

Original Research Article

Prevalence of Colonization of MRSA in Health care workers – making the compliance to Hand hygiene a need of the hour

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Abstract: *Staphylococcus aureus* is a major cause of community and healthcare infections, and methicillin-resistant *S. aureus* (MRSA) is currently the most commonly identified antibiotic-resistant pathogen in many parts of the world. Patients, contaminated surfaces as well as health care workers can play a role as reservoirs for spread of MRSA in hospitals. A prospective cross-sectional study is conducted to find out the prevalence of colonization of MRSA and bacterial contamination on the hands of health care providers and to report their antibiogram for appropriate decolonization therapy. Nasal and interdigital space swabs were collected from 60 health care providers (Doctors-36, staff nurse-14, ward boys-10) from burns ward. The specimens were processed and suspected colonies of *Staphylococcus aureus* were identified by standard bacteriological techniques. The strains of MRSA were identified by using Cefoxitin (30mcg) disk on Mueller Hinton agar. Out of total 60 nasal swabs from HCP 30 (50%) yielded *S. aureus* of which 13(21.6%) were MRSA. Of 36 nasal swabs from Doctors 18(50%) were *Staphylococcus aureus*, with 7(38%) MRSA strains. Out of 14 staff nurses 8(57%) were *S. aureus*, where 4(50%) were MRSA. Out of 10 ward boys 4 (40%) were *S. aureus*, of which 2 (50%) were MRSA. Out of the total 60 inter digital spaces 24 (40%) yielded *S. aureus* of which 10(41%) were MRSA and 24(40%) were contaminants. Out of 36 Doctors 12(33.3%) were with *S. aureus* with 4(33) MRSA and 6 (16%) contaminants. Out of 14 staff nurses 7(50%) were *S. aureus* of which 3 (42%) were MRSA and contaminants were 8 (57%). Among the 10 ward boys 5 (50%) were *S. aureus* among this 3 (60%) were MRSA and 6 (60%) were contaminants. Most of the *S. aureus* strains were sensitive for clindamycin, Vancomycin, Ofloxacin, Linezolid. All the MRSA carriers were given Clindamycin and their samples were recollected after 2 weeks which were found negative.

Keywords: Healthcare workers; Hospital environment; Methicillin Resistant *S. aureus*; Nosocomial infection; Hand hygiene

INTRODUCTION

Staphylococcus aureus is a major cause of community and healthcare infections, and methicillin-resistant *S. aureus* (MRSA) is currently the most commonly identified antibiotic-resistant pathogen in many parts of the world [1,2]. Treatment of infection caused by *S. aureus* has become more problematic since the occurrence of methicillin resistance, as MRSA strains are resistant to all β -lactam antibiotics thereby significantly limiting the treatment options. However the incidence of nosocomial infection caused by MRSA continues to increase worldwide. Infections caused by MRSA strains are associated with longer hospital stay, prolonged antibiotic administration. Next to colonized patients and contaminated environmental surfaces, colonized healthcare workers (HCWs) can act as a reservoir for the spread of MRSA to patients and other

HCWs [3]. Identification of patients and healthcare workers colonized with MRSA, combined with hand hygiene and other precautions have been shown to be effective in reducing the transmission and controlling the spread of MRSA. In the current study we conducted a cross sectional study to determine the nasal carriage rate of MRSA among HCW.

MATERIALS AND METHODS :

A cross sectional study was conducted on a total of 1201 HCWs from a tertiary care hospital. Out of the 60 HCW's 36 were Doctors and 14 remaining were nurses and grade IV class workers. Nasal swab collection and inter digital space sample were done using Sterile cotton swabs. Nasal sample was obtained by rotating the swabs gently for five times on both nares of the study participants so that the tip is entirely at the

nasal ostium level ...: Specimens were inoculated into MacConkey Agar (MA), Blood Agar (BA) and Mannitol Salt Agar (MSA) (only for nasal) and incubated at 37^o C for 24 hours. Gram positive cocci in clusters, catalase +ve, fermentative, manitol fermentor and coagulase +ve were identified as *S. aureus*. Those colonies that were mannitol fermenter (golden or cream colour on MSA) and tested coagulase positive were taken as *S. aureus*. A Colony suspension at a 0.5 McFarland standard was made. Swab was dipped in the suspension and streaked on a CHROMagar MRSA plate. The results were read after 24 and 48 h of incubation at 35°C. Pink / mauve coloured colonies as MRSA. For MRSA detection *S. aureus* isolates were also subjected to Methicillin sensitivity on Muller Hinton agar using (30µg) and Cefoxitin disc along with other Gram positive panel of drugs and confirmed by inoculating on MRSA Agar [4].

Antimicrobial susceptibility testing : All the identified isolates of *S. aureus* were undertaken in-vitro antibiotic susceptibility test by using Kirby Bauer’s disc diffusion method. The antibiotics used were Cefazolin, Cefotaxim, Cefoxitin, Clindamycin, Ciprofloxacin(5),

Linezolid(30), Erythromycin (15mcg/disc), and Vancomycin (30mcg/disc), Amoxyclav(20/10) Amikacin, Teicoplanin(30). All antibiotic susceptibility tests were conducted by using *S. aureus* ATCC 25923, MRSA ATCC 29213 and MSSA ATCC 33591 as controls under similar conditions as were used for test strains. All antibiotic discs were procured from HiMedia Laboratories Pvt. Limited, India. Antibiotic sensitivity testing and interpretation of results were done according to CLSI guidelines. Repeat samples were collected from the participants who showed a nasal carriage of MRSA after an interval of 15 days and they were processed in the same manner as has been mentioned above, for confirmation.

RESULTS AND DISCUSSION :

Out of total 60 nasal swabs from health care personnel, 30 (50%) yielded *S. aureus* of which 13(21.6%) were MRSA (Table 1). Of 36 nasal swabs from Doctors 18(50%) were *Staphylococcus aureus*, with 7(38%) MRSA strains. Out of 14 staff nurses 8(57%) were *S. aureus*, where 4(50%) were MRSA. out of 10 ward boys 4 (40%) were *S. aureus*, of which 2 (50%) were MRSA (Table 2).

Table – 1: Isolation of *S. aureus* from Nasal and Interdigital swabs

	TOTAL SWABS	<i>S. aureus</i>	MRSA	CONTAM-INANTS
NASAL	60	30(50%)	13(21%)	-----
INTER DIGITAL SPACES	60	24(40%)	10(41%)	24(40%)

Out of the total 60 inter digital spaces 24 (40%) yielded *S. aureus* of which 10(41%) were MRSA and 24(40%) were contaminants. out of 36 Doctors 12(33.3%) were with *S. aureus* with 4(33) MRSA and 6 (16%) contaminants. Out of 14 staff

nurses 7(50%) were *S. aureus* of which 3 (42%) were MRSA and contaminants were 8 (57%). Among the 10 wardboys 5 (50%) were *S. aureus* among this 3 (60%) were MRSA and 6 (60%) were contaminants (Table 3).

Table 2: Isolation pattern of *S. aureus* from Nasal swabs among Health care professionals

HCP	TOTAL SWABS	<i>S. aureus</i>	MRSA
DOCTORS	36	18(50%)	7(38%)
STAFF NURSES	14	8(57%)	4(50%)
WARD BOYS	10	4(40%)	2(50%)

Table 3: Isolation pattern of *S. aureus* from inter-digital swabs among Health care professionals

HCP	TOTAL SWABS	<i>S. aureus</i>	MRSA	CONTAMINANTS
DOCTORS	36	12(33.3%)	4(33%)	6(16%)
STAFF NURSES	14	7(50%)	3(42%)	8(57%)
WARD BOYS	10	5(50%)	3(60%)	6(60%)

Most of the *S. aureus* strains showed resistance for Azithromycin, Cefazolin, Cefaperazone, cefoxitin, Amikacin. But were sensitive for

clindamycin, Vancomycin, Ofloxacin Linezolid (Fig 1).

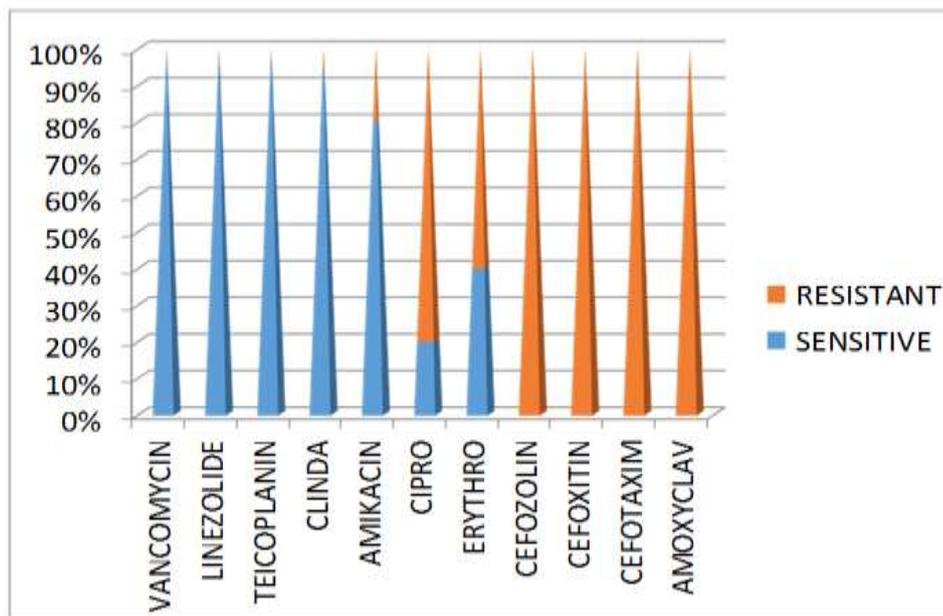


Fig 1: Antibiotic sensitivity pattern of the isolates of *S. aureus*

All the MRSA carriers were given Clindamycin and their samples were recollected after 2 weeks which were found negative for MRSA.

A Cross-sectional study in Ethiopia noted incidence of *S. aureus* as 28.8% among health care workers [1]. A study from Mangalore revealed that The number of strains of *S. aureus* which was isolated from our 200 participants was 35, with a rate of 17.5% of the 35 isolates of *S. aureus*, 5 (14.3%) were MRSA. None of the *S. aureus* strains were vancomycin resistant [5]. Several other studies have similar findings of detecting MRSA among health care professionals [6,7,8,9,10]. The present study reemphasizes that it is necessary to detect the MRSA carriers among health care workers (HCWs) in hospitals, particularly those who work in the critical care areas. These individuals act as a potential source of infection to their patients, causing nosocomial infections and thereby, causing extended stays in the hospital. The best methods which can be used for controlling this are regular screening of the HCWs and taking the appropriate preventive measures. The prevalence of MRSA varies between institutions and geographic areas. The differences in the study design, such as the sample size and the method which is employed for MRSA detection, may account for the disparity in the carriage rate.

CONCLUSION:

Our study revealed that health care providers were the potential colonizers of MRSA. This study helped us to alert the authority to improve the compliance of hand hygiene in health care providers and advocate appropriate medication to eradicate their carrier state.

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