Short Communication

Nasal Carriage of Methicillin-Resistant *Staphylococcus aureus* among Surgical Unit Staff

Vinodhikumaradithya A., Uma A.*, Srinivasan M., Ananthalakshmi I., Nallasivam P., and Thirumalaikolundusubramanian P.

*Institute of Microbiology, Madurai Medical College, Madurai, and Tamilnadu Dr. MGR Medical University, Chennai, India*

(Received September 17, 2008. Accepted March 26, 2009)

**SUMMARY:** Methicillin-resistant *Staphylococcus aureus* (MRSA) is a problem within healthcare organizations and in the community. The aims of this study were to identify the prevalence of *S. aureus* in the anterior nares of surgical unit staff, to analyse their antibiogram with special reference to methicillin resistance, and to compare the isolates among surgical unit staff and in relation to the wards where they worked. Sterile swabs were used to collect the samples from the anterior nares of 100 healthcare workers working in 5 surgical wards who satisfied rigid inclusion and exclusion criteria. Standard procedures were followed for isolation, identification, and antibiotic sensitivity testing. *S. aureus* carrier status was observed in 13 individuals, of whom 2 (15.4%) were resistant to methicillin. All the isolates of *S. aureus* were multidrug-resistant but sensitive to vancomycin and bacitracin. One of the 13 was resistant to linezolid. Sixty-three of the staff were carriers of coagulase-negative *Staphylococcus*. The presence of methicillin resistance may cause problems in hospital infection control programs and may indicate emerging issues. This study suggests the need for periodic screening of hospital personnel in order to monitor trends and take steps to treat carriers.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is now a problem within healthcare organizations and in the community. For infection control teams, particularly those in hospitals, MRSA remains a significant cause of hospital-acquired infection (1). The ecological niches of *S. aureus* strains are the anterior nares (2). In an Indian scenario, limited data are available on the prevalence in the nasal carriage of MRSA among surgical unit staff. The present report describes the prevalence of *S. aureus* in the anterior nares of surgical unit staff, analyses the antibiogram of the isolates with special reference to methicillin resistance, and compares the isolates among surgical staff and in relation to wards where they worked.

The study was undertaken in the surgical units of a tertiary care hospital between October and November 2007. The hospital’s general surgery department has 5 units with a total of 167 staff (42 doctors, 30 residents, 25 staff nurses, 40 medical students, and 30 nursing students). Out of 122 staff who were willing to participate in the study, 100 (22 doctors, 15 residents, 21 medical students, 26 nursing students, and 16 staff nurses) who satisfied the inclusion and exclusion criteria were considered for participation.

Of the 100 willing staff, those who had been working in the general surgery ward for at least 2 months consistently were included in the study. At the same time, participants were excluded if they had a history of upper respiratory infection, fever, recent nasal surgery, smoking, using snuff, diabetes, immunocompromisation, use of nasal medications, or antimicrobial therapy.

Sterile swabs were used to collect samples from the anterior nares of both sides and were transported to the microbiology department within 30 min without employing any transport medium. Following all sterile precautions, the samples were inoculated into nutrient broth and incubated overnight at 37°C. They were subcultured onto nutrient agar and blood agar plates, and incubated overnight. The suspected *S. aureus* colonies were confirmed by Gram staining, O-F testing, mannitol fermentation, and both slide and tube coagulase tests. Antibiotic sensitivity test was performed using Kirby Bauer’s disc diffusion method. Methicillin resistance was checked for all isolates of *S. aureus* using 1 μg oxacillin discs (HiMedia, Mumbai, India). The prevalence of coagulase-negative *Staphylococcus* (CoNS) was also identified using standard procedures. Statistical analysis was carried out using SPSS statistical package version 14 for Windows (SPSS, Chicago, Ill., USA).

Out of the 100 swabs, *S. aureus* and CoNS appeared in 13 and 63, respectively. There was no dual isolation from any of the swabs. The percentage and their distribution in relation to staff and wards are shown in Table 1. All 13 isolates of *S. aureus* were sensitive to vancomycin and bacitracin. Only 2 of the 13 isolates (15.4%) were resistant to methicillin, and 1 (7.7%) was resistant to linezolid. Seventy-seven percent of strains were resistant to cloxacillin, 84.6% to ampicillin, 61.5% to cephalaxin, 46.1% to cotrimoxazole, 30.7% each to erythromycin and ceftriaxone, 23% to ciprofloxacin, and 7.6% each to gentamycin and doxycycline.

Among the CoNS, all 63 were sensitive to methicillin, bacitracin, vancomycin, and linezolid. The resistance patterns to common antimicrobials were 44.4% to cloxacillin, 33.3% each to ampicillin and cotrimoxazole, 30.1% to cephalaxin, 25.4% to ceftriaxone, 23.8% to gentamycin, 22.2% to ciprofloxacin, 20.6% to erythromycin, and 14.3% to doxycycline.

*Staphylococcal* carrier status leads to nosocomial infection (1). Hence, carrier status should be looked for. Earlier studies (3,4) revealed the prevalence of *S. aureus* carriers among healthcare workers in different hospitals and specialties, which
in Manipal, India (7). There was no significant difference (31.7% of surgical staff were carriers in a study at a hospital, whereas only among the staff working in one particular ward (No. 221).

70.6% (6,4). The carrier status of preva lent of MRSA reported earlier ranged from 34.8 to which is in concordance with a report from Delhi (5). High Methicillin resistance was observed in 15.4% of the carriers, dent. One in each category was resistant to methicillin. Out of the 13 carriers, 5 each were doctors and nursing stu-
dents (28.6%). Surprisingly, 90% of the staff nurses in ward 229 varied from 18.6 to 50%. The burden is further increased when bacteria become resistant to methicillin.

In the present study, 13% of participants carried S. aureus. Out of the 13 carriers, 5 each were doctors and nursing stu-
dents. One in each category was resistant to methicillin.
Methicillin resistance was observed in 15.4% of the carriers, which is in concordance with a report from Delhi (5). High prevalences of MRSA reported earlier ranged from 34.8 to 70.6% (6,4). The carrier status of S. aureus was high (30.6%) among the staff working in one particular ward (No. 221).

It was interesting to note that almost two-thirds (63%) of the surgical unit staff were carriers of CoNS, whereas only 31.7% of surgical staff were carriers in a study at a hospital in Manipal, India (7). There was no significant difference (P < 0.05) between the isolates from doctors, nursing students, and staff nurses. Carrier status was lowest among medical students (28.6%). Surprisingly, 90% of the staff nurses in ward No. 223 were carriers of CoNS. All the isolates were multidrug-resistant.

The single most important factor in preventing nosocomial infections is compliance with sanitary and antibacterial guidelines by health professionals. To achieve this, health professionals should be informed about the potential consequences of nosocomial infections both inside and outside the hospital, and their cooperation should be sought to diminish the carriage of S. aureus. Simple preventive measures like hand washing before and after patient examination, the use of sterile aprons and masks in postoperative wards, awareness while examining immunocompromised patients, and avoiding touching one’s nose during work, can reduce disease transmission rates considerably. Transmission can be reduced also by monitoring and surveillance of nosocomial infection, review at epidemic control meetings, and discussion at microbiology audits.

The prevalence of S. aureus carriers among healthcare workers in our hospital (13%) puts both patients and workers at risk. They might act as potential sources for the nosocomial spread of infection, especially to those with open wounds admitted to a surgical unit. The presence of MRSA may cause problems in hospital infection control programs. The study also shows the need for periodic screening of all hospital personnel (8) and measures to treat the carriers.

**ACKNOWLEDGMENTS**

The financial assistance provided by the Indian Council of Medical Research (ICMR) through the Short Term Research Studentship (STS) program to the first author [Ref No. 21/552/2006-BMS] is gratefully acknowledged.

**REFERENCES**


