



Original Research Article

## Prevalence of Colonization of Methicillin Resistant *Staphylococcus Aureus* among Health Care Workers in a Tertiary Care Hospital of Nanded, Maharashtra

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### ABSTRACT

**Background & objectives-** *Staphylococcus aureus* has been reported as a major cause of community and hospital acquired infection. Methicillin resistant *Staphylococcus aureus* strains were initially described in 1961 in UK has emerged as one of the most important nosocomial pathogen. The organism has a differential ability to spread and cause outbreaks in hospitals. Health care workers play an important role in nosocomial infections as they are asymptomatic carriers for most of the pathogens. So, the current study was undertaken to know the colonization of Methicillin resistant *Staphylococcus aureus* among health care workers. Methods - The study was conducted over a period of 4 months, from September to December 2014. Total 300 health care workers from Operation Theater, wards and critical care units were screened for nasal and hand colonization by MRSA. Methicillin resistant was determined on Muller – Hinton agar (MHA) by Kirby Bauer disk diffusion method using Oxacillin 1ug disk, obtained from Hi-Media Laboratories Pvt. Ltd. The isolates were considered Methicillin resistant if the zone of inhibition was 10mm or less. Results - 20 (6.6%) HCW were found to be colonized by MRSA and 50% of these were carrying MRSA on both hands and anterior nares. Antibiotics sensitivity pattern of the MRSA shows 100% sensitivity to Vancomycin & 0% sensitivity to Ampicillin.

**Key words:** Methicillin resistant *Staphylococcus aureus*, Health care workers.

### INTRODUCTION

Methicillin resistant *Staphylococcus aureus* (MRSA), strains were initially described in 1961 in UK has emerged as one of the most important Nosocomial pathogen. [1,2] The organism has a differential ability to spread and cause outbreaks in hospitals. [3] Infections caused by *Staphylococcus aureus* used to respond to beta lactam and

related group of antibiotics. However, due to development of Methicillin resistance amongst *Staphylococcus aureus* isolates, treatment of these infections has become problematic. Indiscriminate use of multiple antibiotics, prolonged hospital stay, intravenous drug abuse, carriage of Methicillin resistant *Staphylococcus aureus* in nose and hands are few important risk

factors for MRSA acquisition.<sup>[4]</sup> Burns, Orthopaedics and intensive care units are such high risk units, where patients are on multiple antibiotics and have a long stay in hospital. Currently, the treatment options for MRSA infections are limited to very few and expensive drugs like Teicoplanin and Vancomycin. Infected and colonized patients provide the primary reservoir and transmission is mainly through hospital staff.<sup>[5]</sup> Colonised employees are generally asymptomatic, although they are a potential reservoir of infection acquired by patients.<sup>[6]</sup>

## MATERIALS AND METHODS

The study was conducted in department of microbiology, Dr. Shankarrao Chavan Government Medical College, Nanded Maharashtra over a period of 4 months from September to December 2014. 300 health care workers from operation theaters, surgical wards and intensive care units were screened for colonization of MRSA.<sup>[2]</sup> Ethical clearance was obtained from the institutional ethical research committee. Sterile cotton swabs, moistened with sterile normal saline were used to collect specimens from dorsum of hands and anterior nares which were transported in Robertsons cooked meat medium with 10% NaCl. Subcultures were done on Blood agar and Mannitol salt agar. *Staphylococcus aureus* was identified by Gram's stain, catalase, mannitol fermentation and coagulase test. Methicillin resistant was determined on Muller – Hinton agar (MHA) by Kirby Bauer disk diffusion method using Oxacillin 1ug disk, obtained from Hi-Media Laboratories Pvt. Ltd. The isolates were considered Methicillin resistant if the zone of inhibition was 10mm or less. Antibiotics sensitivity of the isolates was tested using disks of Ampicillin (10ug), Erythromycin (15ug), Gentamicin (10ug), Netilmicin (30ug), Amikacin (30ug), Cotrimoxazole

(25ug), Ciprofloxacin (5ug), Rifampicin (5ug) and Vancomycin (30ug).<sup>[7]</sup> Colonization was defined as MRSA positive culture from any mention site.

## OBSERVATIONS & RESULTS

Out of 300 HCW screened, *Staphylococcus aureus* was detected in 112 (37.3%) and MRSA was detected in 20 (6.6%) (Table 1). Of the 20 HCW with MRSA, 10 (50%) were carrying MRSA on both dorsum of hands and anterior nares, 6(30%) were only nasal carriers and 4(20%) were only hand carriers (Table 2). Antibiotics sensitivity pattern of the MRSA isolated from the HCW shows 100% sensitivity to Vancomycin and 0% to Ampicillin (Table 3).

**Table 1. Isolation of MRSA from Health care workers (HCW) n=300**

HCW in	Total no. screened	HCW with S. aureus No. (%)	HCW with MRSA No. (%)
Operation theater	096	50(52)	12(2.5)
Wards	112	34(30.3)	4(4.3)
Intensive care unit	092	28(30.4)	4(4.3)
TOTAL	300	112(37.3)	20(6.6)

**Table 2. Distributions of MRSA on various sites of HCW. (n=20)**

Sites of HCW	No. of MRSA	%
Dorsum of hand	4	20
Anterior nares	6	30
Both	10	50

**Table 3. Antibiotics sensitivity pattern of MRSA n=20**

Antimicrobial	Sensitive	%
Ampicillin	0	0
Cotrimoxazole	8	40
Ciprofloxacin	8	40
Erythromycin	10	50
Gentamicin	14	70
Amikacin	16	80
Netilmicin	18	90
Rifampicin	19	95
Vancomycin	20	100

## DISCUSSION

It is often been suggested that certain strains of *Staphylococcus aureus* have a special ability to colonise patients and staff and that certain MRSA strains are among these.<sup>[8]</sup> Many outbreaks of MRSA

infections in hospitals have been traced to hospital personnel. [9] We have assessed the prevalence of colonization of MRSA among HCW and thus the possibility of its spread in hospital.

In our study, the rate of colonization of *Staphylococcus aureus* among HCW was 37.3% (112/300) and the carriage of MRSA was 6.6% (20/300). Data reported in other studies over the world in tertiary care centers shows a similar incidence. [10-12] Multi drug resistance is a common feature of MRSA. [13,14] Among our isolates 100% shows sensitivity to Vancomycin, 95% Rifampicin, 90% Netilmicin, 80% to Amikacin, 70% to Gentamicin, 50% Erythromycin, 40% to Ciprofloxacin & 0% to Ampicillin. Prevention of MRSA infections merits discussion as once introduced in a hospital, MRSA are very difficult to eradicate. [15] After introduction within hospital, MRSA spreads rapidly by hands of medical personnel. Colonized employees of hospital such as asymptomatic nasal and hand carriers acting as reservoirs are important source of the spread of this organism. [9,10] Multiple, prolonged use of antibiotics and prolonged hospital stay are another important factors which make hospital an ideal place of transmission and perpetuation of MRSA. Whether the eradication of MRSA carrier state will lead to a decreased rate of MRSA infection has yet to be documented. [16] Local therapy with mupirocin ointment has been shown to eliminate MRSA nasal colonization in both patients and hospital personnel, but recolonisation often occur after therapy is discontinued. It is possible that long term intermittent therapy with mupirocin may be more effective in suppressing or eradicating MRSA colonization. Whether this would lead to increasing problems with mupirocin resistance, a phenomenon already described, is unknown. [17]

## CONCLUSION

Methicillin resistant *Staphylococcus aureus* have been responsible for many Nosocomial epidemic. Colonized employees of hospital such as asymptomatic nasal and hand carriers act as reservoirs for the spread of this organism within hospital. During a period of 4 months, 300 HCW were screened for nasal and hand colonization by MRSA. 6.6% (20) HCW were colonized by MRSA and 50% of these were carrying MRSA on both hands and anterior nares. Antibiotics sensitivity pattern of the MRSA isolated from the HCW shows 100% sensitivity to Vancomycin and 0% to Ampicillin. Whether the eradication of MRSA carrier state will lead to decreased rate of MRSA infection yet to be documented.

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