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Research

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Compliance and Microbial Findings Among Intensive Care Unit (ICU) Health Care Workers in a Tertiary Hospital in Sudan: Pre- and Post-Intervention Study

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ABSTRACT

Background: Health care associated infections are the major cause of morbidity, mortality and increased economic burden throughout the world. This study assessed the impact of hand hygiene training program on microbiological finding and compliance of the health care workers in the adult intensive care unit (ICU) in a tertiary hospital in Khartoum, Sudan.
Methods: A pre- and post-intervention study design in which a multi-modal strategy for hand hygiene was implemented.
Results: There was highly significant compliance towards hand hygiene among the health care workers in adult ICU with overall difference in compliance of 47.2%. As well the positive growth of the samples taken from fingertips was reduced from 88.2% to 32.4% post-intervention.
Conclusion: The study concluded that multi-modal interventions strategies had a good impact in improving compliance and reduction of fingertips microbiological growth among the health care workers in adult ICU.

KEYWORDS: Compliance; Microbial findings; ICU health care workers; Tertiary hospital pre- and post-intervention study.

ABBREVIATIONS: ICU: Intensive Care Unit; HCAIs: Hospital acquired infections; HCWs: Health Care Workers; WHO: World Health Organization; SMSB: Sudan Medical Specialization Board.

INTRODUCTION

Hospital acquired infections (HCAIs) are any infections occurring in a hospital or any health care facility within first 48 hours of admission other than initial presenting illness, or within 30 days after patient has been discharge home.[1] HCAIs can be occurred locally or systematically as a result of invasion of infectious organism or due to its toxin which are not present at the time of admission.[2] The infectious organisms may originate from patient own flora (endogenous) or infection through contaminated hands of staff (cross-infection) or infection through contaminated instruments and environment (exogenous). The major cause of transmission of infectious organisms is because of lack of personal hygiene among the health care workers, especially improper hand washing, disposal of sharp instruments and use of personal protective devices, such as gloves, facemasks and goggles.[3-4] The most important sites for HCAIs infections are: urinary tract, lower respiratory tract, surgical site, blood stream and other sites like skin and soft tissues.[5] Age of patient, severity of underlying disease, immune status, duration of hospitalization, virulence of the organism, resistant to antimicrobial agents, invasive interventions and devices, lack of adherence to infection control standard precautions among health care workers and improper ventilation and cleaning in health care facilities are the major risk factors.[6] HCAIs cause significant concern regarding the safety and health care quality worldwide.[7]

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HCAIs have been identified as a fundamental priority and were selected as the topic of the first global patient safety challenge. Hand hygiene is one of the 5 key initiatives set out by the World Alliance for Patient Safety's. Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands while maintaining the good skin integrity resulting from a hand care program. Hand hygiene includes surgical hand antisepsis, hand washing, antiseptic hand wash and alcohol-based hand rub.[7] This study aimed to assess the impact of hand hygiene training program on hand hygiene compliance and microbiological findings among health care workers in an adult ICU in a tertiary hospital.

METHODOLOGY

Study Design

A pre- and post-intervention study design in which a multi-modal strategy for hand hygiene was implemented during 2012-2013.

Study Setting

The study was conducted in a tertiary hospital in Khartoum, Sudan. It is a central hospital, which was established to provide tertiary care. The ICU unit consists of three rooms with 10 ICU beds, and 34 health care workers. The unit is so busy throughout the year.

Study Population and Sample Size

All health care workers (HCWs) at adult ICU unit in the hospital were included in the study. They are 34 HCWs: 3 consultants, 14 general practitioners, 10 sisters, 4 medical assistants and 3 cleaners.

Intervention

The study was conducted into 3 phases: Pre-intervention, intervention and post-intervention.

Pre-Intervention Survey

All health care personnel who came in contact with patients in the study area were observed for their hand hygiene compliance unobtrusively by the observer during the day-time shift, which was the busiest shift. The observer was the infection control coordinator in the hospital, who had been trained for one week before the observation phase. The observation checklist was adopted from the World Health Organization (WHO) standard observation checklist "My five moments for hand hygiene". The observation continued for 4 weeks. The target patient who was selected randomly was observed continuously for the entire 15 minutes period. The category of the health care personnel and the compliance for each hand hygiene opportunity that presented were noted by the observer during the observations. Compliance was measured by dividing the number of positive actions (the numerator) by the number of indications (the denominator).

According to WHO the positive actions are hand washing and alcohol hand rub in the observation checklist while gloves and no action are considered as negative actions. So Compliance (%)=Performed positive actions X100/opportunity.

Assessment of microbiological finding: The culture medium was prepared, sterilized, labelled, and kept properly for each phase pre- post-intervention, the HCWs were asked to press their fingertips gently for 5 seconds into the blood agar plates after performing hand hygiene according to their usual way. The inoculated media were incubated at the optimum temperature (35-37 °C) for 24 hours, then reading of the culture medium for the presence of growth, the number of colonies in the culture media, gram staining was done to identify the growth.

Intervention: It was a multi-modal intervention including training which was conducted in the hospital, using portable multimedia covering the following: lecture covering: definition of HCAIs, worldwide burden of HCAIs, impact of HCAIs, most frequent site and risk factors, general risk factors, aetiology and route of transmission, diagnosis and treatment, prevention and control of HCAIs. Lecture on hand hygiene covering: introduction and importance of hand hygiene, definitions, hand transmission, indication of hand hygiene according to my five moment, hand hygiene technique, steps of hand washing and hand rubbing, missed area during hand rubbing and hand washing, steps of surgical hand hygiene, gloving, efficacy of hand hygiene preparations in killing bacteria, self-reported factors for poor adherence with hand hygiene and figures on organisms present on patient skin or the immediate environment, organism transfer from patient to HCWs' hands, organism survival on HCWs' hands, incorrect hand cleaning and failure to cleanse hands results in between-patient cross-transmission. Hand hygiene video show covering the following: overview of HCAIs, indication of hand hygiene, hand hygiene technique, equipment, appropriate use of gloves, policies on jewellery, finger nail hygiene, selected complication and religious issues.[8]

The visual reminders: posters on indication of hand hygiene, steps of hand washing and steps of alcohol hand rub. Verbal reminder was conducted by infection control sister in her regular visits to the study area also were conducted by infection control coordinator.

Post-intervention: Same as in the phase I except that the health care workers were asked to press their fingertips after performing hand hygiene according to training recommendations.

DATA COLLECTION AND ANALYSIS

The data was collected and analysed using SPSS version 20. The 2 main outcomes are: compliance with hand hygiene standards and microbial growth.

ETHICAL CLEARANCE

The ethical approval was obtained from Sudan Medical Special-

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ization Board (SMSB). Permission from the hospital director and from the head of ICU department through official letter from the head of the quality general directorate was obtained. Verbal consent was taken from HCWs and patients after through explanation of the aim and the methodology of the study.

RESULTS

In the study the majority of the population were female (58.82%) and of them 70.59% within the age groups 30-39 years. Most of them were medical doctors (Table 1). Compliance towards hand hygiene was significantly increased post-intervention (Table 2) as well microbiological growth was significantly reduced (Table 3). Before the intervention, the growth scale was mainly maximum and moderate growth. This was shifted after intervention to no growth or little growth (Table 4).

DISCUSSION

In this study, a multi-modal interventional strategy was used, with intensive educational sessions based on "my five moments of hand hygiene" as well as displaying posters, providing verbal reminders, video show, training role model and ensuring easy and ample supply of hand hygiene products in the ICU unit, with these strategies there was significant improvement in the compliance and significant reduction in finger tip bacterial growth after intervention. A review of literature suggests that single intervention programs produce less success in leaving a lasting impact on hand hygiene compliance.[9,10]

Multimodal interventional strategies, which include audits, performance feedbacks, education, memos, posters and films, ensuring easy availability and supply of alcohol-based hand rubs and strategies aiming to improve accessibility to hand hygiene agents, have been more successful.[11-15]

In a study by Lam et al,[13] the hand hygiene compliance before and after the implementation of a multimodal implementation program in a neonatal ICU concluded that an effective education program could improve hand hygiene compliance and reduce the rate of health care associated infections. In another study conducted in five adult ICUs, an intervention strategy

Socio-demographic characteristic	Frequency (n)	%
Age (years)		
20-30	5	14.71%
30-39	24	70.59%
40-49	4	11.76%
50>	1	2.94%
Gender		
Male	14	41.18%
Female	20	58.82%
Occupation		
Doctors	17	50.00%
Sisters	10	29.41%
Medical assistants	4	11.76%
Cleaners	3	8.83%

Table 1: Socio-demographic characteristics of the respondents (n=34).

Category	Before intervention	After intervention	Difference	*p*-value
Doctors (n=17)	3 (17.6%)	13 (76.4%)	58.8	<0.001
Sisters (n=10)	3 (30.0%)	7 (70.0%)	40.0%	0.178
Medical assistants (n=4)	1 (25.0%)	3 (75.0%)	25.0%	0.485
Cleaners(n=3)	1 (33.3%)	1 (33.3%)	0.00%	0.999
Overall compliance (n=34)	9 (26.4%)	25 (73.5%)	47.1%	<0.001

Table 2: HCWs compliance pre-and post- intervention (n=34).

Category	Freq. (%) of positive growth pre-intervention	Freq. (%) of positive growth post-intervention	Difference	*p*-value
Doctors (n=17)	15 (88.2%)	6 (35.3%)	52.9%	0.002
Sisters (n=10)	9 (90.0%)	3 (30.0%)	60.0%	0.19
Medical assistants (4)	3 (75.0%)	2 (50.0%)	25.0%	0.999
Cleaners (3)	3 (100.0%)	0 (0%)	100.0%	1.000
Total	30 (88.2%)	11 (32.4%)	55.8%	<0.001

Table 3: Microbiological finding pre-and post- intervention (n=34).

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Category	Scaling of growth	Pre-intervention	Post-intervention
Doctors	No growth	11.1%	66.6%
	Little growth	5.6%	22.2%
	Some growth	11.1%	5.6%
	Moderate growth	27.8%	5.6%
	Maximum growth	44.4%	0.0%
Sisters	No growth	10%	60%
	Little growth	30%	40%
	Some growth	40%	0%
	Moderate growth	20%	0%
	Maximum growth	0%	0%
Medical assistants	No growth	25.0%	50%
	Little growth	0%	50%
	Some growth	25.0%	0%
	Moderate growth	25.0%	0%
	Maximum growth	25.0%	0%
Cleaners	No growth	0%	100%
	Little growth	0%	0%
	Some growth	0%	0%
	Moderate growth	50%	0%
	Maximum growth	50%	0%

Table 4: Microbiological growth scaling pre- and post- intervention.

consisting of educational program and improving standards of catheter care resulted in a significant decrease in catheter-related blood stream infection rates, with significant increase in hand hygiene compliance.[16]

In conclusion a multi-modal interventions strategy such as the one that has been conducted revealed a good impact in improving compliance of health care workers and reduction of fingertips microbiological growth among the study groups.

The study recommends to hospital authority to continue the intervention at regular intervals. Avenues of future research would include conducting further studies on hand hygiene to demonstrate reduction in HCAIs, as well as reduced morbidity and mortality in our study setting. Training and feedback sessions on hand hygiene especially for new staff and reminders sessions for the old staff should be maintained.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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