

Original Article

Hand hygiene compliance by health care workers at a teaching hospital, Kingston, Jamaica

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Abstract

Introduction: Consistent practice of hand hygiene (HH) has been shown to reduce the incidence and spread of hospital acquired infections. The objectives of this study were to determine the level of compliance and possible factors affecting compliance with HH practices among HCWs at a teaching hospital in Kingston, Jamaica.

Methodology: A prospective observational study was undertaken at the University Hospital of the West Indies (UHWI) over a two weeks period. Trained, validated observers identified opportunities for hand hygiene as defined by the WHO “Five Hand Hygiene Moments” and recorded whether appropriate hand hygiene actions were taken or missed. Observations were covert to prevent the observer’s presence influencing the behaviour of the healthcare workers (HCWs) and targeted areas included the intensive care units (ICUs), surgical wards and surgical outpatient departments. A ward infrastructure survey was also done. Data were entered and analysed using SPSS version 16 for Windows. Chi-square analysis using Pearson’s formula was used to test associations between ‘exposure’ factors and the outcome ‘compliance’.

Results: A total of 270 hand hygiene opportunities were observed and the overall compliance rate was 38.9%. No differences were observed between the various types of HCWs or seniority. HCWs were more likely to perform hand hygiene if the indication was ‘after’ rather than ‘before’ patient contact ($p = 0.001$).

Conclusion: This study underscores the need for improvement in HH practices among HCWs in a teaching hospital. Health education with particular attention to the need for HH prior to physical contact with patients is indicated.

Key words: hand hygiene compliance; infection control.

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Introduction

The University Hospital of the West Indies (UHWI) is a 512-bed teaching hospital in Kingston, Jamaica and is also recognized as a regional institution providing health care for other Caribbean countries as well. There have been several outbreaks of HAIs in this institution including *Stenotrophomonas maltophilia* and methicillin-resistant *Staphylococcus aureus* (MRSA) infections [1-2]. However, the extent to which HH practices among HCWs is a contributor to the observed pattern is not known. This study delineates the extent of the problem of compliance with the WHO (2009) guidelines for HH at the UHWI. Further, it examines barriers to good hand hygiene including the presence and location of wash basins and sinks and availability of alcohol-based hand scrubs.

Health care-associated infection (HCAI) is a major problem for patient safety [3]. Its prevention and

surveillance are therefore priorities in the interest of health care optimization. HAIs are associated with prolonged hospital stay, long-term disability, increased mortality, increased antimicrobial drug resistance and greatly increased financial burden to health care facilities and patient families [3]. They present a universal challenge for all health care providing facilities since more than 1.4 million patients in both developed and developing countries are estimated to be affected at any given time [3]. In developed countries, HCAI is reported to occur in 5-15% of hospitalized patients and 9-37% of admissions to Intensive Care Units (ICUs) [3-4]. Many studies in developing countries, albeit usually single institution based, report hospital-wide rates of HCAI that are higher than in developed countries [5-7].

The results of 40 years of research show that the hands of health care workers’ play an important role in

the transmission of HCAs [8]. This transmission of pathogens among patients via the hands of HCWs' requires five sequential steps: a) organisms are present on the patient's skin or have been shed onto objects immediately surrounding the patient; b) organisms are transferred to the hands of HCWs; c) organisms must be capable of surviving for at least several minutes on HCWs' hands; d) hand washing or hand antiseptics by the HCW must be inadequate or entirely omitted; and e) the contaminated hand or hands of the caregiver must come into direct contact with another patient or with an inanimate object that will come into direct contact with the patient [8]. Based on this sequence, five hand washing opportunities have been formulated and this forms the basis behind this observational study. The five hand washing opportunities as outlined by the WHO (2009) Patient Safety Alliance are: 1) before touching the patient in order to protect the patient from harmful pathogens on your hands; 2) before clean/aseptic procedures in order to protect the patient from pathogens including the patient's own, entering his/her body; 3) after body fluid exposure risk; 4) after touching the patient; and 5) after touching patient surroundings [8].

Increased HH compliance is associated with a significant reduction in HCAs [9-12]. Despite this knowledge, compliance rates continue to be poor [13-14]. Although reported compliance rates range from 5-89%, the average compliance rate is 38% [8]. In 2000, Pittet *et al* reported a remarkable reduction in HCAI rates and improvement in HH compliance at the Geneva University Hospital after implementation of a strategy to improve hand hygiene among HCWs [15]. This included the implementation of alcohol based hand-rub.

Methodology

A prospective, observational study of compliance with HH practices among HCWs was conducted over a two weeks period (2010). HCWs included physicians at all levels (interns to consultants), nurses at all levels (students to sisters), nursing aides, physiotherapists, technicians, medical students and ancillary workers. Covert observations were conducted in two intensive care units, four surgical wards and one surgical outpatient department by six observers who were trained and validated by the researchers to detect appropriate hand washing opportunities as defined by the WHO (2009) "Five hand hygiene moments". Actions of HCWs were recorded using WHO (2009) observation forms. Redundant hand-hygiene by HCWs (*i.e.* not at a point which will interrupt transmission of

organisms from the environment to the patient, hence not required) was not recorded.

Observation periods were for one hour and observations of up to three HCW's per observer were recorded, depending on the level of activity at the time. A timetable was constructed to ensure observations occurred at different times of the day and different areas of the wards and clinics, to prevent biases. Observers recorded the professional category of the HCW being observed, the hand hygiene indication, the hand hygiene action that was taken (hand washing or hand rub) or if the opportunity was missed. It was also noted if gloves were worn, when appropriate, by the HCW. Data were entered and analysed using SPSS version 16 for Window. The hand hygiene compliance rate was calculated using the formula: Compliance (%) = No of actions/ No of opportunities x 100. Chi-square analysis using Pearson's formula was used to determine statistical significance of differences between hand hygiene compliance and demographic and other factors and a *p*-value of <0.05 was considered significant. A post adhoc power calculation indicated that the study had a power of 90% using a reference compliance rate of 38%, a variability of 5% and alpha value of 5%.

A survey of the physical facilities of the wards and departments being studied was done using the Ward Infrastructure Survey (2009) instrument from the WHO Global Hand Hygiene Campaign which included availability of running water, soap or alcohol-based hand rub, presence of HH posters and number of sinks [16].

Results

Eighty-seven (87) HCWs were monitored; 41 nurses, 27 physicians and 19 other staff members, including physiotherapists, technical and ancillary staff. A total of 270 HH opportunities were observed, 145 (53.7%) from the surgical wards, 110 (40.7%) from

Figure 1. Distribution of hand hygiene opportunities across staff categories

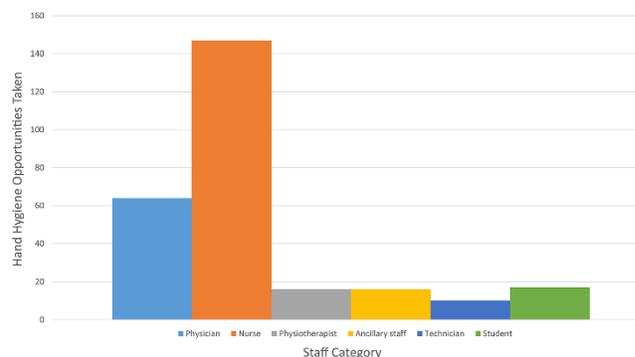


Table 1. Distribution of hand hygiene action by indication

Indication	Hand hygiene action		Total
	Appropriate	Missed	
Before patient	23 (28.8%)	57 (71.2%)	80
Before aseptic procedure	5 (17.9%)	23 (82.1%)	28
After body fluids	19 (51.4%)	18 (48.6%)	37
After patient	43 (54.4%)	36 (45.6%)	79
After patient surroundings	15 (32.6%)	31 (67.4%)	46
Total	105	165	270

ICU, and 15 (5.6%) from the surgical outpatient department. Of these, 64 (23.7%) observations were made of physicians, 147 (54.4%) were of nurses and 59 (21.9%) were of other staff members (Figure 1).

There were only 105 (38.9%) appropriate HH actions (100 hand washes and 5 hand rubs) and 165 (61.1%) missed opportunities. The frequencies of indication for HH actions, using the WHO's "five hand hygiene moments", are shown in Table 1. Gloves were used by the HCWs in 66 (24.4%) of the hand hygiene opportunities.

There was no strong evidence of a difference between location in the hospital and HH compliance ($p = 0.34$). The compliance rate with HH amongst ICU staff was 35.5% (39 of 110) and that of ward and outpatient staff was 41.2% (66 of 160). The type of staff member also made no significant difference to the compliance rate: 37.5% (24 of 64) for doctors, 42.2% (62 of 147) for nurses and 32.2% (19 of 59) for other ($p = 0.40$) (Table 2). The compliance rate with hand hygiene when gloves were used during the opportunity was 37.9% (25 of 66) which was very similar to the compliance rate when gloves were not worn: 39.2% (80 of 204) [$p = 0.85$].

HCWs were much more likely to perform a hand hygiene action if the indication was 'after' (48%) rather than 'before' (26%) patient contact ($p < 0.001$) (Table 1).

Physical facilities

All wards involved in the study had the required sink to bed ratio of one sink to 10 beds [16-18]. The sinks were located to the side along one wall of the ward. Running water was reported as being consistently available in all areas. Soap and disposable towels were always available in 4 of the seven (57%) areas studied while only intermittently available in the other 3 areas. Hand sanitizer was consistently present in 3 (43%) of the areas and only intermittently in the others, Pocket sized bottles for HCW's were present in only two (33%) areas. Posters on hand hygiene placed in the proximity of sinks or hand sanitizer dispensers were present in

only 3 (43%) of the areas surveyed. Hand hygiene compliance has never been audited so there has never been any feedback to the staff concerning this.

Discussion

Hand hygiene compliance at the UHWI was shown to be suboptimal, in keeping with the international literature which reports an average compliance rate of 38% [8]. Possible factors contributing to this, based on the findings of the survey of the physical facilities, include lack of alcohol based gels (and occasionally other materials needed for hand hygiene), position of sinks and lack of consistent reminders in the form of posters or signs. Compliance rates should be optimized when a) the hand hygiene procedure is simple, accessible, comfortable and of short duration; b) HCWs are sensitized to the high level of impact of hand hygiene on HCAI's; and c) effective reminders are provided.

While the sink to bed ratio at the UHWI is as recommended in the literature, the placement of the sinks to one side of the ward, away from the patient's beds, undoubtedly affects the overall compliance [16-18]. Although the HH procedure is simple, it may be perceived as an interruption in the HCW's schedule. Where the workload is demanding, unless there are effective reminders, regular HH can be easily disregarded. Only a few wards had reminders, in the form of HH posters and these were very often faded and would have long lost their impact.

Table 2. Distribution of hand hygiene action by category of staff

Category of staff	Hand hygiene action		Total
	Appropriate	Missed	
Physician	24 (37.5%)	40 (62.5%)	64
Nurse	62 (42.2%)	85 (57.8%)	147
Other	19 (32.2%)	40 (67.8%)	59
Total	105	165	270

Additionally, there has not yet been widespread acceptance of alcohol based hand rubs as a suitable alternative for HH at this hospital. Discussion with HCW's revealed that they were unaware of the efficacy of these in comparison with soap and water and they complained of the smell and feel of the alcohol based hand sanitizers. There is need for education of HCW's on the advantages and disadvantages of both methods of HH. One definite advantage of using alcohol based hand sanitizers is that it takes 20-30 seconds, while effective hand washing with soap and water takes between 45 and 90 seconds [16]. In addition, the placement of hand sanitizer dispensers at the point of care (POC) coupled with the distribution of pocket bottle sanitizers to HCWs could also facilitate increased compliance [19-21]. One study conducted in Western Australia reported a 13% increase in hand decontamination frequency after the introduction of hand sanitizers in an ICU [20]. Another study by Bischoff *et al* evaluated the effect of various factors such as education/ feedback interventions, patient awareness and introduction of hand sanitizers on HH compliance in two ICUs and one medical ward [21]. This study showed that the introduction of hand sanitizers had the greatest impact on HH compliance with increases of 22-25%.

Each of the five HH indications as outlined by the WHO was regarded as a HH opportunity in this study. Based on informal surveys, compliance with all five indications is perceived as being tedious by HCW's. This raises the question as to whether these indications should be prioritized, with more emphasis being placed on only three: before patient contact, after patient contact and before a sterile procedure; or whether healthcare workers should be convinced of the importance of complying with all indications if effective interruption of microbial transmission is to be achieved. The fact that the HCWs were more likely to comply with hand washing after patient contact rather than before may reflect a priority to protect themselves from the patient's body fluids rather than to protect the patient. This emphasizes the need for educational programmes and increased surveillance to ensure both patients and HCWs are not being exposed to harmful organisms or transporting them to other areas.

The finding that there was no strong evidence of a difference in HH compliance between different categories of HCW's at this hospital was surprising, however the sample size was not large enough to detect a statistical difference. Other studies have shown markedly increased compliance among nurses when compared to other categories [19]. There was also no

evidence of a difference in behaviour among the various levels of staff, which shows the need to target all staff members in any HH promotion exercise. The concept of encouraging senior staff members, especially consultants, in various disciplines to function as role models for junior staff members should be considered, as this has been found to play a significant role in changing behaviour [22]. Regular audits of HH compliance with feedback to respective areas have also been found to influence compliance positively [19]. At the time of this study, the hospital had not recently engaged in any audits or specific promotion of HH. The introduction of these measures at the UHWI should also be considered. It would be interesting to see the effect of a HH campaign, including the promotion of hand sanitizers, on compliance.

Causes of potential bias arising from direct observation include observation, observer and selection bias. Observation bias is generated by the presence of an observer, who influences the behaviour of the observed and hence falsely increases the level of compliance. This was minimized by keeping observations covert. Observer bias refers to the systematic error introduced by inter-observer variation in the observation method. To reduce this bias, observers were trained then validated by the researchers. Selection bias results from systematically selecting HCWs, care settings, or observation times with specific HH behaviour. This bias was minimized by creating a predetermined timetable to ensure different locations and times during the day were rotated for observation periods.

Conclusions

Hand hygiene compliance at the UHWI is suboptimal across all categories of HCWs. Education of HCWs is needed to increase awareness of the importance of HH as well as to provide information on the options available. This very important infection control policy should be monitored using regular audits with feedback of results to respective areas in an effort to encourage compliance.

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