

## Letters to the Editor

### Is Methicillin-Resistant *Staphylococcus aureus* More Contagious Than Methicillin-Susceptible *S. aureus* in a Surgical Intensive Care Unit?

#### To the Editor:

Vriens et al. studied methicillin-susceptible *Staphylococcus aureus* (MSSA) isolates obtained for clinical and screening purposes in an intensive care unit during 2 months. Eleven patients and 16 staff members carried MSSA. Twenty-one contacts between patient and staff MSSA carriers were documented. There was no instance of identical strains being carried by patients and staff contacts. These data contrasted with the authors' previous experience with methicillin-resistant *S. aureus* (MRSA) transmission, leading to the conclusion that "MRSA seems to spread more easily than MSSA, probably because of selection under antibiotic pressure."<sup>1</sup> No specific information was provided regarding antistaphylococcal antibiotic therapy.

The work of Vriens et al. prompted us to study antibiotic pressure as well as the genetic relationship among clinical MSSA isolates versus MRSA isolates during a 5-month period in a 721-bed nursing home. We reasoned that greater genetic relatedness in one group would provide evidence of greater transmission.

The Wisconsin Veterans Home is a skilled nursing home that provides care for 721 residents on 14 nursing units. We performed pulsed-field gel electrophoresis (PFGE) on all MRSA and MSSA isolates encountered during clinical practice during 5 months (March through July 2002). Chromosomal DNA was prepared by the method described by Maslow et al.<sup>2</sup> The PFGE profiles were analyzed using Multi-Analyst Fingerprinting Plus software (Bio-Rad, Hercules,

TABLE 1

COMPARISON OF PULSED-FIELD GEL ELECTROPHORESIS BANDS AMONG ISOLATES OF METHICILLIN-SUSCEPTIBLE *STAPHYLOCOCCUS AUREUS*\*

MSSA Strain	Profile									
	H2	U	I1	I2	Q	V	W	X	Y	Z
U	12									
I1	9	11								
I2	10	12	3							
Q	5	7	9	13						
V	8	8	11	12	8					
W	8	10	7	8	8	8				
X	13	5	8	11	9	11	9			
Y	10	8	9	10	10	4	10	13		
Z	8	8	11	14	4	4	8	9	8	

MSSA = methicillin-susceptible *Staphylococcus aureus*.

\*The number of times a pulsed-field gel electrophoresis type was isolated during 5 months from separate residents was twice for H2 and U and once for I1, I2, Q, V, W, X, Y, and Z.

TABLE 2

COMPARISON OF PULSED-FIELD GEL ELECTROPHORESIS BANDS AMONG ISOLATES OF METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*\*

MRSA Strain	Profile									
	L	A1	A13	L5	A2	A16	H1	K1	N1	Q
A1	3									
A13	5	2								
L5	3	6	8							
A2	3	2	2	6						
A16	5	4	4	6	6					
H1	9	8	8	10	8	10				
K1	5	4	2	8	4	6	10			
N1	4	5	3	5	3	7	7	5		
Q	7	8	9	8	9	10	5	8	5	

MRSA = methicillin-resistant *Staphylococcus aureus*.

\*The number of times a pulsed-field gel electrophoresis type was isolated during 5 months from separate residents was four for L and A1, twice for A13, and once for L5, A2, A16, H1, K1, N1, and Q.

CA).<sup>3</sup> We constructed separate tables for MRSA and MSSA, calculating the band difference on PFGE between each of the MSSA isolates and each of the MRSA isolates (Tables 1 and 2). We compared the groups using analysis of covariation. An identical PFGE type was included as many times as it was isolated.

During the 5-month study, 11 MSSA isolates (8 wound, 2 urine, and 1 throat) were encountered from 6 nursing units. A total of 9 unique PFGE types were obtained that varied by at least 1 band. There were 2 sets of identical isolates (profiles H2 and U) (Table 1). Each set occurred on the same nursing

unit (total, 14 units) separated by 9 and 48 days. Vriens et al. reported only 3 identical isolates among 27 MSSA isolates. During the same 5-month period, 17 MRSA clinical isolates (8 wound, 6 urine, 1 sputum, 1 blood, and 1 stool) were encountered from 10 nursing units. A total of 10 unique PFGE types were encountered that varied by at least 1 band (Table 2). The nursing home has 4 nursing buildings. All 4 profile L isolates occurred in the same building, 3 of which were from the same floor. Two of 4 profile A1 isolates were from the same unit, with a third isolate being from the same building. The 2 profile A13 isolates were from the same building. The mean band difference between the MRSA isolates was  $5.9 \pm 2.4$ , whereas the mean band difference between the MSSA isolates was  $9.1 \pm 2.5$ . The data were normally distributed. The MRSA isolates were significantly more genetically related than were the MSSA isolates ( $P < .0001$ ). Our results are similar to those of Dominguez et al., who performed PFGE on 189 MRSA and 52 MSSA isolates in a 1,000-bed hospital in Barcelona, Spain. The 189 MRSA isolates fell into 11 to 19 PFGE patterns, whereas the 52 MSSA isolates fell into 33 PFGE patterns. These investigators also found greater genetic relatedness among MRSA versus MSSA isolates.<sup>4</sup>

We speculate that the closer genetic relatedness of our MRSA isolates versus our MSSA isolates provides evidence for greater transmission. Ward reported evidence of equivalent adhesion of MRSA and MSSA strains to nasal epithelial cells.<sup>5</sup> Bisognano et al. reported induction of fibronectin-binding proteins and increased adhesion of quinolone-resistant *S. aureus* by subinhibitory levels of ciprofloxacin.<sup>6,7</sup> All 17 MRSA isolates were ciprofloxacin resistant. Ten patients had received quinolones in the previous 90 days. None of 11 MSSA isolates was ciprofloxacin resistant and 2 of these patients had received a quinolone. We speculate that the use of antibiotics active against MSSA, but not MRSA, creates a selective advantage for MRSA survival and spread. Exposure to quinolones might facilitate adhesiveness of MRSA and destroy competing flora.<sup>8</sup>

## REFERENCES

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## To the Editor:

In the University Hospital of Saint-Etienne, an increase in the number of methicillin-resistant strains of *Staphylococcus aureus* was observed from 1997 (22% of all *S. aureus* strains) to 1999 (36%; 0.71 per 100 admissions). This increase was associated with outbreaks in different units, as previously described,<sup>1,2</sup> and the detection of methicillin-resistant *S. aureus* (MRSA) nasal carriage in up to 10% of healthcare workers (HCWs). In addition, some of the MRSA strains were shared by patients and colonized HCWs. In several of these outbreaks, approximately half of the student HCWs (nurses and practitioners) were found to be colonized with MRSA (P Berthelot, MD, MPH, PhD, P Fascia, MD, and F. Grattard, MD, PhD, personal communication, 1999).

To investigate this observation during a non-epidemic period, we performed a prospective epidemiologic estimation of the prevalence of methicillin-sensitive and methicillin-resistant strains of *S. aureus* among students of the University Hospital of Saint-Etienne (fellows, medical students, and nursing students) in February 2000. The study also sought to investigate the potential relationship between the prevalence of MRSA nasal carriage and the duration of work at the hospital.

A nasal screening and a questionnaire were offered to each student. Data recorded included gender, HCW category, number of years of hospital work, history of *S. aureus* infection, history of hospitalization in the past 5 years, other household members working in a healthcare institution, household members hospitalized in the past 5 years, sexual partner working in a healthcare institution, and sexual partner hospitalized in the past 5 years. A random sample of HCWs recruited from each of the 50 units of the hospital on a voluntary basis (1 practitioner, 2 nurses, 1 assistant nurse, and 1 cleaning agent per unit) served as a control group. All of the samples were rendered anonymous by the staff of the infection control unit. For both groups, the exclusion criteria were ongoing antibiotic treatment, an evolutive cutaneous infection, pregnancy, and refusal of the protocol.

A total of 561 HCWs participat-

## Is Nasal Carriage of Methicillin-Resistant *Staphylococcus aureus* More Prevalent Among Student Healthcare Workers?