

Letters to the Editor

Risk of Transmission of Nosocomial Methicillin-Resistant *Staphylococcus aureus* (MRSA) From Patients Colonized With MRSA

To the Editor:

Staphylococcus aureus resistant to methicillin (MRSA) has become an increasingly important nosocomial pathogen in hospitals worldwide. Infections with antibiotic-resistant organisms are thought to result in higher morbidity and mortality rates.¹ Vancomycin use may increase substantially as MRSA becomes more prevalent, resulting in increased selection pressure for vancomycin-resistant organisms. For these reasons, efforts to control MRSA are warranted.

Patient-to-patient transmission in healthcare settings, usually via the contaminated hands, clothes, or equipment of healthcare workers, has been a major factor accounting for the increase in the incidence and prevalence of MRSA in acute care facilities.^{2,4} Barrier precautions are often included in recommended control measures for MRSA, and contact isolation in a single room has been recommended by the Centers for Disease Control and Prevention since 1983 for patients colonized or infected with MRSA.^{5,6}

In a previous study, the relative risk of transmission of MRSA from unisolated patients (ie, using standard precautions) was found to be high as compared with that from patients identified by surveillance cultures and cared for using contact or droplet precautions (relative risk, 15.6; 95% confidence interval, 5.3 to 45.6; $P < .0001$).⁷ Some hospitals have used contact precautions only for infected patients, implying that colonized patients are not an important reservoir for spread. We therefore

reanalyzed the data from the previous study excluding the 3 patients who became infected at some point during the study. We calculated the relative risk of transmission of MRSA from asymptomatic MRSA carriers while they were unisolated as compared with that from those identified by surveillance cultures and cared for using contact or droplet precautions.

The University of Virginia was a 700-bed hospital with a neonatal intensive care unit containing 33 beds. During a 7-month outbreak of MRSA in the unit, prospective weekly surveillance cultures were done, isolates underwent molecular typing, and epidemiologic analyses were performed.

The probable source for each transmission was identified using the following parameters: (1) temporal relation between proposed source and recipient; (2) geographic relation between proposed source and recipient; and (3) personnel shared between proposed source and recipient. Two observers performed this analysis and reached the same conclusions independently. Acquisition date was estimated to have occurred at the midpoint between the last negative and the first positive culture. Transmission rates (transmissions per patient-days) from patients colonized with MRSA who were unisolated were compared with those from patients in contact or droplet precautions.

During the outbreak, 16 (4.8%) of 331 patients acquired the outbreak strain of MRSA. Three patients developed MRSA infection (conjunctivitis, bloodstream infection, and dialysis catheter-site infection) and 13 other patients were only colonized with MRSA. The most common sites of colonization were the nares (88%), umbilicus (56%), groin (50%), and axillae (31%). The 13 colonized patients were believed to be the source of 12 transmissions. There were 555.5 patient-days of MRSA colonization during the outbreak (transmission rate, 0.02). A total of 497 patient-days

TABLE
RATE OF TRANSMISSION

	Source of Transmission	
	Isolated	Unisolated
No. of transmissions	5	7
No. of patient-days	497	58.5
Rate of transmission	0.01	0.12

of colonization were spent in contact or droplet isolation, and 58.5 were spent unisolated. Unisolated colonized infants were judged to be the source of 7 transmissions, whereas isolated infants were believed to be responsible for 5 transmissions during the outbreak. The relative risk of transmission from unisolated colonized patients was 11.9 (95% confidence interval, 3.25 to 47.5; $P = 1.4 \times 10^{-4}$) compared with that from patients in contact isolation (Table).

The risk of transmission was 12-fold higher for MRSA-colonized patients when they were not isolated as compared with when they were isolated. Patients colonized with MRSA were thus an important reservoir of spread that was better controlled using isolation than standard precautions. Identification of asymptomatic MRSA carriers using a screening program is important for controlling nosocomial MRSA infections as recommended in the Society for Healthcare Epidemiology of America guideline.³

REFERENCES

1. Cosgrove SE, Sakoulas G, Perencevich EN, et al. Comparison of mortality associated with methicillin-resistant and methicillin-susceptible *Staphylococcus aureus* bacteremia: a meta-analysis. *Clin Infect Dis* 2003;36:53-59.
2. Tammelin A, Klotz F, Hambræus A, et al. Nasal and hand carriage of *Staphylococcus aureus* in staff at a Department for Thoracic and Cardiovascular Surgery: endogenous

or exogenous source? *Infect Control Hosp Epidemiol* 2003;24:686-689.

3. Muto CA, Jernigan JA, Ostrowsky BE, et al. SHEA guideline for preventing nosocomial transmission of multidrug-resistant strains of *Staphylococcus aureus* and *Enterococcus*. *Infect Control Hosp Epidemiol* 2003;24:362-386.
4. Blok HE, Troelstra A, Kamp-Hopmans TE, et al. Role of healthcare workers in outbreaks of methicillin-resistant *Staphylococcus aureus*: a 10-year evaluation from a Dutch university hospital. *Infect Control Hosp Epidemiol* 2003;24:679-685.
5. Garner JS, Simmons BP. Guideline for isolation precautions in hospitals. *Infect Control* 1983;4(suppl):245-325.
6. Garner JS. Guideline for isolation precautions in hospitals: the Hospital Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol* 1996;17:53-80.
7. Jernigan JA, Titus MG, Groschel DH, et al. Effectiveness of contact isolation during a hospital outbreak of methicillin-resistant *Staphylococcus aureus*. *Am J Epidemiol* 1996;143:496-504.

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Society for Healthcare Epidemiology of America Guideline Approach Works to Control a Methicillin-Resistant *Staphylococcus aureus* Outbreak

To the Editor:

I want to thank the Society for Healthcare Epidemiology of America (SHEA) and *Infection Control and Hospital Epidemiology* for setting a standard for excellence in infection control. SHEA has recommended the use of evidence-based measures for controlling nosocomial methicillin-resistant *Staphylococcus aureus* (MRSA) infections¹ and *Infection Control and Hospital Epidemiology* has kept a steady focus on this growing problem.^{2,5}

I am the sole infection control practitioner employed by a Health Region in Alberta, Canada. Thus, I am required to make decisions regarding whether and when to use screening and isolation precautions for controlling MRSA (and vancomycin-resistant *Enterococcus*) infections. I have found

the guidance of *Infection Control and Hospital Epidemiology* most helpful in managing these situations and would like to relate a recent experience controlling MRSA infections.

In September 2003, a MRSA outbreak was suspected in a small town of 5,400 in my region. Two deaths followed probable inappropriate antibiotic treatment of unrecognized MRSA infection. Initially, it was known from routine clinical cultures that 2 acute care and 2 home care patients, 6 nursing home residents, and 6 community members who had previously received healthcare services had MRSA. These numbers were larger than expected for rural Canada, leading me to wonder whether the practices recommended by some (no screening and no use of contact precautions in long-term care) might be creating an "ostrich with its head in the sand" situation. When my supervisor, the Medical Officer of Health, and I sought counsel, we were advised to just "give up" because most U.S. healthcare facilities, where according to National Nosocomial Infections Surveillance System data MRSA infections are currently approximately 25-fold more common than they were in 1980, were not even bothering to control nosocomial MRSA infections.

On the basis of the SHEA guideline, however, surveillance cultures were conducted and identified 2 additional colonized acute care patients in the 34-bed hospital and 21 additional colonized nursing home residents; this meant that 27 (30%) of the nursing home's 90 residents were found to be colonized before or during the prevalence survey. Of 166 healthcare workers (64%) volunteering to be screened, 4 were colonized (2.4%). All MRSA isolates showed the same antibiogram with resistance to oxacillin, erythromycin, and clindamycin. Twenty-five isolates were submitted for pulsed-field gel electrophoresis testing, which showed that 20 (80%) were identical to and 5 were closely related to the outbreak strain (ie, > 90% similarity). Contact precautions with gowns and gloves were used for the care of colonized patients. Colonized residents and healthcare workers underwent 1 week of decolonization therapy with intranasal mupirocin three times daily, mupirocin ointment applied to small skin lesions twice daily, 2% chlorhexidine baths once daily and 2%

chlorhexidine shampoos on days 1 and 4, 600 mg of rifampin orally once daily, and trimethoprim-sulfamethoxazole (1 double strength tablet twice daily), except one resident who was allergic to sulfonamide and who received 100 mg of doxycycline orally twice daily instead of trimethoprim-sulfamethoxazole. Screening cultures were used for patients being transferred between the hospital and the nursing home. Alcohol hand gel was made available to healthcare workers in every room, and the entire nursing home was disinfected using accelerated hydrogen peroxide (1:16 strength).

On follow-up after 6 months, 14 (70%) of 20 nursing home residents who had undergone eradication therapy still remained free of colonization. Three others had died during the ensuing 6 months and 6 had failed eradication or had become recolonized and were thus back in contact isolation. In addition, 4 of the previously culture-negative residents had acquired MRSA colonization, bringing the total prevalence after 6 months of control efforts to 10 (11%) of the nursing home's 90 patients, a two-thirds relative reduction. At 12 months, 12 (71%) of the remaining 17 residents who had been MRSA positive were culture negative and 5 (5.6%) of all 90 nursing home residents remained culture positive for the outbreak strain (an 81% relative reduction).

The SHEA approach greatly benefited the residents of the nursing home. MRSA is an important and sometimes deadly pathogen that was being nosocomially transmitted in this small healthcare facility. The proactive efforts taken to control it were worth it.

Complicating the approach to the MRSA outbreak was a concomitant influenza A outbreak that occurred in this facility *before* the arrival of vaccine for residents and staff. For this reason, staff wore gowns for contact precautions and added masks if they could not tolerate amantadine prophylaxis. When healthcare workers' faces were covered by masks and their name tags were covered by gowns, residents sometimes could not tell who was caring for them. For this reason, a label with the words "Behind the Mask is: _____" was developed that could be placed on the healthcare worker's