

Original Research Article

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## Role of Hand Hygiene in Reducing Transient Flora on the Hands of Health Care Workers (HCW) at a Tertiary Health Care Centre in Ballari, India

Mariraj Jeer<sup>1</sup>, U. Shruthi<sup>2\*</sup>, S. Krishna<sup>3</sup> and Swati Sagarika<sup>4</sup>

Department of Microbiology, Vijayanagar Institute of Medical Sciences,  
Ballari, Karnataka – 583104, India

\*Corresponding author

### ABSTRACT

#### Keywords

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Healthcare associated infections (HAI) are an important cause of morbidity and mortality among hospitalised patients worldwide. Hand hygiene is now considered as one of the most effective intervention to control transmission of infections in hospital. This study was done to determine the role of hand hygiene using alcohol based hand rub in reducing the transient flora in the hands of HCW and to study the awareness regarding hand hygiene among HCW. A total of 100 HCW from different spectrum were subjected to questionnaire to determine their knowledge on hand hygiene, following which cultures from impressions of all the 10 fingertips were taken on blood agar plates before and after using 70% alcohol based hand-rub. Identification of organism was done using standard methods and antimicrobial susceptibility testing was done for the potential pathogens. Out of 100 HCW 74% of them had significant bacterial count before the use of sanitizer and there was >95% reduction in colony count after hand hygiene procedure was followed. 28% were MRSA, 14% were ESBL producers. This study emphasized the importance of hand hygiene amongst the HCW and how umpteen nosocomial infections could be prevented effectively with 30 seconds procedure of hand hygiene.

### Introduction

Healthcare associated infections (HAI) has increased the morbidity and mortality of the patients and are responsible for increase in the cost of treatment, prolong the hospital stay, and increase the cost of healthcare, all over the world. HAIs are also responsible for increase in transmission of multidrug-resistant organisms (MDRO) in a healthcare organisation (Kapil, *et al.*, 2015).

The magnitude of the problem of HAI is particularly relevant in settings where basic

infection control measures are virtually non-existent. (WHO guidelines on hand hygiene in healthcare, 2009)

Transient flora, which colonizes the superficial layers of the skin, is more amenable to removal by routine hand hygiene. They are often acquired by HCW during direct contact with patients or contaminated environmental surfaces adjacent to the patients and are the organisms most frequently associated with

HAIs. The practice of hand hygiene by HCW through the use of either soap and water or alcohol based sanitizer is widely considered to be the most important and effective means of preventing HAIs. Various studies have established that alcohols effectively reduce the bacterial count on the hands (WHO guidelines on hand hygiene in healthcare, 2009).

Multimodal interventions are the most suitable strategy to determine behavioural change leading to improved hand hygiene compliance and reduction in HAI rates. Introduction of alcohol based hand rubs and continuous educational programmes are key factors to overcome infrastructure barriers and to build solid knowledge improvement. (Allegranzi, *et al.*, 2009)

In developing countries like India more emphasis should be given on such practices like hand hygiene in which infection control can be done to overpower the infections and to improvise the medical standards and health conditions in a very economical way (Mani, *et al.*, 2010).

This study was done to determine the role of hand hygiene using alcohol based hand rub in reducing the transient flora in the hands of HCW and to study the awareness regarding hand hygiene among the HCW.

### **Materials and Methods**

A total of 100 HCW of different credentials were included in the study. HCW included doctors, nurses, medical students, laboratory technicians and hospital attendants with 20 subjects in each group. These subjects were considered for the study while working in the casualty, ICU and central laboratory.

### **Questionnaire**

Each subject was instructed to answer the

questionnaire (Kapil, *et al.*, 2015; Questionnaire on hand hygiene and healthcare associated infections, WHO; Nair, *et al.*, 2014) to assess the knowledge and practice of hand hygiene. After this every study subject was demonstrated the steps of hand hygiene using alcohol-based hand rub (Saniscrub E: chlorhexidine gluconate solution BP 2.5% v/v, equivalent to chlorhexidine gluconate 0.5% w/v, Ethanol IP 70% v/v)

The alcohol-based hand rub was used for 30 seconds. (WHO guidelines on hand hygiene in healthcare, 2009)

### **Bacterial Culture**

The cultures from the hands of all the participants were taken touching all the 10 fingertips on the blood agar plates before and after hand hygiene. After incubation overnight the manual colony count was done to sum up all the colonies. Those showing >100 colonies were not counted further (Kapil, *et al.*, 2015)

Identification of the organism was done using standard methods and antimicrobial susceptibility testing was done for potential pathogens which included *Staphylococcus aureus*, *Enterobacteriaceae* and *Acinetobacter* spp.

### **Results and Discussion**

#### **Doctors**

10 doctors were posted in casualty and 10 doctors were posted in ICU. All of them were aware about hand hygiene through CME, community medicine or microbiology classes. Only 8 doctors practised hand hygiene before patient care while all of them practised it after patient care. (Table-1)

### **Nurses**

5 nurses were posted in casualty, 5 were posted in injection room and 10 were posted in ICU. All of them were aware about hand hygiene procedure through microbiology classes and awareness posters. Only 5 of them practised hand hygiene before patient care and 14 of them practised it after patient care. (Table-1)

### **Medical Students**

They were posted in medical and surgical wards. All of them were aware of hand hygiene through classes. Only 2 of them practised hand hygiene before patient care while hand hygiene was followed by all after patient care (Table-1).

### **Lab Technicians**

They were posted in microbiology, pathology, biochemistry and sample collection unit. 15 of them were aware of hand hygiene significance and practise through the training. None of them practised hand hygiene before any procedure but 7 of them strictly followed hand hygiene practices after the procedures (Table-1).

### **Hospital Attendants**

They were posted in casualty, central lab

and ICU. Only 3 of them were aware about hand hygiene but could not trace the source of awareness. The practise of hand hygiene amongst this group was very low. None of them practised hand hygiene before patient care and only 3 of them followed it after patient care. (Table-1)

### **Awareness**

78% of the study subjects were aware of hand hygiene significance while it was strictly followed by only 15% of the study subjects. Limitations for the practise of hand hygiene were due to lack of time, lack of knowledge regarding the role of hand hygiene in patient care and increased work load.

### **Bacterial Counts**

37% of the study subjects had colony counts <100 and 63% of them had colony counts > 100 before the hand hygiene procedure. There was >95% reduction in the colony count after the use of alcohol based hand rub in all the HCW except in the Hospital attendants group in which there was only 80 – 85% reduction in colony count after the use of alcohol based hand rub.(Table-2 and Fig-1)

**Table.1**

<b>Practice of Hand hygiene</b>	<b>Before patient care (20)</b>	<b>After patient care (20)</b>
Doctors	8	20
Nurse	5	14
Medical students	2	20
Lab technicians	0	7
Hospital attendants	0	3

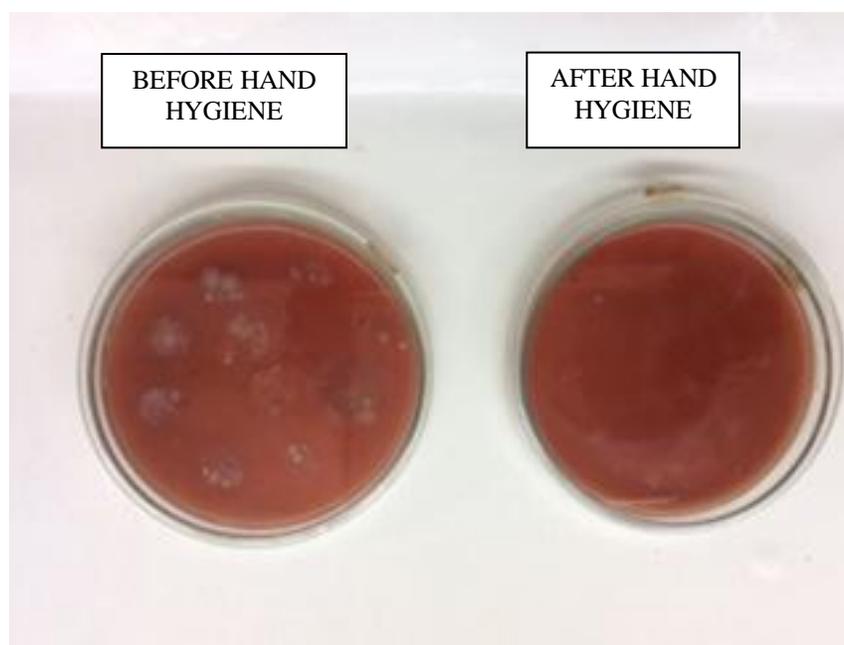
**Table.2**

HCW	< 100 Colonies (%) Before Hand Hygiene	>100 Colonies(%) Before Hand Hygiene
Doctors	65	35
Nurse	45	55
Medical students	25	75
Lab technicians	30	70
Hospital attendants	20	80
% Reduction In Colony Count After Hand Hygiene		
Doctors	>95%	>95%
Nurse	>95%	>95%
Medical students	>95%	>95%
Lab technicians	>95%	>95%
Hospital attendants	80-85%	80-85%

**Table.3**

Pathogens Isolated	Percentage
<i>Staphylococcus aureus</i>	37
<i>Klebsiella spp.</i>	15
<i>E.coli</i>	3
<i>Pseudomonas spp.</i>	2
<i>Acinetobacter spp</i>	2

**Fig.1**



The pathogens isolated from the hands of HCW were *Staphylococcus aureus*, *Klebsiella spp*, *Escherichia coli*, *Pseudomonas spp* and *Acinetobacter spp*. There were 14 MRSA and 4 ESBL producers amongst these isolates. The growth of pathogens was absent after the use alcohol based hand rub (Table-3).

Hands play not only the role of microbial vector, but they may also be an important source of undesired microorganisms multiplying in and being shed from the skin. The objective of hygienic hand rub is to reduce the release of transient pathogens with maximum efficacy and speed, so that hands can be rendered safe after known or suspected contamination. (Hospital epidemiology and infection control, 4<sup>th</sup> ed)

In a study by Kapil *et al.* it was shown that there was 95-99% reduction in the bacterial load in all the HCW except in case of lab attendants where there was only 70-90% reduction and in case of sanitary attendants there was only 50% reduction in bacterial load after using alcohol based hand rub. The study also gave the evidence that CMEs and training programmes could be effective in strengthening the hand hygiene practice (Kapil, *et al.*, 2015).

In a study by Kampf *et al.* ethanol based hand gel was found to have a broad spectrum of bactericidal activity in only 15 seconds which included most common species causing nosocomial infections and the relevant emerging pathogens (Kampf, *et al.*, 2008).

In a study by KuKanich *et al.* it was demonstrated that hand hygiene performance by HCW in outpatient clinics could be improved through promoting the use of gel sanitizer and information posters. (Ku Kanich, *et al.*, 2013)

In a study by Pittet it was evident that compliance to hand hygiene practices should be multimodal and multidisciplinary approach (Pittet, 2001).

In our study it was observed that majority of the HCW were aware of hand hygiene but failed to practise it due to lack of time and increase workload. 59% of the HCW carried pathogens on their hands out of which 24% were MRSA and 7% were ESBL producers. These transient flora were effectively removed by following the correct steps of hand hygiene using alcohol based hand rub. There was >95% reduction in the bacterial load in all the health care workers except in case of hospital attendants wherein there was 80-85% reduction in bacterial count. This could be because of their lack of knowledge and training with respect to hand hygiene.

This study emphasizes the need for frequent educational programmes on hand hygiene to increase the awareness at all levels of health care and strengthen the supply and usage of alcohol based hand rub in the health care centres, thus effectively controlling the spread of many nosocomial infections.

To conclude hand hygiene is one of the most effective tools to reduce umpteen nosocomial infections. Alcohol based hand rub are effective and easy to use product that can be utilised to make the patient and the HCW interaction much safer. Frequent educational programmes and use of posters can increase the awareness amongst all the categories of HCW.

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