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Original article

Compliance with hygiene practices among healthcare workers at an academic hospital emergency department

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ABSTRACT

Introduction: Healthcare-associated infections (HCAIs) are an important contributor to patient morbidity and mortality. Healthcare workers (HCWs) hands are the chief mode of transmission of HCAIs. The emergency centre (EC) is frequently the first point of contact for patients within the health care system. The aim of this study is to determine compliance with hygiene practices among healthcare workers at a tertiary hospital EC.

Methods: Hygiene practices of staff were observed over a six-week period. Data pertaining to compliance rates with hand cleansing and other hygiene practices was collected. Consent was obtained retrospectively to avoid influencing participant behaviour.

Results: From a total of 477 potential hygiene opportunities, compliance with hand hygiene was only 34.4% (n = 164). Hand cleansing with an alcohol-based hand rub was observed in 87 (26.7%) of the 326 (68.3%) opportunities where it was indicated, while handwashing with soap and water was observed in 35 (23.2%) of the 151 opportunities where this was indicated. Compliance to each of the six steps of handwashing ranged between 62.2% and 83.5%, with there being a gradual deterioration in compliance from step one through to step six. Compliance with 'bare below the elbows' was observed in 242 (50.7%) opportunities while disposable surgical gloves were worn on 85 (44.7%) of the 190 opportunities where this was indicated.

Conclusion: Compliance with hygiene practices among EC HCWs is suboptimal. Various strategies including ongoing systematic training and regular audits may improve overall hygiene practices among EC staff.

African relevance

- There is a paucity of data pertaining to hygiene practices among healthcare workers in African emergency departments
- The emergency department is the first point of contact for most patients requiring hospitalization
- The hands of healthcare workers have been considered as the chief mode of transmission of infections
- Strategies should be implemented to improve hygiene practices among healthcare workers in the emergency department

Introduction

Healthcare-associated infections (HCAIs) are an important contributor to patient morbidity and mortality and also place a substantial burden on the healthcare system [1,2]. The emergency centre (EC) is the first point of contact for most patients requiring hospitalization [3]. Due to the undifferentiated nature of patient presentation to the EC, many patients including those residing in long term care facilities, those recently discharged from hospital and those on chronic ambulatory therapy are at high risk of harbouring HCAIs [4].

EC overcrowding has been associated with an increase in the risk of spread of infection [5]. However, in general the hands of healthcare workers (HCWs) have been considered as the chief mode of transmission of infections [6] and are therefore a key measure in the prevention of HCAIs [7]. Appropriate hand hygiene has been shown to inactivate and suppress the growth of microorganisms [8]. Accordingly, compliance with optimal hand hygiene practices has resulted in a decrease in the incidence of HCAIs by up to a third [9].

The World Health Organization (WHO) has implemented numerous

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initiatives to increase awareness of the importance of hand hygiene [10–12]. Alcohol-based hand rub is considered the preferred means in preventing HCAIs as compared to other antiseptics agents [13]. However, the use of water and soap is still recommended for decontamination of visibly soiled hands [14]. Other measures such as being 'bare-below the elbows' may also potentially limit the spread of infections [15].

Despite evidence that support the benefit of hand hygiene in the prevention of HCAIs, multiple studies have reported poor compliance among healthcare workers across different patient care settings [16–18]. There is a paucity of data pertaining to hygiene practices in the EC in resource limited settings. This study was therefore aimed at determining hygiene practices among healthcare workers in the EC at a tertiary academic hospital in Johannesburg, South Africa.

Methods

This cross-sectional, prospective study was conducted in the EC of a 1000 bed academic tertiary hospital in the Gauteng province of South Africa. Approximately 40,000 patients attend the EC annually. The EC has 14 beds and seven handwashing basins with each basin being equipped with liquid soap and a paper towel dispenser. In addition, there are 6–8 non-fixed alcohol rub dispensers randomly placed in the department. Permission to conduct the study and ethics approval was obtained from the head of the EC and the University of the Witwatersrand Human Research Ethics Committee (clearance certificate no. M170454) respectively.

The researchers discretely observed hygiene practices of 54 subjects for a minimum of 4 h per day, between 8 am and 6 pm. Data was collected between 11 March and 24 April 2019. All EC doctors and nurses that were involved in clinical care were included in this study. Students, paramedic staff and other health care professionals who were not part of the permanent EC staff but merely passing through the EC for consultation were excluded.

Each study subject was observed for a minimum of five hygiene opportunities on different days. For the purpose of this study, the WHO's '5 moments of hand hygiene' (before touching a patient, before performing an aseptic procedure, after patient body fluid exposure, after touching a patient and after touching a patient's surroundings), were regarded as hand hygiene opportunities. Handwashing with soap and water was indicated when the healthcare workers hands were either visibly dirty, visibly soiled with blood or other body fluids, after using the toilet or after exposure to patients that were potentially infected or known to be infected with spore-forming pathogens such as *C. difficile*. An alcohol-based hand rub was indicated in all other scenarios including when moving from a contaminated to another site during care of the same patient, handling an invasive device for patient care and after removing sterile or non-sterile gloves. Disposable surgical gloves were indicated when it was reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes or non-intact skin will occur [8,19].

During a single patient encounter, subjects were observed on whether hand cleansing with either soap and water or alcohol hand rub was carried out when indicated, if all the steps of hand cleansing were being adhered to when performed, if they were 'bare below their elbow's' (no jewellery or clothing below the elbows) and if they had donned surgical gloves when indicated. To maintain subject confidentiality, each potential subject was assigned a code with no identifying data that was linkable. To eliminate study bias, subjects were blinded to the study design, aims and objectives. Hence covert observations of hygiene practices were carried out with consent being obtained retrospectively upon completion of data collection. All subjects consented to their data being included in the study.

All data was recorded on individual data collection sheets and entered into an electronic database (REDCap – Research Electronic Data Capture) [20] and thereafter exported to an Excel spreadsheet (Microsoft® Excel® 2010). The data was thereafter subjected to descriptive analysis and reported as frequency and percentage in graphic format. Study reporting conformed to STROBE guidelines [21].

Results

A total of 477 potential hygiene opportunities were observed. Overall compliance with hand hygiene was only 34.4% (n = 164). Hand cleansing with an alcohol-based hand rub was observed in 87 (26.7%) of the 326 (68.3%) opportunities where it was indicated, while handwashing with soap and water was observed in 35 (23.2%) of the 151 opportunities where this was indicated. In the remainder of cases where soap and water was indicated, an alcohol-based hand rub was inappropriately used on 42 (27.8%) occasions and no hand hygiene was observed on 74 (49.0%) occasions. Compliance with 'bare below the elbows' was observed in 242 (50.7%) opportunities while disposable surgical gloves were worn on 85 (44.7%) of the 190 opportunities where this was indicated. The above findings are summarized in Fig. 1.

Compliance with each of the WHO's six steps of hand hygiene among the 164 occasions (alcohol-based hand rub and handwashing with soap and water) where this was performed is described in Fig. 2. Compliance for each of the steps ranged between 62.2% and 83.5%, with there being a gradual deterioration in compliance from step one through to step six. All six steps were correctly performed in 62 (37.8%) observations, while five of six steps were correctly performed in 28 (17.1%) observations. Compliance with additional steps among the 35 opportunities where soap and water were used was 100% (n = 35) for rinsing of hands with water, 94.3% (n = 33) for drying of hands with paper towel after rinsing and 71.4% (n = 25) for turning off the tap correctly without contaminating their hands.

Discussion

Appropriate handwashing is one of the most effective measures in preventing the spread of HCAIs [22]. In fact, the proper implementation of hand hygiene has been associated with a 50% reduction in infection rates [16]. As per the WHO, hand hygiene compliance below 60% is considered poor [23], hence, it is concerning that hand hygiene compliance in this study was only observed in 34.4% of opportunities where this was indicated. Comparatively, three other EC-based studies reported similar compliance rates of 21% [24], 29% [25] and 32.3% [22], while two studies reported much higher compliance rates of 67% [5] and 89.7% [26]. Various factors including EC overcrowding, high volume of patient contacts, attending to several patients simultaneously, acuity of patient presentation, time challenges, staff shortages and a lack of enforcement of hand hygiene protocols have been shown to predispose to suboptimal compliance with handwashing and other hygiene practices among staff in the ED [5,7,22,27]. Several interventions such as regular education and training, surveillance, frequent reminders,

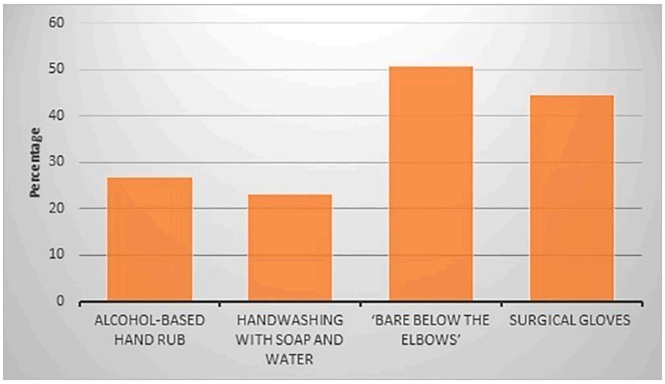

Fig. 1. Rates of compliance with the various categories of hygiene measures.

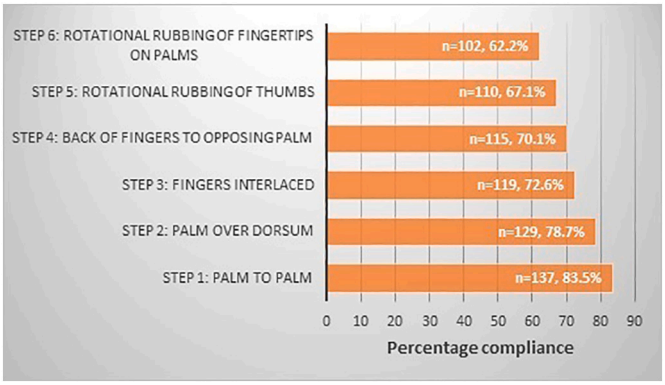

Fig. 2. Rates of compliance with each of the World Health Organization's six steps of hand hygiene.

performance feedback, ensuring the availability of supplies and administrative support are strategies that have been shown to improve hand hygiene compliance [28].

Similar to this study, other non-EC based studies [29,30] also reported higher rates of compliance with the initial steps of hand hygiene. In the study by Arias et al., compliance was the lowest with steps five and six [29], while in the study by Tschudin et al., compliance was the lowest with steps 4 and 6 [30]. This advocates for training initiatives to emphasize and reinforce the importance and value of the later steps of hand hygiene.

Bacterial flora are ten folds more likely to be transmitted via wet hands [31]. Hence, it is commendable that in this study drying of the hands with paper towel was observed in almost all instances (94.3%) where soap and water was used. Drying of hands not only removes excess moisture which encourages bacterial growth, but the process has also been shown to reduce excess bacteria that may still be present after handwashing [8].

Jewellery has been shown to harbour relatively higher quantities of microorganisms [32] that may persist for prolonged periods [33]. In the present study, compliance with 'bare below the elbows' was observed in just 50.7% of subjects. Although 'bare below the elbows' is widely recommended in clinical practice, evidence as to its value in reducing the transmission of microorganisms is lacking [34,35].

In this study, disposable surgical gloves were only worn in 44.7% of instances where these were indicated. Comparatively, in a study where healthcare workers were observed over a six month period, the compliance rate for the use of disposable surgical gloves was shown to be 50% [36]. Two other studies reported the use of disposable surgical gloves in 72.4% and 88% of cases where these were indicated [37,38]. An observational study reported that disposable surgical gloves were more likely to be used only when the exposure was perceived as 'dirty' [5].

There are several limitations to the findings of this study. Firstly, data was not collected during night shifts when there is less oversight from senior staff. Also, we did not look at the relationship of handwashing frequency to the incidence of HCAIs in the EC in which the study was conducted. Additionally, we did not relate findings of hygiene practices to external factors such as the location of washbasins and the availability of alcohol hand rub, soap and other consumables.

Conclusion

Compliance with hygiene practices in this study was suboptimal but similar to findings of other studies. Reinforcement of the importance of adhering to hygiene practices in the EC, regular in-service trainings, displaying of educational material at strategic locations in the EC, seniors or peer oversight, regular audits and improving access to washbasins and consumables are strategies that may be implemented to help improve compliance with hygiene practices in the EC.

Dissemination of results

Results from this study were shared with staff members at the data collection site through an informal presentation.

Authors' contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: AEL contributed 40%; LvR 25%; AJ 15%; COAE and KMS contributed 10% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

CRediT authorship contribution statement

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content:

AL contributed 40%; L-RvR 25%; AJ 15%; C and KS contributed 10% each.

All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of competing interest

The authors declared no conflicts of interest.

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