

CONCISE COMMUNICATION

Methicillin-Resistant *Staphylococcus aureus* Colonization of House Officers

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We performed a prospective prevalence survey of methicillin-resistant *Staphylococcus aureus* (MRSA) carriage in the nares of 50 medical and 50 surgical house officers. None of the 50 internal medicine house officers and 5 of the 50 general surgery house officers had MRSA nares colonization ($P = .03$). None of the MRSA isolates recovered from the surgical house officers were identical.

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Recent articles have highlighted the role of methicillin-resistant *Staphylococcus aureus* (MRSA) colonization of healthcare workers in disease transmission,^{1,2} yet little is known about MRSA carriage of physicians in training (ie, house officers). We determined the prevalence of MRSA carriage in medical and surgical house officers, and we asked the participants to complete a questionnaire so we could better understand their perceptions with regard to MRSA, isolation precautions, and personal protective equipment.

METHODS

From January through February 2008, we performed a prospective single-institution prevalence survey of MRSA carriage in the nares of 50 medical and 50 surgical house officers in a teaching hospital licensed for 719 beds. House officers who were attending educational conferences were asked to volunteer for this Investigational Review Board–approved study. Each house officer enrolled in the study completed a brief questionnaire. Decolonization was offered to any house officer found to be colonized with MRSA. A double-swab Dacron collection device with liquid Stewart media (Copan Diagnostics) was used by a single investigator to obtain samples from the anterior vestibule of both nares for culture. Nasal swab samples were transported at room temperature to the microbiology laboratory within 1 hour of collection and were plated to a differential and MRSA-selective chromogenic medium (CHROMagar; Becton Dickinson). Media were evaluated at 24 and 48 hours for colonies consistent with *S. aureus* (ie, mauve color on CHROMagar). All mauve colonies were confirmed with a Staphaurex latex agglutination test (Remel). Microbroth dilution susceptibility profiles were determined using the Vitek 2 system (bioMérieux). All iso-

lates had oxacillin minimum inhibitory concentrations of more than 8 $\mu\text{g}/\text{mL}$. The MRSA chromosomal DNA was digested with the restriction enzyme *Sma*I and was further analyzed by pulsed-field gel electrophoresis (PFGE). The PFGE patterns that clustered at more than 85% similarity with UPGMA (Unweighted Pair Group Method with Arithmetic mean) and Dice coefficients (BioNumerics, version 5.1; Applied Math) were considered to be within the same PFGE type.

RESULTS

Nares cultures were obtained from 50 of 51 general surgery house officers and 50 of 145 internal medicine house officers. We found that 0 of 50 internal medicine house officers and 5 of 50 general surgery house officers had MRSA recovered from culture of nares samples ($P = .03$; Fisher exact test). Among the surgery house officers, 5 of 31 in postgraduate years 1 or 2 had positive MRSA nares cultures, compared with 0 of 19 in postgraduate years 3–10 ($P = .3$; Fisher exact test). The 5 surgical house officers were each colonized with different MRSA strains: 2 isolates were similar to the USA 100 pattern but different from each other; 1 isolate was similar to the USA 800 pattern; 1 isolate matched the USA 300 pattern; and 1 isolate was similar to the USA 600 pattern (Figure).

With regard to questionnaire results, medical house officers were more likely to respond that they always wore a gown when interviewing or examining a patient with known MRSA colonization or infection ($P = .01$; χ^2 test) (Table). None of the other differences in responses to the questionnaire was significant.

DISCUSSION

A recent review article found a minimal difference in the rate of MRSA carriage among medical healthcare workers (4.1%), compared with surgical healthcare workers (4.5%), but it is unclear how many of these medical healthcare workers were house officers.¹ A French study found that 4.2% of 124 fellows (ie, comparable to United States house officers) had nasal MRSA colonization.³ Although our overall 5% prevalence of MRSA nares colonization was similar to these reports, we found a significantly higher prevalence of MRSA nasal carriage in general surgical house officers, compared with the prevalence in medical house officers. We found no MRSA nasal carriage among 16 emergency department residents at our hospital in 2003–2004.⁴ Thus, surgical house officers may have a unique, unappreciated risk of MRSA colonization in hospitals endemic for MRSA infection (ie, the incidence of

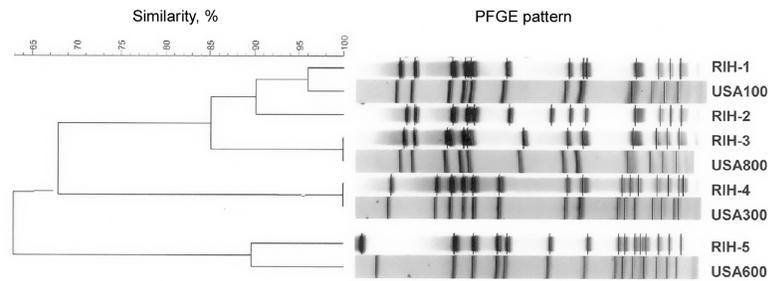


FIGURE. Banding patterns determined by pulsed-field gel electrophoresis (PFGE) and a dendrogram showing the genetic relatedness of the 5 isolates of methicillin-resistant *Staphylococcus aureus* recovered from the nares of surgical house officers from Rhode Island Hospital (RIH).

hospital-wide nosocomial MRSA infections was 0.63 cases per 1,000 patient-days from the first quarter 2007 through the first quarter 2008). There may be a higher risk of MRSA nasal carriage in surgical house officers during postgraduate years 1 and 2. This may reflect a greater responsibility for wound care earlier in their training and less knowledge about infection control during that time. A higher prevalence of MRSA nasal carriage among surgical house officers may be attributable to differences in work assignments, likelihood of contact with patients colonized or infected with MRSA on surgical wards, and/or perceptions with regard to MRSA transmission. From the first quarter of 2007 through the first quarter of 2008, on medical wards and/or ICUs, the incidence of nosocomial MRSA colonization was 1.22 cases per 1,000 patient-days, and the incidence of nosocomial MRSA infection was 0.54 cases per 1,000 patient-days. For the same period, on surgical wards and/or ICUs, the incidence of nosocomial MRSA colonization was 1.23 cases per 1,000 patient-days, and the incidence of nosocomial MRSA infection was 0.96 cases per 1,000 patient-days. Thus, the greater incidence of MRSA-infected patients on surgical services may account for some of the difference we observed.

Medical house officers were more likely to respond affirmatively with regard to the donning of a gown when interviewing or examining a patient with MRSA; however, there were no other significant differences in the questionnaire responses between medical and surgical house officers or between the surgical house officers who had MRSA nares colonization and those who did not (data not shown), but the study was underpowered to detect differences in the latter analysis. Healthcare workers' clothing becomes contaminated after contact with MRSA-colonized or MRSA-infected patients if a gown is not worn, and protective gowns become contaminated if worn after such contact.^{5,6} Thus, the difference in gown use when in contact with patients colonized or infected with MRSA may explain some of the differences we observed between the surgical and medical house officers. The questionnaire responses suggest that the house officers' hand hygiene practice needs improvement. Additionally, educational opportunities exist: house officers do not realize the importance of MRSA transmission that occurs on the hands of healthcare workers.

Our surgical residents were colonized with different MRSA strains, including strains commonly found in community set-

TABLE. Number (%) of House Officers' Responses to a Questionnaire about Transmission of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infection

Question	Always		Sometimes		Never	
	M	S	M	S	M	S
How often do you wear a gown when interviewing and/or examining a patient with known MRSA colonization or infection?	40 (80) ^a	28 (56)	10 (20)	22 (44)
How often do you wear gloves when interviewing and/or examining a patient with known MRSA colonization or infection?	45 (90)	42 (84)	5 (10)	8 (16)
How often do you clean your hands <i>before</i> examining any patient (ie, with or without MRSA carriage)?	17 (34)	20 (40)	32 (64)	28 (56)	1 (2)	2 (4)
How often do you clean your hands <i>after</i> examining any patient (ie, with or without MRSA carriage)?	37 (74)	44 (88)	13 (26)	6 (12)
	Yes		No		Maybe	
Does most MRSA transmission to patients occur from unwashed hands of healthcare workers?	37 (74)	35 (70)	4 (8)	...	9 (18)	15 (30)

NOTE. M, medical house officers; S, surgical house officers.

^a P = .01. No other differences were significant.

tings and those commonly found in healthcare settings. This diversity suggests that the epidemiology of MRSA acquisition is variable among house officers. We have documented transmission of the typical MRSA community strain USA 300 from a patient to healthcare workers at our hospital.⁷ Other researchers have found that typical community-associated MRSA strains can cause outbreaks of infection in healthcare settings,⁸ and sometimes the healthcare setting becomes endemic for infection caused by a community-associated MRSA strain.⁹ Thus, the lines are blurred with regard to the association between MRSA strain and locale.

The extent of transient versus long-term MRSA nasal carriage among our surgical residents is unclear because we did not perform serial cultures. We also did not obtain cultures from different body sites, such as the throat or rectum. Thus, we may have underestimated the prevalence of colonization.¹⁰ Because only one-third of the surgical house officers were included in our study, we cannot rule out selection bias. We hope that future studies will further elucidate the prevalence and duration of MRSA carriage in house officers and the risk factors associated with such carriage, will delineate the impact of such carriage on transmission risk to patients, and will determine the risk of infection among colonized house officers.

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