

more frequent. The relative frequency distribution of etiologic agents for this Turkish hospital was similar to what has been observed in multiple other countries.

A Korean study reported that the most commonly isolated microorganisms were *S. aureus* (17.2%), *P. aeruginosa* (13.8%), and *Escherichia coli* (12.3%).⁴ A prevalence study done in Switzerland found that the leading pathogens were *S. aureus* (13%), *E. coli* (12%), and *P. aeruginosa* (11%).⁸ Of note, *S. aureus* was the most frequent cause of nosocomial infections in our hospital and 65.3% were resistant to methicillin, suggesting the need for improved control measures.

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Nasal Carriage of Methicillin-Resistant *Staphylococcus aureus* Among Healthcare Workers of an Iranian Hospital

To the Editor:

Staphylococcus aureus causes important infections in hospitalized patients that can have severe consequences despite antibiotic therapy.¹ Its main ecological niche is the nose, but the prevalence of nasal carriage has varied according to the population studied. Approximately one-third of the general population carry *S. aureus*, but healthcare workers (HCWs) may be an especially important reservoir, even if transiently colonized. Several studies have reported rates of nasal carriage ranging from 17% to 56% in HCWs.²

Methicillin-resistant strains of *S. aureus* (MRSA) were identified immediately after the introduction of methicillin into clinical practice. The first MRSA outbreaks occurred in European hospitals in the early 1960s. Since then MRSA has spread worldwide, causing problems with therapy and higher mortality rates.¹ Colonized patients have been the primary reservoir for spread, although it can also occur from colonized HCWs. The aim of this study was to determine the frequency of nasal carriage of MRSA among HCWs in Imam Khomeini Hospital of Urmia, West Azarbayjan, Iran.

This is a general, 300-bed, university-affiliated teaching hospital with more than 400 employees, including service and technical staff. For this study, 230 consenting staff members (115 men and 115 women)

had cultures using moistened cotton swabs rotated five times in both anterior nares.³ Samples were carried within 2 hours to the microbiology laboratory and processed as previously described.⁴ The agar screen test was used to detect MRSA by inoculating 10⁴ colony-forming units onto Mueller-Hinton agar supplemented with 4% NaCl and containing 6 mg of oxacillin per milliliter according to the National Committee for Clinical Laboratory Standards guideline.⁵ No change in the method of identifying MRSA occurred during the study. Antibiotyping was performed by using the disk-diffusion method according to the National Committee for Clinical Laboratory Standards guideline.⁶

This study revealed that 92 (40%) of the participants had nasal colonization with *S. aureus* and 32 (35%) of these were MRSA (ie, 13.9% of all study participants). Of 92 HCWs carrying *S. aureus*, 53 (57.6%) were male and 39 (42.4%) were female. The mean age was 31.3 years (standard deviation \pm 6.3 years). Carriage rates for *S. aureus* and MRSA differed for various professional groups (Table). Paramedical staff had more carriage of MRSA than did other groups. There was not an association between gender, age, or years of healthcare service and nasal carriage. Resistance rates to other antibiotics were as follows: penicillin, 67.4%; cotrimoxazole, 42.3%; gentamicin, 25%; clindamycin, 18.3%; ciprofloxacin, 14.18%; erythromycin, 8.7%; and vancomycin, 0%.⁷ A previous study in this hospital had shown that 53.6% of clinical *S. aureus* isolates from patients were MRSA.⁷ The antibiograms of isolates in this study were compared with those from patients in the prior study and rates of resistance to all antibiotics tested were significantly higher

TABLE

FREQUENCY OF *STAPHYLOCOCCUS AUREUS* CARRIAGE AND METHICILLIN-RESISTANT *S. AUREUS* (MRSA) AMONG HEALTHCARE WORKERS

Healthcare Worker	No.	No. With Carriage of <i>S. aureus</i>	Frequency of MRSA
Physician	28	12 (42.8%)	1 (3.5%)
Nurse	54	22 (40.7%)	7 (12.9%)
Paramedical staff	108	43 (39.8%)	22 (20.3%)
Staff not involved in patient care	40	15 (37.5%)	5 (12.5%)

for patients than for HCWs ($P < .001$ to $.05$).

This study revealed a prevalence of 40% for nasal carriage of *S. aureus* among HCWs, of which more than one-third were MRSA. Other studies in Iran and Saudi Arabia have shown a similar prevalence of *S. aureus* carriage among HCWs,^{8,9,10} but the prevalence in other developing countries has varied markedly by country. In a study performed in Madras, India, 18.23% of 724 HCWs carried *S. aureus* in the nose, including 12.15% with MRSA.¹¹ Some of the differences in observed prevalence among countries may be due to differences in the quality of sampling and of culture methods. The high prevalence of MRSA in hospitals in this country is likely due to the lack of routine use of measures for controlling spread and unrestricted antibiotic use.

Although MRSA remains largely a nosocomially acquired pathogen, screening high-risk patients for MRSA and placing colonized patients in isolation have been recommended for effective control of MRSA.¹² The rising prevalence of MRSA among HCWs may lead to still greater spread among patients, however.

The prevalence of MRSA carriage among HCWs is high and most

patients still may acquire MRSA in healthcare facilities. For control of infections, screening of HCWs and eradication of colonization may thus need to be considered.¹³

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