World Alliance for Patient Safety. *Infect Control Hosp Epidemiol* 2005; 26:891-89.
21. Pittet D. Improving adherence to hand hygiene practice: a multi disciplinary approach. *Emerging Infect Dis*. 2001; 7(2):234–240.
22. Pittet D, Hugonnet S, Harbarth S, et al., “Effectiveness of a hospital-wide programme to improve compliance with hand hygiene,” *The Lancet*, vol. 356, no. 9238, pp. 1307-1312, 2000.
23. Price PB. The bacteriology of normal skin: anew quantitative test applied to a study of the bacterial flora and the disinfectant action of mechanical cleansing. *Journal of Infectious Diseases*, 1938, 63:301–318.
24. Sanderson P J, Weissler S. Recovery of coliforms from the hands of nurses and patients: activities leading to contamination. *Journal of Hospital Infection*, 1992, 21:85–93.
25. Sureshkumar D., Ramasubramanain V., Abdulghafur K., Nagvekar V. *BMC Proceedings*. 2011;5(suppl 6):259. <http://www.biomedcentral.com/1753-6561/5/S6/P259>, Accessed 18.12.11.

26. Sharma S., Sharma S., Puri S., Whig J. Hand hygiene compliance in intensive care units of tertiary care hospital. Indian J Community Med. 2011; 36(3):217–221.
27. Tibballs J, “Teaching hospital medical staff to hand wash.” Medical Journal of Australia, vol. 164, no. 7, pp. 395-398, 1996.
28. Wandel D., Labeau S., Vereecken C., Blot S. Behavioral determinants of hand hygiene compliance in intensive care units. Am J Crit Care. 2010; 19:230–240.
29. World Health Organization. WHO guidelines on hand hygiene in health care, WHO Press, Geneva, Switzerland 2009. http://whqlibdoc.who.int/hq/2009/WHO_IER_PSP_2009.07_eng.pdf.
30. World Health Organization. (2001) WHO Global Strategy for Containment of Antimicrobial Resistance. WHO/CDS/CSR/DRS/2001.2.
31. World Health Organization. Prevention of hospital acquired infections. A practical guide. Edited by Ducell, G, FabryJ, Nicoll L. 2002.
32. WHO guidelines on hand hygiene in health care: A summary, 2005 www.who.int/patient_safety/events/05/HH_en.pdf. Accessed in Jan 2010.