Letter to the Editor

Mupirocin- and Methicillin-Resistant *Staphylococcus aureus* Spreading in an Intermediate-Care Unit in a Brazilian Hospital

To the Editor:

Methicillin-resistant *Staphylococcus aureus* (MRSA) represent 38% to 78% of all *S aureus* strains isolated in Brazil.[1] Once introduced into a hospital, some MRSA strains spread more readily than others and are often difficult to eradicate after being established.[2] Mupirocin resistance in staphylococci also has been associated with failure to clear the organisms from both colonized and infected patients.[3] During a prospective epidemiological survey of MRSA in a university hospital in Rio de Janeiro, Brazil, spread of MRSA was detected in the surgical intermediate-care unit.

The Clementino Fraga Filho University Hospital is a 350-bed, tertiary-care teaching hospital affiliated with the faculty of medicine of the Federal University of Rio de Janeiro. It consists of general medical, surgical, and infectious diseases wards; an intensive-care unit (ICU); a surgical intermediate-care unit (SICU), and outpatient departments.

The SICU is a single-room facility with four intensive-care beds. Three patients infected with MRSA were hospitalized in the unit in October 1994. Case 1, the index case, was a 40-year-old man who developed a surgical-site infection in September 1994. MRSA strains were isolated from nares, blood, catheter tip, and the surgical wound between September 1994 and May 1995. Case 2 was a 72-year-old woman who developed septicemia in October; MRSA was isolated from a blood culture. The patient died on October 7, 1994. Case 3 was a 46-year-old man who developed peritonitis and underwent repeat surgery on October 5. MRSA was isolated from the nares and the surgical wound. He developed septicemia and died on October 8, 1994.

All three patients had been hospitalized for prolonged periods and received prior antimicrobial therapy. They underwent surgery and were close to a patient with MRSA in a critical-care unit. All of these circumstances are known risk factors associated with MRSA infection.[2]

Specimens were inoculated on 5% sheep blood agar and mannitol salt agar plates. Isolates were identified as *S aureus* on the basis of colonial morphology, Gram stain, and positive catalase and coagulase reactions. Antimicrobial susceptibility was determined by the disk diffusion method for 19 antimicrobial agents and by the agar dilution method for oxacillin and mupirocin. Methicillin resistance also was determined by using Mueller-Hinton agar supplemented with 4% NaCl and oxacillin (6µg/mL).

To determine their relatedness, the MRSA strains were tested for resistance to antimicrobial agents. Genomic DNA was analyzed by pulsed-field gel electrophoresis (PFGE). Cells were treated as previously reported.[4] DNA was digested with *Sma*I (Boehringer Biochemicals, Mannheim, Germany) according to the manufacturer's instructions. Electrophoresis was performed in 1% agarose gels using the CHEF-DRIII System (BioRad Laboratories, Richmond, CA) at 13°C for 21 hours in 0.5× TBE buffer (40 mM Tris, 1,2 mM boric acid, 40 mM EDTA, pH 8.0) at 6 V/cm. The pulse times were 2 seconds (initial) and 35 seconds (final). Differences between isolates were determined by visual comparison of the bands. Isolates were considered to be related if they did not

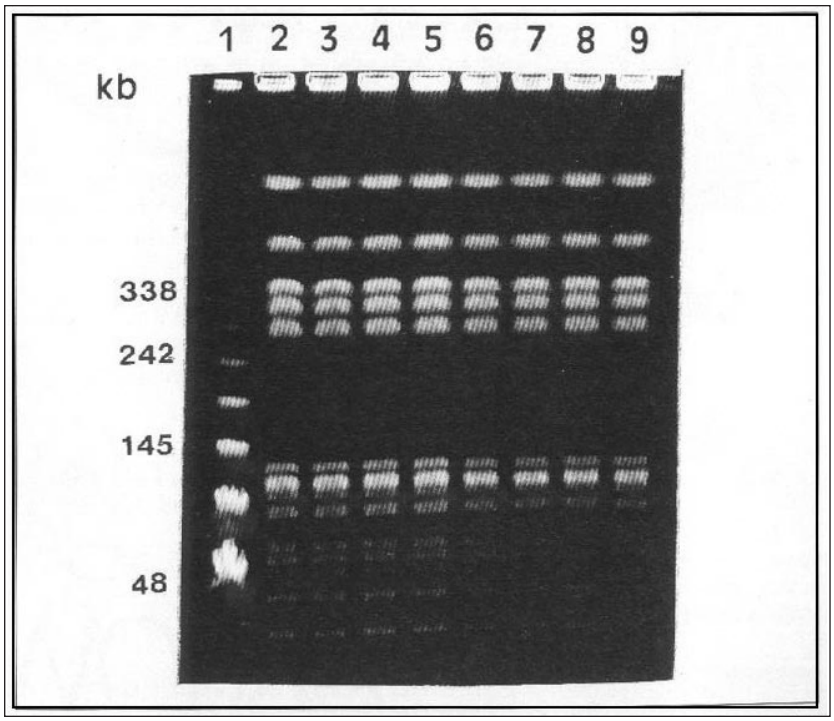

FIGURE. Pulsed-field gel electrophoresis patterns of *Sma*I digests of total DNA from methicillin-resistant *Staphylococcus aureus* (MRSA) isolates. Lane 1: DNA used as molecular size marker (48.5 kb-1,018.5 kb); lanes 2-9: MRSA isolates 1-8.

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differ by more than three bands.[5]

A total of eight MRSA strains were isolated from the three patients studied. All strains were susceptible to vancomycin and resistant to oxacillin and other β-lactams, erythromycin, gentamicin, amikacin, chloramphenicol, clindamycin, tetracycline, ciprofloxacin, rifampicin, and trimethoprim-sulfamethoxazole. Three mupirocin-resistance profiles were observed among the strains: minimum inhibitory concentration (MIC) ⩾512 µg/mL (nares strains from case 1); MIC=32 µg/mL (surgical-wound and catheter-tip strains from case 1; nares and surgical-wound strains from case 3); MIC=1 µg/mL (blood strains from cases 1 and 2). Cases 2 and 3 had MRSA isolates with resistance profiles identical to case 1, suggesting that these microorganisms may have been transmitted by the hands of healthcare workers while caring for these patients, although we were unable to detect MRSA in the nares or hands of healthcare workers. Due to the scarcity of alternative handwashing facilities in critical and semicritical areas in most Brazilian hospitals, as well as the lack of sustained educational programs to motivate hand washing, once a multiresistant bacterial strain occurs, it can spread rapidly in the ward, as well as to other wards.[1]

All of the isolates showed identical PFGE patterns (Figure). The results indicate that strains with *Sma*I restriction profiles similar to that of this index case had spread through the ICU. As previously reported by Santos et al,[6] multiresistant MRSA strains associated with mupirocin resistance, including high-level resistance, are widespread in this Rio de Janeiro hospital. In patients undergoing operative procedures, screening for nasal carriage and treatment of the colonized individuals should be considered.[2] However, nosocomial spread of strains with mupirocin resistance can impair the usefulness of topical intranasal mupirocin as a measure for control of MRSA spreading in a hospital.[3]

The occurrence of this outbreak reinforces the need for infection control surveillance combined with strain typing for the detection of MRSA cross-transmission in a busy ICU. The use of barriers that could have prevented the spread of MRSA strains, such as special procedures for hand washing, single-bed rooms, and treatment of MRSA infection or colonization were not observed. More control efforts in these directions may prevent or reduce MRSA cross-transmission among susceptible patients.

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