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An Observational Study of Hand Hygiene Compliance of Surgical Healthcare Workers in a Nigerian Teaching Hospital

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Background

Patients sometimes contract healthcare associated infections (HCAI) which are unrelated to their primary reasons for hospital admission (Devnani et al., 2011). The frequency of HCAI, especially in high-risk patients in developing countries is 2 to 3 times greater than in developed countries (Allegranzi et al., 2017). Higher prevalence of HCAI in developing countries has been credited to a range of factors (e.g., reuse of instruments, scarcity of basic facilities) including low compliance to infection control measures (Rosenthal, 2011). Surgical site infections (SSI) are the most investigated and most recurrent type of HCAI in developing countries, affecting up to one-third of surgical patients (Allegranzi et al., 2017). SSI are a significant cause of post-surgical morbidity and mortality (Chu et al., 2015). In Nigeria, a systematic review and meta-analysis estimated SSI cumulative incidence rate at 14.5% (Olowo-Okere et al., 2019).

Contaminated hands play a significant role in the spread of HCAI (Dixit et al., 2012). Hand hygiene is the best method to prevent these infections though healthcare workers (HCWs) still do not clean their hands as often as expected (Graf et al., 2011; WHO, 2009a). A large systematic review of published studies on hand hygiene in developed countries suggests compliance rate of only 40% (Erasmus et al., 2010) while our recent narrative review from Sub-Saharan African (SSA) countries estimated compliance rate of 21.1% (Ataiyero et al., 2019). However, there were only 9 studies investigating this in SSA and of these, only 2 studies are from Nigeria, suggesting a need for more studies on hand hygiene compliance rates in this region.

Aim

Our aims were:

1. To assess and offer context to the hand hygiene resources available in a Nigerian teaching hospital through ward infrastructure survey.
2. To determine the hand hygiene compliance rate among surgical HCWs in a Nigerian teaching hospital through hand hygiene observations.

Methods

Setting

This study was conducted in a private teaching hospital in South-western Nigeria, in two surgical wards (male and female) of the hospital. We chose surgical wards because in Nigeria, surgical wards have the highest occurrence of HCAI when compared to other wards (Ige et al., 2011; Iliyasu et al., 2018).

Design

We conducted a ward infrastructure survey of hand hygiene facilities available in each of the two wards, using the WHO hand hygiene ward infrastructure survey form (WHO, 2009b). This form is in two parts. The first part of the form assesses handwashing/hand-rubbing facilities and resources on the wards while the second part is a grid which assesses the exact number of hand hygiene resources and the products in place.

For hand hygiene observations, direct observation of hand hygiene opportunities of HCWs in the two surgical wards was conducted, being the gold standard measure for hand hygiene compliance (Randle et al., 2010). All observed data were collected manually using a modified WHO hand hygiene observation form (WHO, 2009a). The form consists of institutional level characteristics including the ward, department, staff category (medical, nursing or healthcare assistants), and professional level according to seniority. Hand hygiene opportunities observed included one of the "My five moments of hand hygiene" namely – *"before patient contact, before aseptic procedure, after exposure to body fluids, after patient contact* and *after touching patient surroundings"* (WHO, 2009a).

Procedure

No participants (patients or HCWs) were included in the ward infrastructure survey. The purpose of the survey was discussed with the matrons-in-charge of the wards. On the day of the survey, the observer was allowed to conduct the survey alone however, when in doubt, details/clarifications were obtained from the matrons. For instance, the matrons confirmed the number of staff in both nursing and medical professional groups. Only photographs relating to hand hygiene materials were taken to give a pictorial representation of the setting. Photographs of patients or HCWs performing clinical procedures were avoided.

Only HCWs directly involved in patient care including doctors, nurses and healthcare assistants were observed. Observations were conducted during morning and afternoon shifts (between 9am and 6pm). A hand hygiene observation notification poster was displayed on the wards' notice boards a week before observations commenced and the right and procedures of HCWs to dissent from observation was clearly stated. Participant information sheets which detailed what the study was about and HCWs' rights to participate were made available on the wards. The contact details of the observer were also provided on the poster and the information sheet so that if anyone wanted further information or to dissent from observation, such individual could contact the researcher or hand hygiene observations would be done on days dissented HCWs were not on shift, respectively. However, no one asked to be excluded from being observed.

Ethical considerations

Prior to study commencement, ethical approval was granted by the host university, University of Hull (ref 279) and the hospital's Research Ethics Committees; the study was conducted as part of a PhD research programme. Dissent was employed to allow HCWs a choice to either participate in the study or not, because, unlike in developed countries like the UK, hand hygiene audits are not routinely conducted in SSA/Nigerian hospitals.

Data Analysis

Using Statistical Package for Social Sciences (SPSS version 24.0) we conducted a descriptive analysis of audit results, and results were presented according to professional group, seniority, and hand hygiene opportunity of the participants.

Results

Ward infrastructure survey

There were 15 nurses and 6 healthcare assistants in each of the male and female surgical wards. There were 15 doctors attached to the two wards. The wards are open (nightingale style) wards occupied by patients with different surgical needs including but not limited to general surgery, urology, and orthopaedics. There were 30 beds and 21 beds in the male and female surgical wards respectively. Each bed was separated by curtains to provide some privacy for the patients. There were no private rooms for patients on the wards as there is a private ward in the hospital where patients who are more affluent were admitted.

At the time of the survey, each ward had two sinks with visibly clean water running from taps. There were no faulty sinks though one of the four sinks and its environment was visibly dirty. Only cold water was running. Taps were knob-operated, no elbow-operated taps were available. There were plastic water storage facilities, as well as buckets and bowl to manually pour water on the hands in case water was not running. Soap was always available, but they were either bar soaps or heavily diluted liquid soap without any record of dilution standard. Each of the wards also had a treatment room with running water and soap. There were no disposable towels at any point during the survey; cotton hand towels were provided, and these were reportedly changed once per shift. There were no wall mounted alcohol-based hand rubs (ABHRs), none on patients' bedsides and no pocket-sized ABHRs. When available, ABHRs are reportedly placed on and used from the nurses' station. Disposable gloves were observed by all patient bedsides. Posters illustrating hand hygiene were displayed by the sinks but in no other of the ward. No other hand hygiene reminders were displayed. Hand hygiene observation had never been done in the hospital prior to our study. Images 1 to 3 show some of the hand hygiene resources available on the adult male and female surgical wards of the research setting.

(Image1)

(Image2)

(Image3)

Hand Hygiene Observations

To estimate the compliance rate, a total of 700 hand hygiene opportunities, 350 per surgical ward were observed in May 2018 for 70 hours according to the WHO (2009) recommendations, for 7 days. Of these, 341 were nurses, 238 were doctors and 121 were healthcare assistants. Two hundred and eighty-two opportunities were recorded in the morning shifts and 418 opportunities recorded for afternoon shifts. The overall hand hygiene compliance rate was estimated as 29.1%. Compliance to hand hygiene varied across professional groups – 35.7% for doctors, 31.1% for nurses and 10.7% for healthcare assistants. Compliance also varied according to the "five moments of hand hygiene" – 20.5% for before patient contact, 66.7% for before aseptic procedure, 78.5% for after exposure to body fluids, 10% for after touching a patient and 37.8% after touching patient's surroundings. Table 1 and figure 1 present the distribution of hand hygiene opportunities and compliance rates according to professional category, using the "my five moments of hand hygiene".

(Table1)

All the professional groups had their highest compliance after exposure to body fluids with compliance rates of 88.5% for doctors, 73.5% for nurses and 60% for healthcare assistants. The lowest compliance was seen after touching a patient between doctors (10.1%) and nurses (12%). Notably, doctors always had the highest compliance rate across the other four moments of hand hygiene. There were no hand hygiene opportunities before aseptic procedure for healthcare assistants.

(figure1)

Hand hygiene compliance was also compared in terms of seniority level within professional groups. Among doctors, compliance rate was 28% for medical officers, 31.4% for house officers, 44.4% for resident doctors and 44.6% for consultants. Among nurses, compliance rate was 26.3% among assistant chief nursing officers, 30% for senior nursing officers, 33.7% for chief nursing officers and 34.9% for staff nurses. These are presented in figures 2 and 3. Compliance was higher in morning shifts (30.1%) than afternoon shifts (28.5). This is presented in table 2.

(table 2)

(figure2)

(figure3)

Discussion

This study had two purposes; to assess and offer context to the hand hygiene resources available in a Nigerian teaching hospital through ward infrastructure survey and to determine the hand hygiene compliance rate among surgical HCWs in this hospital through hand hygiene observations. Based on the

ward infrastructure survey, we considered our findings within the context of the wider literature in terms of the overall compliance rate, professional groups, seniority level, shift pattern and the WHO my five moments of hand hygiene.

Our study found insufficient hand hygiene resources, below the WHO recommended minimum standards of at least one sink to every 10 beds, soap and fresh towels at every sink and at least bottles of ABHR positioned at points of care in each ward or given to staff (WHO, 2009a). This is consistent with the limited data available relating to this. Unavailability of hand hygiene facilities is markedly worse in developing countries, with only 6% of healthcare facilities having access to basic water and sanitation services (National Bureau of Statistics, 2019). Hospitals in SSA countries are characterised by infrastructural deficit and poor positioning of hand hygiene resources (Ataiyero et al., 2019). A survey of healthcare facilities in low- and middle-income countries found that 50% of the healthcare facilities lacked piped water while 39% lacked handwashing soap (Cronk and Bartram, 2018).

The insufficient hand hygiene resources might have influenced the hand hygiene compliance rates in this study as the overall compliance rate among surgical HCWs was 29.1%. Our findings are consistent with other studies conducted in both developing and developing countries. For instance, our recent review of studies from SSA countries that reported on compliance found an overall compliance rate of 21.1% (Ataiyero et al., 2019). A large systematic review of studies from developed countries also reported less than 40% hand hygiene compliance rate (Erasmus et al., 2010) while a more recent systematic review which included 16 studies from both developed and developing countries also estimated an overall mean baseline compliance of 34.1% before interventions (Kingston et al., 2016). Despite the infrastructural deficit and their poor positioning in SSA countries, compared to developed countries where hand hygiene facilities are abundant, hand hygiene compliance rates of HCWs in both developed and developing countries are comparable.

We also found better compliance among doctors (35.1%) than other professional groups (31.1% for nurses, 10.7% for healthcare assistants). This is contrary to evidence from other countries where doctors were less likely to comply with hand hygiene guidelines when compared to other professional groups (Alshammari et al., 2018; Erasmus et al., 2010; Le et al., 2019). Doctors' better compliance may be attributed to differences in training between doctors and other professional groups (Holmen et al., 2016; Sahay et al., 2010). In terms of seniority level, consultants were more compliant than residents, medical officers, and house officers; chief nursing officers were more compliant than assistant chief and senior nursing officers in our study. Our previous review established that the higher the level of a HCW in the profession, the more likely they have better hand hygiene practices (Ataiyero et al., 2019). This is consistent with the findings from other studies (Aiello et al., 2009; Cantrell et al., 2009).

Compliance rates were better before performing aseptic procedures (66.7%) and when there is exposure to body fluids (78.5%) in this study. This finding has been previously reported in both developing (Alsubaie et al., 2013; Ataiyero et al., 2019) and developed countries (Erasmus et al., 2010; Randle et al., 2010), where HCWs increase compliance when there is high risk for infection, before aseptic procedures or when hands are visibly dirty. Consequently, we found lower compliance rates in other types of patient contact – before patient contact, after patient contact and after touching patient's surroundings. Similar findings have been documented elsewhere (Chavali et al., 2014; Randle et al., 2014). The low compliance before patient contact might be explained by the strong belief of some HCWs that hand hygiene practices are first to protect themselves before the patients (Chavali et al., 2014). A study found significantly lower hand hygiene compliance before touching urinary catheter than after (Biswal et al., 2013). This behaviour might suggest that it is more important to control cross-contamination from patient to patient rather than preventing it which might have been informed by emphasis on infection control rather than prevention (Jenner et al., 2006). Poor hand hygiene compliance after touching patient's surroundings might be due to poor risk perception for touching patient surfaces (Fitzgerald et al., 2013). It is likely HCWs believe person-to-person contact are significantly more likely to transmit pathogens than surface-to-person contact (McLaughlin et al., 2013). HCWs need to be aware that cross contamination can occur at seemingly low risk activities (Fitzgerald et al., 2013).

Higher compliance in morning shifts in this study is contrary to findings from previous studies where higher compliance are observed in later shifts (Alsubaie et al., 2013). However, this may be connected to performing more clinical procedures in the morning than later shifts. While Randle et al. (2010) argued that hand hygiene compliance is independent of the time of the day, some authors stated that HCWs are likely to practise hand hygiene more in evening shifts than the morning shifts (Duggan et al., 2008).

Strengths and Limitations

To the best of our knowledge, this study is the first to assess the hand hygiene compliance rate of surgical HCWs in Nigeria. This is a contribution to knowledge bearing in mind the impact of SSI in SSA countries. However, we identified some limitations. Overt observations could have triggered Hawthorne effect whereby participants change their behaviours because of their awareness of being observed (McCambridge et al., 2014). The study was conducted in short duration although a range of participants, performing different clinical procedures, during peak periods in morning and afternoon shifts wards were observed. Though we observed a good number of hand hygiene opportunities, this study was conducted in just one hospital with only two surgical wards hence generalisation is limited.

Recommendations

We acknowledge that this study has not investigated factors associated with hand hygiene compliance in the study setting. However, based on observations made, we suggest improvements in provision of hand hygiene facilities/resources, encouragement and support from senior staff, on-the-job induction/training,

and more illustrative posters and information around the ward on the importance and steps involved in hand hygiene practices.

This study was conducted in a private teaching hospital where more hand hygiene resources are expected to be available. It would be interesting to assess the hand hygiene compliance rates in surgical wards of public hospitals. We recommend a multicentre study, using electronic monitoring systems for future observational studies to accurately measure the hand hygiene compliance rates. We also suggest the design of regular hand hygiene audit programme, to be carried out by the Infection Prevention and Control staff for adequate monitoring of hand hygiene compliance rates.

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Declaration of Conflicting Interests

None declared.

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