



## Screening of Health Care Workers of Intensive Care Units for Detection of Methicillin Resistant Staphylococcus Aureus Carrier State in Basaveshwara Teaching and General Hospital, Gulbarga

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### Abstract

**Introduction:** *Methicillin resistant Staphylococcus aureus is an important cause of nosocomial infection particularly in intensive care units.*

**Objectives:** *To know the prevalence of methicillin resistant staphylococcus aureus carriers state among health care workers of intensive care units of Basaveshwara Hospital, Gulbarga.*

**Materials and Methods:** *160 health care workers sampling was done from finger tips, nasal cavity and throat of the health care workers engaged in these areas. Specimens were inoculated onto glucose broth, blood agar plate & mannitol salt agar. The suspected colonies were subjected to standard testing procedure for identification of staphylococcus aureus(confirmed by coagulase test). All coagulase positive isolates were subjected for methicillin sensitivity on Muller Hilton agar using oxacillin discs.*

**Results:** *A total of 160 health care workers were screened. i.e. 160 swabs on finger tips and web spaces, 144 swabs from anterior nares and 60 swabs from throat were collected.*

*Of the 160 swabs from finger tips 88(55%) yielded Staphylococcus aureus, of which 26(16.25%) were methicillin resistant. Among 144 nasal swabs, staphylococcus aureus was isolated in 120(83.33%), from which 52(36.11%) yielded methicillin resistant staphylococcus. In 30 throat swabs, 24(40%) samples were positive for staphylococcus aureus and among them 2(3%) was methicillin resistant.*

**Conclusions:** *Our study revealed that health care workers were the potential colonizers of methicillin resistant Staphylococcus aureus. This study helped us to alert the authority to shift these workers to other areas and to advocate appropriate medication to eradicate their carrier state.*

**Keywords:** *Staphylococcus aureus, methicillin resistance, hospital acquired infection*

## Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most commonly identified antimicrobial-resistant pathogen in hospitals in many parts of the world<sup>[1]</sup>

Methicillin resistant *Staphylococcus aureus* is an important cause of nosocomial infections particularly in Intensive Care units.

The anterior nares are the main reservoir of MRSA, although other body sites are frequently colonised, such as the hands, skin, axillae, and intestinal tract<sup>[2,3]</sup>. Colonised individuals are generally asymptomatic.

Healthcare workers (HCWs) are likely to be important in the transmission of MRSA, but more frequently act as vectors, rather than being the main sources of MRSA transmission<sup>[3,4,5]</sup>. The most important mode of MRSA transmission is through contamination of the hand<sup>[6,7]</sup>.

Health care workers who are carriers may transmit the organism to another person through direct or indirect contact, usually through colonized hands and aerosolization following sneezing and coughing<sup>[7]</sup>.

About 25% of all the hospital acquired infections occur in ICU. ICUs accommodate the most seriously ill patients in a relatively confined environment. Increased duration of stay, increased number of indwelling devices, prolonged contact with health care workers is associated with increased risk.

So, screening and eradication of MRSA from the colonized HCWs from ICUs have been recognized and recommended as an important part of a comprehensive infection control policy for this organism.

**Our study is aimed** To know the prevalence of methicillin resistant staphylococcus aureus carriers state among health care workers of intensive care units of Basaveshwara Hospital, Gulbarga & to identify occupational groups and specialties in the healthcare services associated with a higher risk of MRSA exposure.

## Materials and Methods

**This study** was conducted between March 2015 and April 2015 in Basaveshwara Teaching and General hospital Gulbarga.

**Inclusion criteria:** All Health care workers who were involved in the management of critically ill patients (ICU doctors and staff) were included in the study.

**Exclusion criteria:** all Health care workers who were on antimicrobial drugs for any cause were excluded from the study.

A total of 160 Health care workers were screened after obtaining informed consent and approval by the institute ethics committee. Out of them all 160 swabs were collected from finger tips and web spaces of hand, 144 swabs from anterior nares, 60 swabs from throat were collected.

Specimens were collected from the anterior nares, throat, palms and web spaces (taken after at least 30 minutes of last hand wash) of health care workers by using premoistened (with saline) sterile cotton swabs.

Without any delay the swabs were inoculated on glucose broth, blood agar, milk agar, mannitol salt agar medium (selective medium for *Staphylococcus aureus*). After overnight incubation, suspected colonies were confirmed to be Staphylococci by standard Grams staining and Catalase test. Tube coagulase test was done to confirm the *Staphylococcus aureus* species.<sup>(8)</sup>

All coagulase positive isolates were subjected for Methicillin sensitivity on Muller Hilton agar, using 30 mcg cefoxitin disc by Kirby Bauer's disc diffusion method. Interpretive criteria (in mm) for cefoxitin disc diffusion test : sensitivity 22mm and resistant is 21mm.

## Results

A total of 160 health care workers were screened. i.e. 160 swabs on finger tips and web spaces, 144 swabs from anterior nares and 60 swabs from throat were collected. (Table 1)

Of the 160 swabs from finger tips 88(55%) yielded *Staphylococcus aureus*, of which 26(16.25%) were methicillin resistant. Among

144 nasal swabs, staphylococcus aureus was isolated in 120(83.33%), from which 52(36.11%) yielded methicillin resistant staphylococcus. In 30 throat swabs, 24(40%) samples were positive for staphylococcus aureus and among them 2(3%) was methicillin resistant. (Fig 1)

Among the Hand carriage rate, maximum carriage

was seen in Pediatric ICU with 10 MRSA positive (33.3%) in various health care workers. (Table 2) Nasal carrier state of MRSA was most common among all carriage rate, maximum accounting in PICU & SICU (50%). (Table 3)

Throat carriage was 14% of all the health care workers screened.(Table 4)

**TABLE 1 :** MRSA isolated from various carriage sites

	Total specimens	S.aureus isolated	MRSA isolated
Hand specimens	160	88	26
Nasal specimens	144	120	52
Throat specimen	60	24	2
	364	232	80

**TABLE-2:** Relation of healthcare workers screened, MRSA isolated with respect to critical care units by taking samples from finger tips and web spaces of hands

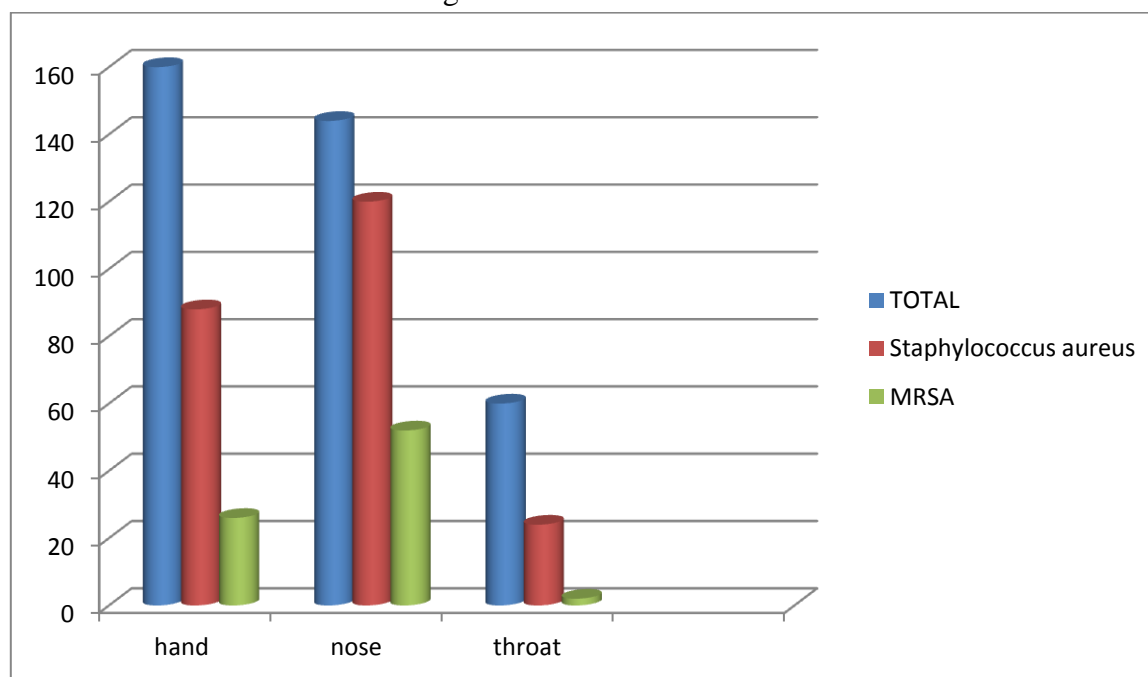
Critical care units	Hand carrier screened	Staphylococcus isolated	MRSA isolated
ICCU	30	10	2
MICU	40	22	6
SICU	20	14	4
PICU	30	22	10
NICU	30	14	4
CCU	10	6	0

**TABLE-3:** Relation of healthcare workers screened, MRSA isolated with respect to critical care units by taking samples from anterior nares.

Critical care units	Nasal carrier screened	Staphylococcus isolated	MRSA isolated
ICCU	30	24	6
MICU	34	30	12
SICU	20	18	10
PICU	28	24	14
NICU	26	22	8
CCU	6	2	2

**TABLE-4:** Relation of healthcare workers screened, MRSA isolated with respect to critical care units by taking samples from THROAT

Critical care units	Throat carrier screened	Staphylococcus isolated	MRSA isolated
ICCU	6	2	0
MICU	16	4	0
SICU	12	3	0
PICU	14	4	2
NICU	10	2	0
CCU	2	0	0

**Fig 1 :** MRSA isolated from various Carriage sites

### Discussion

Methicillin-resistant *Staphylococcus aureus* has during the last three decades, evolved as one of the most important causes of hospital infections worldwide. The data obtained from this study revealed that there were reservoirs or carriers of MRSA in healthcare workers. The commonest carrier site of MRSA among the health care workers is found to be nose (14.2%), followed by hands (7.1%) then by Throat (0.5%), indicating that health care workers were the potential colonisers of MRSA associate nosocomial infections.

In a study done by Werner C Albreich et al showed in 127 investigations, the average MRSA carriage rate among 318 screened health-care workers was 4.6%.<sup>(9)</sup>

The commonest site of MRSA carriage in the present study was found to be the anterior nares, which is similar to many reports. In a study of 403 carriers, the sensitivities of different sampling sites were 78.5% for nose alone, 85.6% for nose and throat and 98% when perineum was included.<sup>[10]</sup>

Saxena S from Delhi has reported 29.6% nasal carriage of *S. aureus* among the healthy individuals

in the community, while it was 44.4% among the healthcare workers which is similar to our study. Among the isolates from health care workers, 25% were MRSA<sup>[11]</sup> which is also similar compared to our study (24%).

Javid A Dar et al have reported that in nasal swabs of hospital workers and patients (n = 225) the frequency of MRSA isolates was 28.9% which again is higher compared to our study.<sup>[12]</sup>

Krishna.B.V et al from Karnataka Institute of Medical Sciences, Hubli, India have reported that 18.1% of the patients carried MRSA.<sup>[13]</sup>

In a study conducted in Mysore by Annu Theagrajan et al, Among 200 HCWs screened, 159 of them carried *Staphylococci* (Carriage rate-79%). Nasal carriage of MRSA (Methicillin resistant *Staphylococcus aureus*) was found in 19 (9.5%), while Skin carriage was found only in 7 (3.5%). This study has similar finding to our study.<sup>[14]</sup>

All these are studies of Health Care Workers at various hospitals. There are very few references for similar study among Health Care Workers across the globe. However many studies have been conducted on the carriage rate of *Staphylococcus* in patients in the community.

### Conclusion

This study has helped us to treat the carriers of *Staphylococcus aureus* in the critical care unit to prevent nosocomial infections in patients, which proves to be of great value in reducing patient morbidity and hospital stay of these patients. ICU onset MRSA infection can be reduced by the provision of isolation facilities and promotion of hand hygiene practice. Health care workers identified as a source of MRSA transmission should be treated with 2% topical Mupirocin ointment for 5 days. Moreover, the perception that compliance to infection control practice being an important safeguard of personal safety against infectious disease appears to be an overwhelming factor in the successful implementation of an infection control policy.

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