

The high RF obtained with the non-medicated handwash product in our model probably was due to the fact that it contains a preservative that seems to be highly effective against enterococci. The in vitro activity against MRSA was absolutely inadequate, so this handwash product would not pass the test criteria of German or European standards for testing hand rubs or scrubs and never would be used for hand disinfection in hospitals.

To conclude, the results of our study obtained with gram-positive microorganisms show that the antimicrobial potency of chlorhexidine-containing scrubs and nonmedicated handwash products is lower than the potency of alcohol-based preparations. Therefore, scrubs and soaps might not be sufficient for eradication of multiply resistant gram-positive microorganisms from the hands of healthcare workers. The superior in vitro activity of alcohol-based disinfectants in our model indicates that these products should be used for hand disinfection to prevent the transmission of nosocomial pathogens by hands. Of course, this in vitro effect on multiply resistant gram-positive bacteria has to be proven in in vivo studies.

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High Methicillin Resistance of *Staphylococcus aureus* and Coagulase-Negative Staphylococci in Imam Khomeini Hospital of Urmia, Iran

To the Editor:

Staphylococcus aureus is a major pathogen for humans and has long been a cause of nosocomial infections such as bacteremia, wound infections, urinary tract infections, and pneumonia. Coagulase-negative staphylococci (CNS), such as *Staphylococcus epidermidis*, have become important in bloodstream infections, urinary tract infections, and infections of prosthetic devices such as heart valves.¹

Worldwide, more than 95% of *S aureus* isolates are resistant to first-line antibiotics such as penicillin or ampicillin. In addition, methicillin-resistant strains of *S aureus* (MRSA) are common. The first report of MRSA was in the 1960s, and MRSA

now commonly accounts for 20% to 40% of all *S aureus* isolates.²

The aim of this study was to estimate the incidence of MRSA in patients hospitalized in Imam Khomeini Hospital of Urmia.

This hospital is a 300-bed university-affiliated teaching center in Urmia, West Azarbayjan, Iran. To do the study, all hospitalized patients were screened for the isolation of MRSA from March 20, 1990, to April 30, 2000. Cultures were obtained after 72 hours. Specimens were plated onto mannitol-salt agar (Merck, Darmstadt, Germany) and incubated for up to 48 hours. Organisms with a yellow color (mannitol fermenters) were identified as *S aureus* by standard methods such as Gram stain, catalase, DNase, and the tube coagulase test. The agar screen test was used to detect MRSA by inoculating 10⁴ colony-forming units onto Mueller-Hinton agar supplemented with 4% NaCl containing 6 µg of oxacillin per mL. Strains resistant to oxacillin were confirmed as methicillin-resistant.³ No changes in the method of identifying MRSA occurred during the study. Antibiogram typing was performed by using the disk-diffusion methods according to the National Committee for Clinical Laboratory Standards guidelines. Other antibiotics used included penicillin, cotrimoxazole, vancomycin, ciprofloxacin, erythromycin, clindamycin, and gentamicin.

During the 1-year study, 200 strains of staphylococci were isolated from clinical samples of hospitalized patients. Of the 200 isolates, 153 strains (76.5%) were identified as *S aureus*, and the remaining 47 strains (23.5%) were CNS.

The frequency of MRSA by the oxacillin screen agar method was 82 strains (53.6%), whereas 26 strains (55.3%) of CNS were methicillin-resistant. Blood cultures were the

TABLE
SOURCES OF *STAPHYLOCOCCUS AUREUS* AND COAGULASE-NEGATIVE STAPHYLOCOCCI

| Isolate | Blood | Wound | Catheter | Pleural | | Urethral | | Infantile | | Total |
|------------------------------|-------|-------|----------|---------|-------|-----------|-----------|-----------|-----|-------|
| | | | | Fluid | Urine | Discharge | Umbilical | Cord | Eye | |
| <i>Staphylococcus aureus</i> | 79 | 12 | 7 | 1 | 37 | 3 | 9 | 4 | 1 | 153 |
| CNS | 30 | 1 | 2 | 0 | 11 | 0 | 0 | 3 | 0 | 47 |
| Total | 109 | 13 | 9 | 1 | 48 | 3 | 9 | 7 | 1 | 200 |

Abbreviation: CNS, coagulase-negative staphylococci.

source of 51.6% *S aureus*, and 63.8% of CNS were isolated from blood cultures. The other strains were from specimens such as wound, catheter, pleural fluid, urine, urethral discharge, eye, and stool (Table).

Resistance rates of *S aureus* to other commonly used antibiotics were as follows: penicillin, 96.75%; cotrimoxazole, 70.2%; vancomycin, 9.2%; ciprofloxacin, 40.25%; erythromycin, 47.1%; clindamycin, 21%; and gentamicin, 61.03%. Resistance rates for CNS to these antibiotics were 97.82%, 78.3%, 4.3%, 21.73%, 27.7%, 10.6%, and 45.65%, respectively.

The ideal method for identification of MRSA is direct detection of *mecA*, but tests for the gene or its products are not yet performed routinely in most clinical microbiology laboratories. A reliable method for detection of MRSA in routine work is the oxacillin screen agar test. Oxacillin is preferred to methicillin because it is more stable. Sensitivity of oxacillin screen agar

approaches 100% for the detection of MRSA and 95% for CNS.⁴

In our country, the routine method for susceptibility testing is disk diffusion, but unfortunately this method is not well-standardized in many laboratories; for this reason, data obtained from various studies are not comparable. In addition, in developing countries such as Iran, standard disks and strains of organism are not available. Delayed transportation and failure of cold storage also affect the quality of antibiotics used as diagnostic reagents.⁵ Our study was the only standard method for detection of MRSA in Iran.

As mentioned before, unfortunately the frequency of MRSA and resistance of CNS to methicillin are very high in Imam Khomeini Hospital. The rate of MRSA may be due to poor quality and misuse of antibiotics, inadequate hospital infection control, and inadequate drug-resistance surveillance.

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MRSA Infection in Patients With Cystic Fibrosis

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Miall and colleagues from Leeds, United Kingdom, note that methicillin-resistant *Staphylococcus aureus* (MRSA) infection is increasingly found in patients with cystic fibrosis (CF). They conducted a study to determine whether MRSA infection has a deleterious effect on the clinical status of children with CF. Children with MRSA in respiratory cultures during a 7-year period were identified and compared with controls matched for age, gender, and respiratory function. Respiratory function tests, anthropometric data, Shwachman-Kulczycki score, Northern chest radiograph score, intravenous and nebulized

antibiotic therapy, and steroid therapy were compared 1 year before and 1 year after MRSA infection.

From a clinical population of 300, 10 children had positive sputum or cough swab cultures for MRSA. Prevalence rose from 0 in 1992 through 1994 to 7 in 1998. Eighteen controls were identified. Children with MRSA showed significant worsening of height standard deviation scores and required twice as many courses of intravenous antibiotics as controls after 1 year. They had significantly worse chest radiograph scores at the time of the first MRSA isolate and 1 year later, but showed no increase in the rate of decline in chest radiographic appearance. There was a trend toward lower FEV₁ and FEF₂₅₋₇₅ in children with MRSA.

There were no significant differences between the two groups with respect to change in weight, body mass index, or Shwachman score. There was no significant difference in prior use of steroids or nebulized antibiotics.

The authors concluded that MRSA infection in children with CF does not affect respiratory function significantly, but may have an adverse effect on growth. Children with MRSA require significantly more courses of intravenous antibiotics and have a worse chest radiograph appearance than controls.

FROM: Miall LS, McGinley NT, Brownlee KG, Conway SP. Methicillin-resistant *Staphylococcus aureus* (MRSA) infection in cystic fibrosis. *Arch Dis Child* 2001;84:160-162.