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RESEARCH ARTICLE

NOSOCOMIAL INFECTIONS PREVENTED BY ANTISEPTIC HAND WASHING AND EDUCATION

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ABSTRACT

Nosocomial infections are the hospital acquired infections caused by the pathogenic microorganisms such as bacteria, fungi, viruses and parasites. The purpose of this study was to demonstrate the importance of the use of antiseptics in preventing and controlling the nosocomial infections. Hand washing is the most important factor in controlling the transmission of nosocomial infections by bacteria, viruses and pathogens. Most of the health care professionals do not wash their hands before and after contact with the patients. This study was performed to improve the quality of life by providing knowledge about the control of nosocomial infections. Tertiary health care facilities were examined and it was found that there was a deficiency in the knowledge regarding the hand washing and its role in the prevention of nosocomial infections.

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INTRODUCTION

The most important factor in controlling the nosocomial infections is hand hygiene (Semmelweis, 1988; Rotter, 1997). In spite of the developments in infection control results are not constantly achieved in daily life (Jarvis, 1994; Rotter, 1998). The adherence of the medical professionals to hand washing and sanitization is considerably less than the prescribed values. (Jarvis, 1994; Donowitz, 1987; Simmons *et al*., 1990; Tibballs, 1996; Lowbury *et al*., 1964; Rotter and Koller, 1991; Teare *et al*., 2001). Professional education, speeches, lectures and pamphlets have been associated with transitory advancement (Jarvis, 1994; Simmons *et al*., 1990; Lund *et al*., 1994; Albert and Condie, 1981; Graham, 1990; Quraishi *et al*., 1984). Most of the hospital infections are caused by the transient flora which can be easily removed by the hand washing (Albert and Condie, 1981; Graham, 1990). Hand washing and hygiene tremendously decreases the risk of communication of nosocomial infections. By regularly cleaning the hands health care workers (HCWs) decreases the risk of communicating nosocomial infections between patients. In view of this it is now extensively believed that hospital acquired infections can be significantly decreased by hand washing and hygiene (Quraishi *et al*., 1984). Health care experts have strongly encouraged the hand hygiene as the excellent measure in controlling the transmission of infectious diseases.

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Participants, methods and study Plan

Setting

Hand washing and hygiene study was conducted in tertiary care teaching facility from august 2016 to December 2016 in Medical ICU and Surgical ICU.

Study Plan

Baseline data was obtained without any interference in the control period. Study plan was observational and prospective. It was followed by an education intervention schemeon sanitization and hand washing. Due to the more number of patients and extended stay of the patients in Medical ICU there was increased risk of nosocomial infections in Medical ICU. So the Medical ICU was first selected for the institution of isopropyl alcohol built antiseptic. In addition to the already present soap dispensers,isopropyl alcohol based antiseptic was also delivered in the soap machines.

Hand washing Guidelines and Materials

The APIC guidelines endorse the use of three to five mL of soap, chloroxylenol solution, or the isopropyl alcohol antiseptic solution for the minimum of ten to fifteen seconds (Simmons *et al*., 1990). In 1ststage of research two hand

washing disinfectants were used in the Medical ward ICU and Surgical ward ICU. The first disinfectant used was soap and the second was chloroxylenol solution. The third disinfectant used was isopropyl alcohol solution.

Hand washing Prospects

All the high risk procedures which involved contact with mucous membranes, secretions, excretions and damaged skin required thorough hand wash before and after the contact. They also included the procedures like changing or opening the vascular and intravenous lines. These events were listed and documented. One incident was considered complete after either touching a different site on the same patient or different patient or by touching any other surface. Hand wash after each incident was also calculated. Multifaceted procedures were counted as 1 incident, if it was not affected by any other procedure.

Documentation of compliance

One of the colleagues observed the hand washing habits of nurses and medical staff in medical ICU and Surgical ICU. The nurses and the medical staff were not informed about the plan of observing colleague during the control period. An assessment of experimental incidents was performed by concurrent recording of incidents by another person on 4instances during the trial and outcomes were matched. The real number of hand washing and total number of possible hand washing opportunities were recorded during two hours observation periods at random intervals all over the day from 8 ‘o clock in the morning to 11‘o clock at night for 2 randomized ICU beds (25 minutes for every bed). For each study constituent observational time was fixed to fifteen hours. In addition to the direct observation, the number of soap, Chloroxylenol, and isopropyl alcohol antiseptic machine uses was calculated. Calculations were performed in Medical ward ICU and Surgical ward ICU. In order to regulate the number of patients in both units during the study periods, the number of machine uses was divided by the number of patient days.

Awareness, Teaching, motivation and intervention

Eight seminars and lectures were conducted in Medical ICU and Surgical ICU. The nurses and the associated staff was included in the seminars and lectures. The effectiveness of hand washing was demonstrated. All the medical are professionals were motivated to use hand sanitizer regularly prior to interaction with the patient and after interaction with the patients.

Patient and attendants education awareness

Different pamphlets were circulated among the patients and the attendants demonstrating the importance of regular hand washing in controlling the infectious and nosocomial diseases.

Statistical Analysis

The prime measure of the effectiveness of education, awareness, intervention and the isopropyl alcohol built hand antiseptic was hand washing compliance, calculated by dividing the number of hand washing incidents by the number of possible hand washing opportunities. These values were compared and assessed using Fishers exact test, X2 statistics and t test. All tests of statistical significance were 2 sided, and α level was set at .05.

RESULTS

Observational data

Health care workers hand washing compliance was observed for over 100 hours with a total of 1450 possible hand washing chances. In the Medical intensive care units most of the patients were on endotracheal intubation and respiratory care was generally observed in those patients. In MICU respiratory tract incidents were (34%) followed by vascular line incidents (32%) urinary tract 14% and others 20%.Whereas in surgical ICU most of the patients were associated with vascular line incidents 48%, respiratory care 22%, urinary tract 13% and others 17 %. Before any interference nurses and other medical staff washed their hand prior to interaction with the patient and after interaction with the patient at rates of11 % (prior to patient interaction) and 27% (after the interaction with patient) in Medical ICU whereas in surgical ICU 3 % (prior to patient interaction) and 12% (after interaction with patient) (table 1).After professional education regarding the hand washing and hygiene the hand washing compliance was 18% (priorto interaction with patient) and 32% (after interaction with patient) and in surgical ICU 6% (prior to interaction with patient) and 16% (after the interaction with patient).

Table 1. Result of Education awareness and intervention scheme on hand washing

		Directly observed hand washing compliance, No of hand washings/No of Possible opportunities		
Category of ICU	Opportunity	Baseline Duration	After education awareness and intervention	P value
Medical ICU	Prior to patient interaction	11%	18%	0.19
	After patient Interaction	27%	32%	0.503
Surgical ICU	Prior to patient Interaction	3%	6%	0.27
	After patient Interaction	12%	16%	0.711

When the isopropyl alcohol containing hand antiseptic was introduced there was increase in hand washing rates. The rate of hand washing with isopropyl alcohol based disinfectant was 21 % prior to interaction with patient and 44 %after the interaction with patient (Figure 1).

Soap, Chloroxylenol and Isopropyl Alcohol-Based Disinfectant agent consumption data

Total of 284 438 dispenser consumptions were noted in Medical ICU and Surgical ICU (Table 2). Before any interference nurses and staff use was 125 with soap and 18 with Chloroxylenol in the Medical ICU. In Surgical ICUChloroxylenol was not used, the rate of hand washing was 105 with soap. After the professional education and intervention soap use was increased up to 140 and Chloroxylenol use was increased up to27 in Medical ICU. Whereas in Surgical ICU a decrease was noted with 88 soap consumptions. When the isopropyl alcohol based antiseptic

was introduced there was increase in the hand washing compliance. The total count of soap, Chloroxylenol, and isopropyl alcohol-based antiseptic solution did not increase despite a directly observed increase in hand washing compliance.

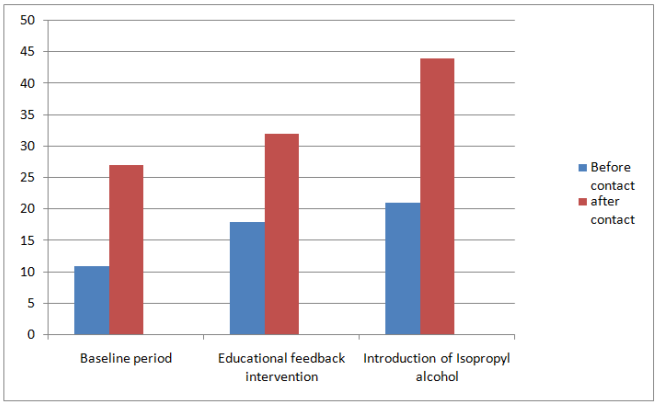

Figure 1. Effect of educational feedback intervention and iso propyl alcohol on hand washing compliance in the intensive care unit

Table 2. Result of education, awareness and intervention scheme on the rates of dispenser uses per day

		No of dispenser uses /Patient day		
Type of Unit	Detergents	Baseline	After education, awarenessand intervention scheme	P*
Medical Intensive Care unit	Soap	125	140	0.42
	Chloroxylenol	18	27	.07
Surgical Intensive care unit	Soap	105	88	0.36

DISCUSSION

Most of the studies have demonstrated that the hand washing compliance is considerably low in medical health professionals (Zimakoff *et al*., 1993; LeClair *et al*., 1987) especially in the ICU (Conly *et al*., 1989; Bauer *et al*., 1990; McGuckin *et al*., 1997; McGuckin *et al*., 1997; Voss AWidmer *et al*., 1997). There is increased documentation supporting the role of hand washing in controlling the nosocomial and infectious diseases (Pittet *et al*., 1999; Donowitz, 1987). The increased risk of nosocomial infections makes the hand washing mandatory for health care professionals (Larson *et al*., 1997). The approach used by McGuckin *et al* was to determine the worth and price benefits of conjoining the distribution of pamphlets with a brief verbal introduction to patients (McGuckin *et al*., 1997). It resulted in considerably increased soap use rates, but in spite of this hand washing compliance was not seen. There is another fear that patient awareness program can adversely affect patient-health professional association. There is also a concern of time shortage among the nursing staff for washing hands. Voss and Widmer (1997) have recently addressed this issue. It was noticed that the time required for the use of soap was five to six times greater than the time required for the isopropyl alcohol built antiseptic solution. By offering a fast and safe disinfectant hand washing rates can be increased tremendously. Existing studies have demonstrated that hand washing compliance ranges from 14 % to 48% (Pittet DMourouga and PPerneger, 1999). But the previous studies have only shown the hand washing after contact with the patient. In our study we have calculated hand washing rates and its effects in controlling infectious diseases both before and after contact with the patient. At baseline tremendously low rates of 3% to 11% were noticed before interaction with the patient and 12% to 27% after interaction with the patient. However in our most consistent group, the hand washing rates were increased merely to 21% before patient interaction and 44% after patient interaction. Even if these rates are greater than the formerly described rates, there are still chances of improving approaches for hand washing. There are also several drawbacks. Long term follow up of patients cannot be done by this method. Studies have demonstrated that interferences and interventions have partial effect on the behavior of health care professionals (Donowitz, 1987; Larson *et al*., 1997). The second drawback is that the repeated feedback and long term interventions cannot be done by this method.

Conclusion

In summary, use of the easily available isopropyl alcohol, Chloroxylenol and soap markedly increased the rate of hand washing and thus helped in controlling the nosocomial infections. In addition education awareness and intervention also facilitated in preventing the transmission of infectious diseases and motivating the health care professionals to wash hands regularly.

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