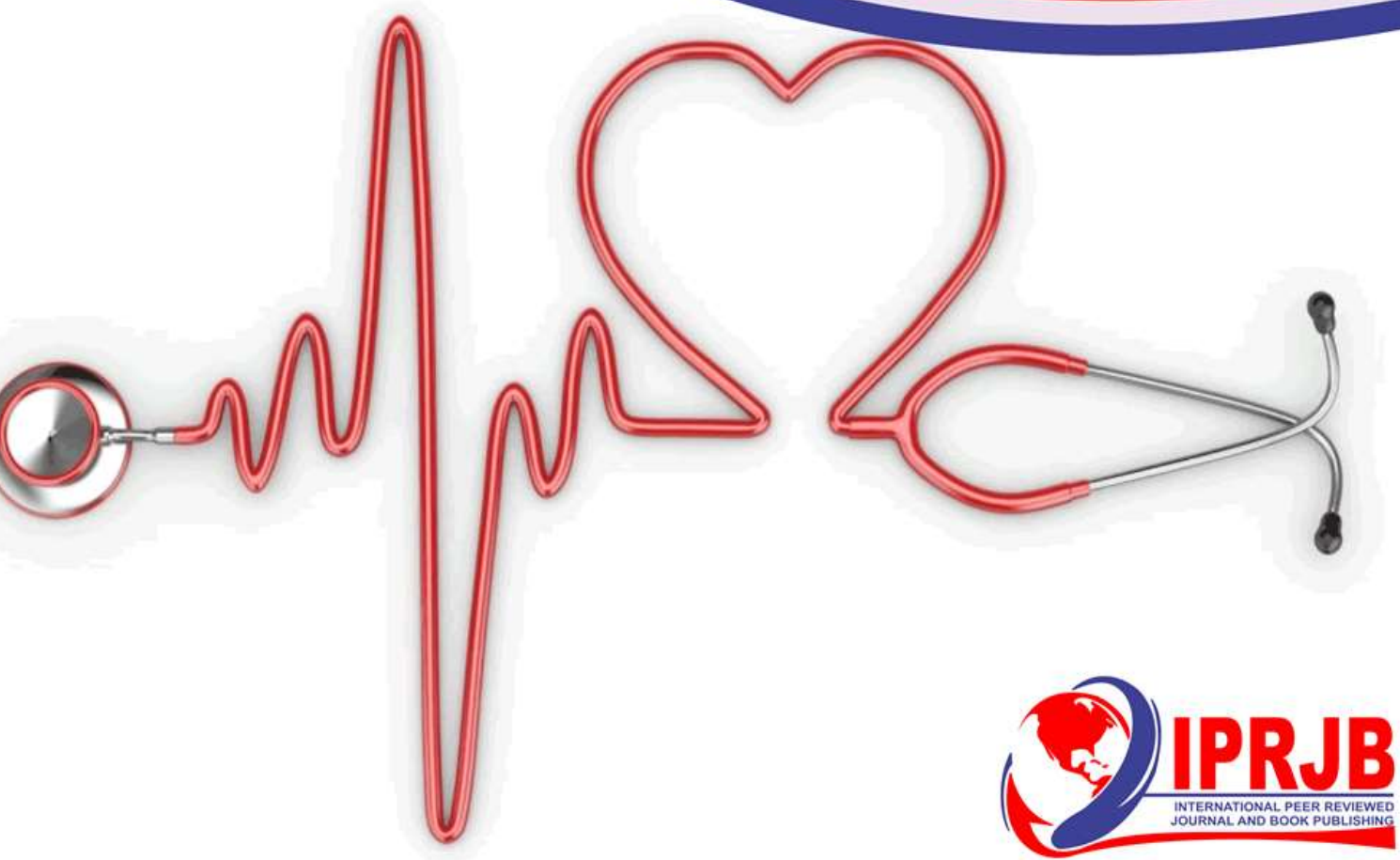


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**Enablers and Barriers to Hand Hygiene among Health Workers at Mbarara Regional Referral Hospital**

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## Enablers and Barriers to Hand Hygiene among Health Workers at Mbarara Regional Referral Hospital



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### Abstract

**Purpose:** Hospital acquired infections (HAIs) are a public health problem that is more prevalent in developing countries than in developed countries. Hand hygiene is a prime preventive measure for HAIs. This study assessed barriers and enablers to hand hygiene among health care workers (HCWs) in a developing country at Mbarara Regional Referral Hospital.

**Methodology:** A descriptive cross-sectional design was employed. HCWs providing care to patients admitted on the selected wards were recruited. Data were collected by trained RAs from participants who fulfilled the eligibility criteria using a semi-structured questionnaire.

**Findings:** The majority (73.4%) of the participants reported lack of hand hygiene protocols on the ward. The barriers and enablers were elicited using a Likert scale. The enablers to hand hygiene were water being visibly clean ( $M = 3.5, SD = 0.7$ ) and availability of running water on the ward ( $M = 3.4, SD = 0.8$ ). Barriers to hand hygiene identified were: lack of audits on hand hygiene compliance on the wards ( $M = 1.7, SD = 0.9$ ), posters illustrating hand hygiene techniques are not displayed on the wards ( $M = 2.1, SD = 1.0$ ) and alcohol hand rubs are not routinely distributed ( $M = 2.1, SD = 0.9$ ).

**Unique Contribution to Theory, Practice and Policy:** Donabedian model is a validated model used in quality improvement in health care. There is need to include training for health care workers in hand hygiene, ensure availability of hand hygiene protocols, and include mechanisms for monitoring to improve hand hygiene.

**Keywords:** *Hand Hygiene, Healthcare Workers, Barriers and Enablers*

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## INTRODUCTION

Hand hygiene, the main foundation stone for hospital acquired infection (HAI) prevention, started in the 19<sup>th</sup> century by Dr. Semmelweis (Gordis, 2014). He systematically observed that hand hygiene significantly reduced the rate of streptococcal infection among a cohort of post-partum mothers from 12.3% to 1.3% (Faria et al., 2007). Since then, a number of clinical studies have stressed the importance of hand hygiene in clinical care settings in an attempt to reduce nosocomial infections (Akyol, 2007; Gould, Moralejo, Drey, Chudleigh, & Taljaard, 2017; Mani, Shubangi, & Saini, 2010; Ott & French, 2009; Sax et al., 2009)

In developed countries, hospital acquired infections (HAIs) have been reported to affect 5% to 15% of hospitalized patients (Novák, Breznický, Kompaníková, Malinovská, & Hudečková, 2020). These infections affect a higher rate (9% to 37%) of those admitted to intensive care units (ICUs) (WHO, 2006). In developing countries there are scanty statistics, but the prevalence rates have been estimated to be between 15% and 49% (Faria et al., 2007). The higher prevalence has been attributed to the insufficiencies of basic infection prevention measures in resource limited settings due to many challenging factors such as understaffing, poor hygiene and sanitation, and lack or shortage of basic equipment.

Insufficient stock of hand hygiene products and facilities such as running water, sinks, soap, alcohol based hand sanitizers, and paper towels have been implicated in poor hand hygiene (Mani et al., 2010; Mearkle, Houghton, Bwonya, & Lindfield, 2016). Lack of these products and facilities could lead to higher prevalence of HAI especially in developing countries where such shortages are significant. Most wards in a Nigerian hospital lacked adequate facilities for proper hand hygiene and opted to use a bucket and bowl as an alternative to a lack of running water (Ogunsola & Adesiji, 2008). Similarly, in India, insufficient or inconsistently positioned sinks, shortage of water and soap, and unavailability of hand towels reportedly hindered effective hand hygiene practice (Devnani, Kumar, Sharma, & Gupta, 2010).

A recent study conducted in two ophthalmic units in Uganda revealed that 79% of the hand hygiene opportunities were missed in hospital A compared to 82% in hospital B (Mearkle et al., 2016). Reports of HAI prevalence are high at Mbarara Regional Referral Hospital (MRRH). Despite the devastating outcomes of HAI, it has been observed over time that hand hygiene practices among HCWs do not correspond with the recommended WHO hand hygiene guidelines. There is paucity of literature exploring the barriers and enablers of hand hygiene in resource-limited settings. Therefore, this study sought to assess barriers and enablers to hand hygiene among health care workers at Mbarara Regional Referral Hospital.

### Theoretical Framework

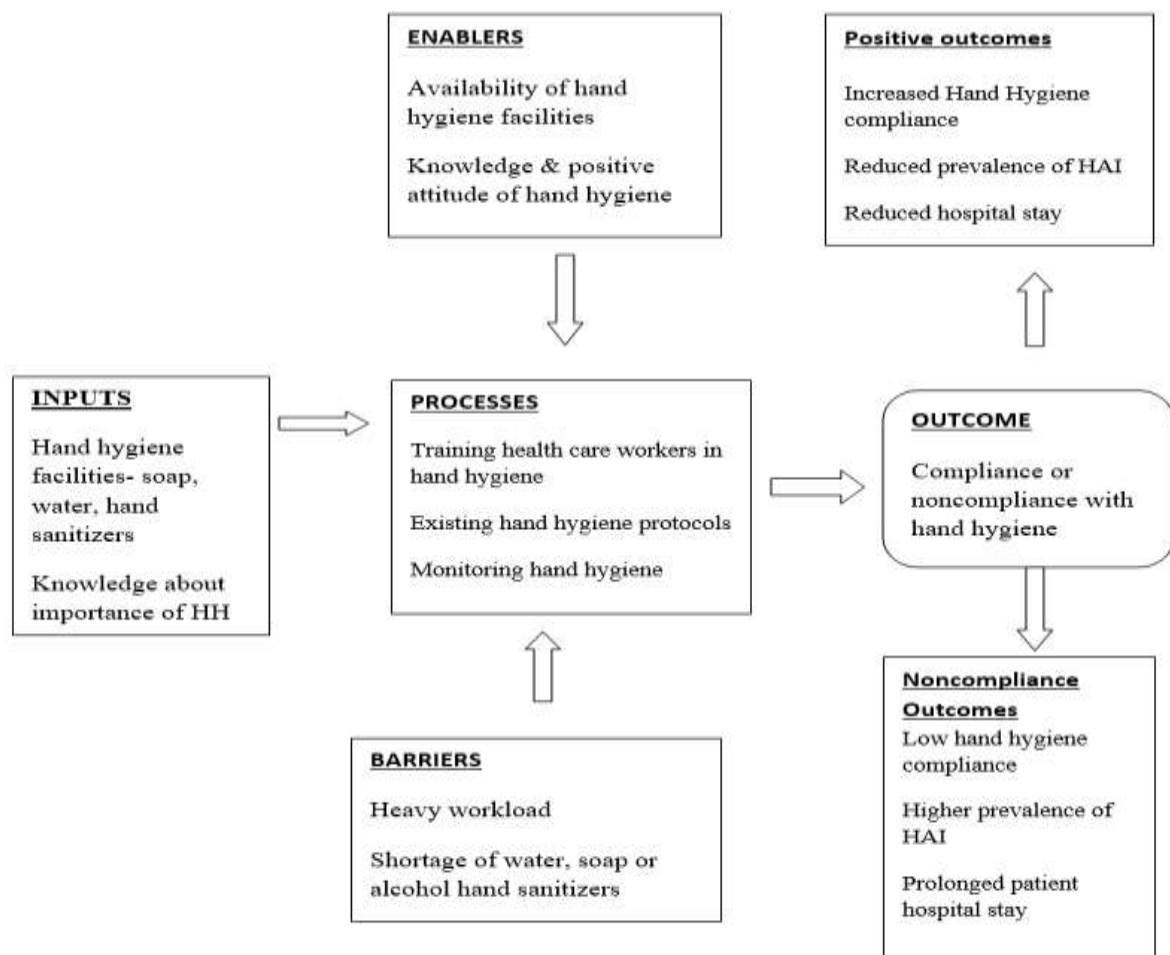
This study was guided by the **systems thinking model** as proposed by Donabedian (1980) which addressed three domains: structure/inputs, processes, and outcome. This frame work can be used for assessing the quality of health care provided to patients. As illustrated in figure 1 below, inputs go through processes in order to realize an outcome.

First, **structures** of health care are defined as the physical and organizational aspects of care settings that foster hand hygiene practices among health care workers such as hand hygiene facilities and equipment.

Second, the **processes** rely on the structures to provide resources and mechanisms for health care workers to practice hand hygiene. Such processes include ongoing education, compliance measurement and creation of a hand hygiene culture in a healthy facility.

In addition, **processes** are performed in order to improve hand hygiene practices among health care workers leading to the outcomes of reduction in transmission of hospital-acquired infections, promotion of recovery, functional restoration, survival and even patient satisfaction with health care.

However, the processes are affected by the barriers and enabling factors which finally determine the outcome as either positive or negative. In the context of hand hygiene, it is noted that positive outcomes are related to the availability of hand hygiene facilities, willingness by healthcare workers to practice hand hygiene and positive knowledge and attitudes toward hand hygiene.



**Figure 1: Conceptual framework about hand hygiene practices among healthcare workers**

## **MATERIALS AND METHODS**

### **Design and Setting**

This was a cross sectional study conducted at Mbarara Regional Referral Hospital in Southwestern Uganda. The study was conducted in the five units that specifically treat critically ill patients: medical and surgical emergency wards (ED), ICU, and medical and surgical general wards.

### **Study Participants**

The target population in this study were healthcare workers who were providing care to patients admitted in the ICU, medical and surgical emergency, and medical and surgical general wards. The study included health care workers working in the ED, ICU, and medical and surgical general wards, were providing care to admitted patients at the time of data collection and gave a written informed consent to participate in the study. The study excluded undergraduate students who were learning/training from the hospital at the time of data collection.

### **Sample Size Estimation**

We recruited all health care workers working in the ED, ICU, and medical and surgical general wards. Hence, we used a convenience sample of 94 participants in this study.

### **Sampling Criteria and Data Collection**

Convenience sampling was used to recruit study participants. Data were collected using a structured questionnaire. The questionnaire was developed following review of literature from related studies (Bolon, 2016; Boyce, 2019; WHO, 2009). The questionnaire was pretested among ten (10) Health workers at Mbarara Municipal HC IV. The results of the pretest were used to adjust the test items in the questionnaire. Trained research assistants collected after obtaining written informed consent from the study participants.

### **Data Analysis**

Data were analysed using SPSS version 20. Descriptive statistics such as frequencies and percentages were used for categorical variables and mean and standard deviations for continuous variables. One way ANOVA was used to determine differences in essential hand washing barriers and enablers among health care worker groups and among the four units. Results were expressed using *F* statistics using 95% confidence intervals. The level of statistical significance was set at a value  $p \leq 0.05$ .

### **Quality Control**

Pre-testing of the questionnaire was done with 10 health care workers out of the study area and necessary corrections were done accordingly. Intensive training was given to research assistants for one day about how to approach study subjects and how to use the questionnaire. Before data collection, the research assistants tested and refined the data collection tool. Experts certified in infection prevention and control (CIC) based at a major health and academic centre in the U.S were contacted to review the data collection tools to ascertain the content. There were no changes required following the expert review. The collected data were checked for the completeness, accuracy, and clarity by the investigator. Appropriate measures were taken for completeness before data entry. Data clean up and cross-checking were done before analysis.



### Ethics and approvals

The protocol to conduct the study was approved by Mbarara University of Science and Technology Research Ethic Committee (MUST -2021-279), and additional clearance to conduct the study was obtained from Uganda National Council for Science and Technology (UNCST). Administrative clearance was obtained from the hospital director of Mbarara Regional Referral Hospital. A written informed consent was obtained from each participant prior to the start of data collection. The study was conducted in accordance with UNCST guidelines and the declaration of Helsinki.

### Study Findings

The demographic characteristics of the participants are presented in Table 1

The mean age of the participants was 34.1 ( $SD = 7.0$ ), 48 females (51.1%) were the majority of respondents. About one-third (36.2%) were diploma holders. The majority (73.4%) of the participants reported lack of hand hygiene protocols on the ward.

**Table 1: Demographic Characteristics of the Participants N=94**

Characteristic		M (SD)
<b>Age</b>		34.1 (7.0)
		<i>n</i> (%)
<b>Sex</b>		
	Male	46(48.9)
	Female	48(51.1)
<b>Education level</b>		
	Certificate	27(28.7)
	Diploma	34(36.2)
	Degree	16(17.0)
	Masters	13(13.8)
	PhD	4(4.3)
<b>Cadre</b>		
	Enrolled nurse	32(34.0)
	Nursing officer	29(30.9)
	Clinical officer	4(4.3)
	Medical officer	11(11.7)
	Post graduate	6(6.4)
	Consultant	12(12.8)
<b>Ward</b>		
	Surgical emergency	14(14.9)
	Medical emergency	12(12.8)
	ICU	20(21.3)
	Surgical ward	22(23.4)
	Medical ward	26(27.7)

### Analysis of the Enablers and Barriers to Hand Hygiene

The enablers and barriers were elicited using 11 items on the Likert scale tool with responses scored as strongly agree (4), agree (3), disagree (2) and strongly disagree (1). The total possible score ranged from 17 to 44. The frequencies of the responses for the different items are shown

in Table 2. The statistical values for the total mean scores ( $M = 26.8$ ,  $SD = 6.3$ ) indicated a general perception that barriers outweighed enablers because the mean score was below the neutral point on the scale of 30.5.

**Table 2: Perceived Barriers and Enablers to Hand Hygiene N=94**

Statement	Strongly agree n(%)	Agree n (%)	Disagree n (%)	Strongly disagree n (%)	M(SD)	95% CI of Mean
Running water is always available on this ward	55(59.6)	27(28.7)	7(7.4)	5(5.3)	3.4(0.8)	3.2-3.6
Water is visibly clean	56(59.6)	30(31.9)	6(6.4)	2(2.1)	3.5(0.7)	3.3-3.6
Soap is always available at all sinks	18(19.1)	25(26.6)	45(47.9)	6(6.4)	2.6(0.9)	2.4-2.8
Alcohol based hand gels are always available	13(13.8)	17(18.1)	39(41.5)	25(26.6)	2.2(1.0)	2.0-2.4
Every health care worker has easy access to alcohol hand rubs	14(14.9)	16(17.0)	37(39.4)	27(28.7)	2.2(1.0)	1.9-2.4
There is always a person responsible for distributing alcohol hand rubs	12(12.8)	20(21.3)	29(30.9)	33(35.1)	2.2(1.0)	1.9-2.3
Alcohol hand rubs are routinely distributed	10(10.6)	13(13.8)	44(46.8)	27(28.7)	2.1(0.9)	1.9-2.3
There are posters illustrating hand hygiene techniques displayed besides each sink	13(13.8)	14(14.9)	37(39.4)	30(31.9)	2.1(1.0)	1.9-2.3
Posters illustrating indications for hand hygiene displayed in the ward	12(12.8)	15(16.0)	39(41.5)	28(29.8)	2.1(1.0)	1.9-2.3
Examination gloves are always available on the ward	21(22.3)	38(40.4)	31(33.0)	4(4.3)	2.8(0.8)	2.6-3.0
Audits on hand hygiene compliance are frequently performed on this ward	5(5.3)	13(13.8)	25(26.6)	51(54.3)	1.7(0.9)	1.5-1.9

Items with a mean score of 2.5 were considered neutral; those with a mean score below 2.5 were considered barriers while those with a mean score above 2.5 were considered enablers to hand hygiene. Therefore, the three greatest enablers to hand hygiene were water being visibly clean ( $M = 3.5$ ,  $SD = 0.7$ ) and availability of running water on the ward ( $M = 3.4$ ,  $SD = 0.8$ ). Availability of soap ( $M = 2.6$ ,  $SD = 0.9$ ) is neither a barrier nor an enabler because the 95% CI of the mean includes the neutral point.

The three greatest barriers to hand hygiene identified were: lack of audits on hand hygiene compliance on the wards ( $M = 1.7$ ,  $SD = 0.9$ ), posters illustrating hand hygiene techniques were not displayed on the wards ( $M = 2.1$ ,  $SD = 1.0$ ) and alcohol hand rubs are not routinely distributed ( $M = 2.1$ ,  $SD = 0.9$ ).

### Relationship between Respondent Age and the Perceived Barriers and Enablers

To assess whether age had effect on the perceived barriers or enablers to hand hygiene, age was categorised into three groups and the mean score for each age group computed (Figure 1).

In this study, age was used as a proxy for years of experience. To test if the mean of total scores for the three groups were statistically significantly different, one-way ANOVA was performed. The results however showed that the difference in mean total scores between the three age groups were not statistically significant ( $F(2) = 1.55, p = .219$ ) indicating an overall agreement across experience levels in the sum of all barriers and enablers measured in this study. A post hoc power analysis for the F test shows this sample size yielded sufficient power to exclude a type II error (Cohen's  $d = 15.1; \alpha = .05$  and  $1-\beta = .94$ ).

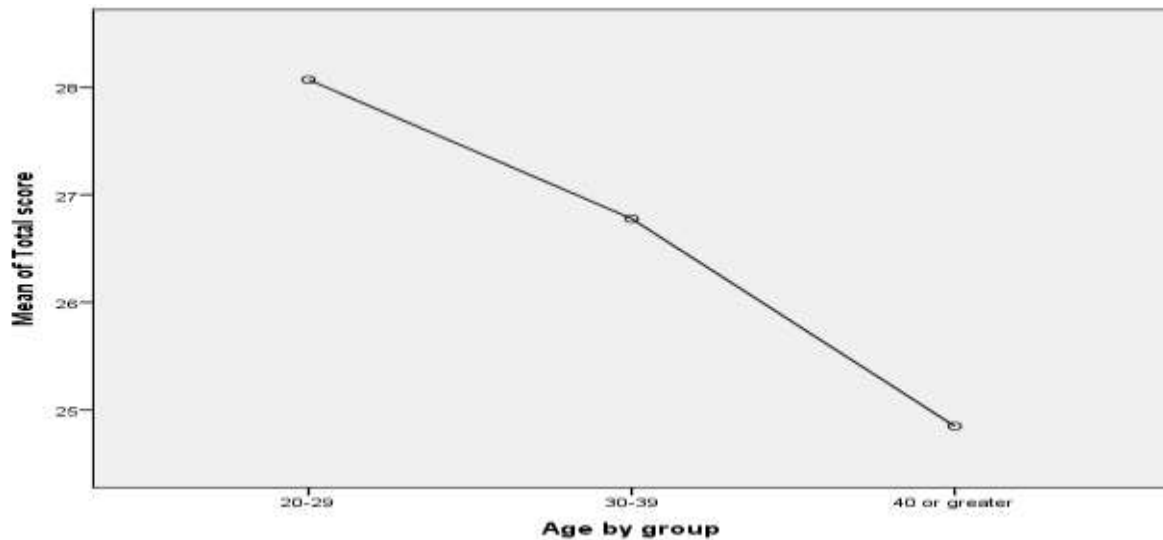


Figure 2: A Line Graph of the Mean Total Score for the Age Groups

### Relationship between Health Workers' Cadre and Perceived Barriers and Enablers to Hand Hygiene

To assess whether the health workers' cadre had an effect on the perceived barriers or enablers to hand hygiene, the total mean score for each cadre was computed (Figure 2).

To test if the mean of total scores for the cadres were different, one-way ANOVA was performed. The results however showed that the mean total scores for the different did not show a statistically significant difference ( $F(5) = 2.189, p = .63$ ) implying that the total effect of all measured barriers and enablers were essentially equal between cadres of health workers. A post hoc power analysis for the F test shows this sample size yielded sufficient power to exclude a type II error (Cohen's  $d = 12.7; \alpha = .05$  and  $1-\beta = .92$ ).



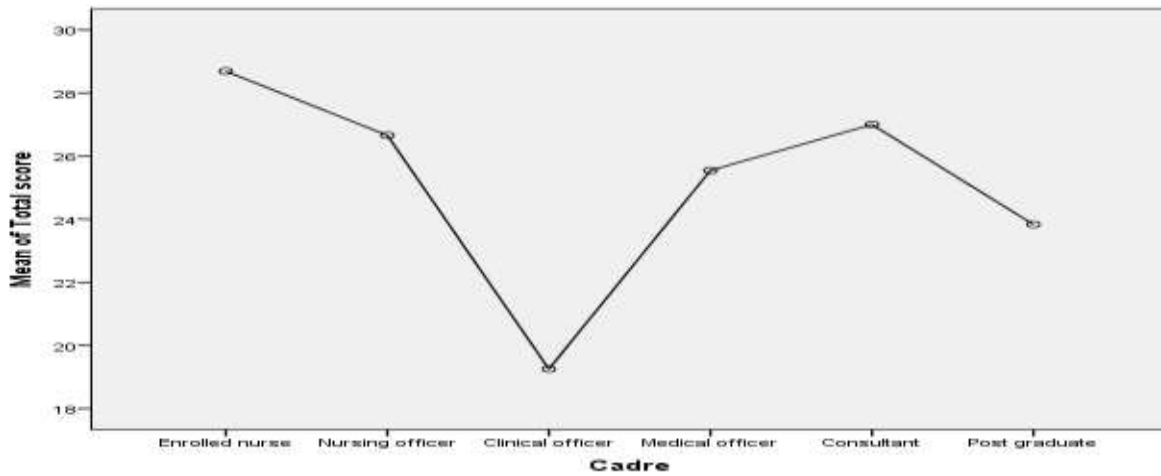


Figure 3: A Line Graph for the Mean Total Score for Health Care Workers' Cadre

### Relationship between Ward and Perceived Enablers and Barriers

To assess whether the ward had effect on the perceived barriers or enablers to hand hygiene, the total mean scores for each ward were computed and a graph of means of total score for each ward plotted (Figure 3). One-way ANOVA showed a statistically significant difference in the mean scores between the different wards ( $F(4) = 2.603, p = 0.043$ ). Post hoc tests using one way ANOVA revealed that surgical emergency mean total scores were statistically significantly lower than the mean scores from medical ward with a mean difference of 6.321 (95%CI 0.38-12.08,  $p = 0.029$ ). This difference implies that the perceived barriers of respondents from surgical emergency had greater negative influence than for respondents from medical ward.

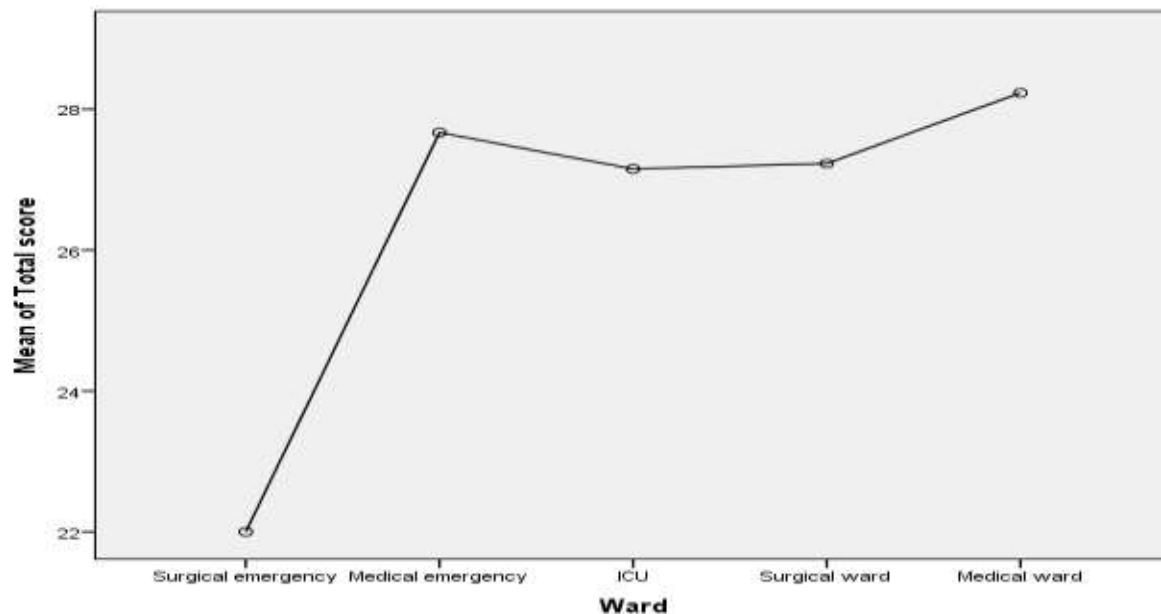


Figure 4: A Line Graph of the Total Mean Scores for the Wards

## **Discussion**

The two greatest enablers to hand hygiene identified were water being visibly clean and availability of running water on the ward. This is consistent with the findings of Abdella et al. (2014) who demonstrated that presence of water and availability of hand hygiene protocols greatly enhance hand hygiene action by health workers.

In this study, the three greatest barriers to hand hygiene identified were: lack of audits on hand hygiene compliance on the wards, absence of posters illustrating hand hygiene techniques on the wards, and alcohol hand rubs are not routinely distributed. This is consistent with the previous researchers' findings of insufficient stock of hand hygiene products and facilities such as sinks, soap, alcohol based hand sanitizers, and paper towels have been implicated in poor hand hygiene (Mani et al., 2010; Mearkle et al., 2016). Shortages of these products and facilities are occur more frequently in developing countries where they could lead to higher prevalence of HAI. A study conducted on most wards in a Nigerian hospital found that they lacked adequate facilities for proper hand hygiene and opted to use a bucket and bowl as an alternative to a lack of running water (Ogunsola & Adesiji, 2008).

## **Conclusion**

Displaying reminder posters, distributing inexpensive hand gels, and implementing routine quality audits for hand hygiene offer some potential for improvements. The factors that contributed the most obstacles to HCW fulfilling hand hygiene are easily addressed without great expense. The local hospital should place posters to remind HCW of hand hygiene, they should regularly distribute locally produced and inexpensive hand gel, and they should implement routine quality audits for hand hygiene compliance. These three activities may offer great value in improving the adherence to WHO hand hygiene guidelines while reducing the HAIs in resource limited developing country settings.

## **Limitations**

The questionnaire was not completely comprehensive to the local context. A number of factors were not assessed including effect of workload on hand hygiene, whether health workers had prior training in hand hygiene and HCWs attitudes and knowledge regarding hand hygiene.

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**Competing interests:** There were no competing interests

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