

Nasal and hand carriage of methicillin-resistant staphylococcus aureus and its antibiogram in healthcare workers

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Abstract


Background: *Staphylococcus aureus* has been reported as a major cause of community and hospital acquired infections. Asymptomatically colonized health care workers are the major sources of MRSA in the hospital environment and identified as links in the transmission of MRSA between patients. This study has been undertaken to detect carriage of methicillin-resistant *staphylococcus aureus* and its antibiogram in healthcare workers. **Material and Methods:** A total of 25 healthcare workers working in operation theatres who are at a greater risk for MRSA carriage were included in the present study. From each healthcare worker, two swabs, one from anterior nares and one from hands were collected. Samples were inoculated onto Mannitol Salt Agar plates and incubated at 35°C. The colonies suggestive of MRSA was confirmed as *Staphylococcus aureus* by tube coagulase and DNase test. Methicillin resistance was confirmed with cefoxitin susceptibility testing according to CLSI method. **Results:** Out of the 50 samples taken from health care workers 25 were anterior nares swabs and 25 were hand swabs. 16 (64%) anterior nares swabs and 6 (24%) hand swabs showed growth of *S. aureus* on mannitol salt agar. Out of 22 (44%) *S. aureus* isolates, 13 (26%) were found to be methicillin resistant. MRSA were detected more commonly in swabs from the anterior nares 11 (44%) than those from hands 2 (8%). **Conclusion:** Screening for resistant strains of Staphylococci in healthcare workers should be adopted as a protocol in medical colleges, in order to curb the spread of drug resistant Staphylococci from the hospital to community. **Key Words:** Methicillin resistant Staphylococcus aureus, nasal swabs, hand swabs, healthcare workers, screening.

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INTRODUCTION

Staphylococci are one of the major groups of bacteria inhabiting the skin, skin glands and mucous membranes. *Staphylococcus aureus* has been reported as a major cause of community and hospital acquired infections and has serious consequences despite antibiotic therapy¹. The organism has differential ability to spread and cause

outbreaks in hospitals². Ever since its first isolation in 1961, Methicillin Resistant *Staphylococcus aureus* (MRSA) has emerged as one of the commonest causes of hospital acquired infection (HAI) and continues to remain an important factor contributing to failure of management³. The prolonged hospital stay, indiscriminate use of antibiotics and the lack of awareness are possible predisposing factors for MRSA emergence⁴. Serious endemic and epidemic MRSA infections occur globally as asymptomatically colonized patients and health care workers are the major sources of MRSA in the hospital environment, with the latter being more commonly identified as links in the transmission of MRSA between patients⁵. Hence, this study has been undertaken to detect carriage of methicillin-resistant *staphylococcus aureus* and its antibiogram in healthcare workers of a tertiary care hospital as they could pose a potential risk for nosocomial transmission when the same healthcare

workers are exposed to hospital settings during their work duties.

MATERIAL AND METHODS

A total of 25 healthcare workers working in operation theatres who are at a greater risk for MRSA carriage were included in the present study. From each healthcare worker, two swabs, one from anterior nares and one from hands were collected. HCWs with history of hospitalization or antibiotic therapy during last three months were excluded from the study. For collection of anterior nares swab, a sterile moistened swab was inserted into each nostril in turn, to a depth of approximately 1 cm, and rotated five times. Swabs from hands were collected by moistening a sterile cotton swab was rubbed on palms and web spaces of both hands. The samples were quickly sent to the laboratory. Samples were inoculated onto Mannitol Salt Agar plates and incubated at 35°C. Inoculated plates were observed after 24 hrs and after 48 hrs. The yellow colored colonies suggestive of MRSA was confirmed as *Staphylococcus aureus* by tube coagulase and DNase test. Methicillin resistance was confirmed with cefoxitin susceptibility testing according to CLSI method⁶.

RESULTS

Out of the 50 samples taken from health care workers 25 were anterior nares swabs and 25 were hand swabs. 16 (64%) anterior nares swabs and 6 (24%) hand swabs showed growth of *S. aureus* on mannitol salt agar. Out of 22 (44%) *S. aureus* isolates, 13 (26%) were found to be methicillin resistant. MRSA were detected more commonly in swabs from the anterior nares 11 (44%) than those from hands 2 (8%) (Table 1).

Table 1: Colonization with *Staph. aureus* in healthcare workers

Organism type	Swabs	
	Anterior nares	Hand swabs
MRSA	11	2
MSSA	5	4
Total	16	6
%	64	24

All the 22 strains were sensitive to linezolid and vancomycin and resistant to penicillin. Among other antibiotics, all the fluoroquinolones showed 95.5% susceptibility followed by clindamycin and gentamicin (86.4% each) (Table 2). Out of the 22 strains, inducible clindamycin resistance was observed in 2 (12.5%) strains.

DISCUSSION

Methicillin Resistant *Staphylococcus aureus* (MRSA) is a major nosocomial pathogen causing significant morbidity and mortality⁷. Asymptomatically colonized patients and

health care workers are the major sources of methicillin-resistant *Staphylococcus aureus* (MRSA) in the hospital environment, with the latter being more commonly identified as links in the transmission of MRSA between patients. The presence of *S. aureus* in the anterior nares of HCWs may serve as a source of infection to patients, is known to be a significant risk factor⁷. Identification of healthcare workers colonized with MRSA has been helpful in reducing transmission and controlling spread.

Table 2: Antibiotic sensitivity pattern of the study samples (n= 22)

Antibiotics	Sensitive		Resistant	
	n	%	n	%
Penicillin	0	0	22	100
Cefoxitin	9	40.9	13	59.1
Co-trimoxazole	11	50	11	50
Clindamycin	19	86.4	3	13.6
Erythromycin	12	54.5	10	45.5
Gentamicin	19	86.4	3	13.6
Ciprofloxacin	21	95.5	1	4.5
Gatifloxacin	21	95.5	1	4.5
Levofloxacin	21	95.5	1	4.5
Ofloxacin	21	95.5	1	4.5
Linezolid	22	100	0	00
Tetracycline	14	63.6	8	36.4
Vancomycin	22	100	0	00

Table 3: Various studies across India reporting the prevalence of MRSA carriers in HCWs

Study	MRSA in nasal carriers (%)
Kumar <i>et al</i> ⁸	27.2
Mathanraj <i>et al</i> ⁹	1.8
Rajadurai <i>et al</i> ¹⁰	51.9
Saxena <i>et al</i> ¹¹	18.1
Vidhani <i>et al</i> ¹²	2.9
Present study	44

In the present study, increased isolation of MRSA in nasal carriers was observed. Contemporary literature shows highly variable nasal carrier rate ranging from 1.8% to 79.5%. (Table 3). This was an alarming observation as HCWs did appear to be a major source of MRSA in present study, although it would require screening of larger numbers before arriving at any definite conclusions. Although nasal carriage of *S.aureus* harmless in healthy individuals, they can become carriers who could pose the risk of spreading infections to the community at large. Healthcare workers have interaction to hospital environment and could cause major risks in transmitting to hospital patients and spreading nosocomial infections. Screening for resistant strains of *Staphylococci* in healthcare workers should be adopted as a protocol in medical colleges, in order to curb the spread of drug resistant *Staphylococci* from the hospital to community.

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