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Illicit drug users, alcoholics, and psychiatric patients: *Staphylococcus aureus* and methicillin-resistant *Staphylococcus aureus* colonization on the border between community and healthcare settings

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To the Editor—Even though methicillin-resistant *Staphylococcus aureus* (MRSA) colonization and infections have been extensively reported among users who inject illicit drugs,^{1,2} studies addressing other illicit drug users (IDUs),³ alcoholics and psychiatric patients are scarce.⁴ Those latter groups are of special concern when admitted to acute-care or long-term care facilities. In these settings, MRSA colonization may be a predisposing factor for invasive infection and/or for spread of potentially hazardous clones.⁵ With that in mind, we conducted a survey for asymptomatic colonization with overall *Staphylococcus aureus* and MRSA among patients from 2 psychiatric care hospitals in Botucatu, inner Brazil. Notably, the use of injection drugs is extremely rare in this country, while there is endemic prevalence of use of inhaled cocaine, crack cocaine and marijuana smoking, and abuse of alcoholic beverages.⁶

The study was conducted a reference hospital for short-term admissions of IDUs and alcoholics (70 beds) and a psychiatric hospital with both short and long-term admissions (80 beds). Nasal and oropharyngeal swabs were collected from patients upon admission, except for those in long-term care, who had their swabs

collected during their hospital stay, which often lasted years. Species identification and antimicrobial susceptibility tests followed current microbiology practices. MRSA was characterized by amplification of the *mecA* gene and typing of the staphylococcal chromosome cassette (SCC*mec*). Molecular strain typing was performed with *smal*- or *Apa*I-based pulsed-field gel electrophoresis (PFGE). A questionnaire was applied to study subjects in the moment of the collection of swabs, and extensive review of their medical charts was performed. Briefly, we assessed information on demographics, sexual behavior, history of previous incarceration, patterns of use of alcohol and illicit drugs. We also recorded the following data for the year previous to inclusion in our study: admissions to acute-care hospitals, invasive procedures (including surgeries), use of antimicrobials, respiratory infection, and skin or soft-tissue infections. Statistical analysis including univariate and multivariable (Poisson regression) models was performed using SPSS version 20 software (IBM, Armonk, NY). We used a stepwise forward strategy to select variables for the multivariable models, with $P < .10$ as a criteria for both entering and staying in the models.

In total, 220 subjects were included in our study: 138 from the IDU/alcoholics facility and 82 from the psychiatric hospital. Overall *S. aureus* and MRSA colonization prevalence rates were as follows: (1) IDUs/alcoholics facility, 28.3% (95% confidence interval [CI], 20.1%–36.6%) for *S. aureus* and 2.9% (95% CI, 0.8%–7.3%) for MRSA and (2) psychiatric hospital, 24.3% (95% CI, 15.6%–35.1%) for *S. aureus* and 7.3% (95% CI,

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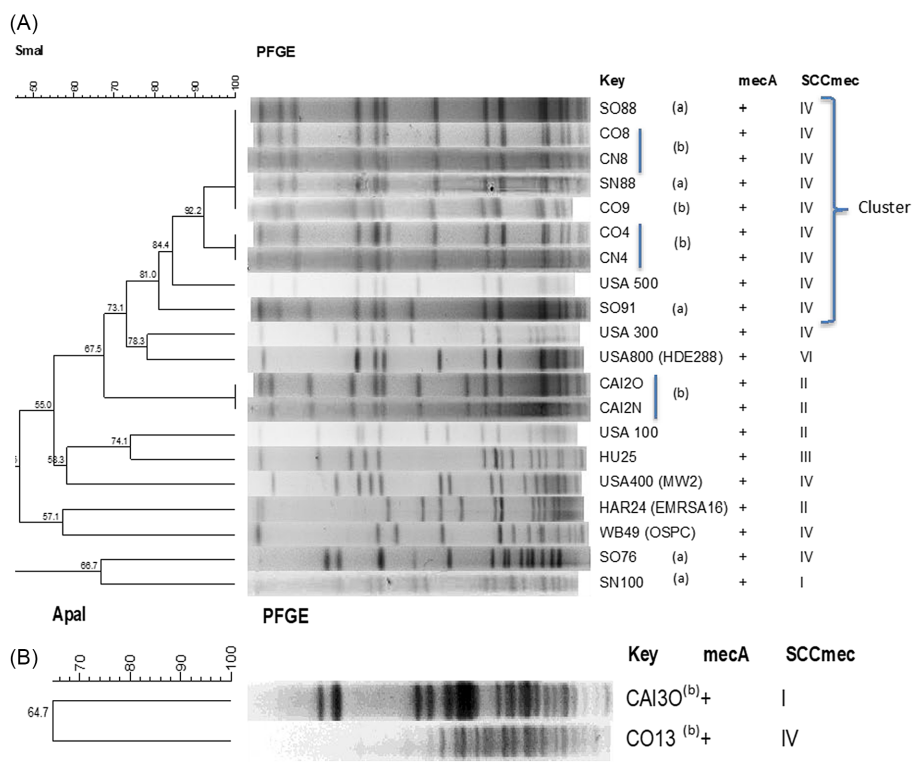


Fig. 1. Dendrograms showing MRSA isolates recovered in the study, together with international reference clones. (A) Isolates typed with *SmaI*. (B) Isolates that required *ApaI* for typing. Isolates from the same subject are grouped with vertical lines. The origin of isolates was as follows: (a) subjects in hospital for drug and alcohol addiction (HRCAD); (b) subjects from the psychiatric hospital (CPA). Note. N, nasal swab; O, oropharyngeal swab.

2.7%–15.3%) for MRSA. Notably, in this latter psychiatric hospital, patients in acute-care admissions presented significantly ($P < .05$) higher prevalence of both *S. aureus* (39.4% vs 14.3% in long-term residents) and MRSA (12.1% vs 4.1%).

The analysis of predictors for *S. aureus* colonization is presented in Supplementary Tables 1 and 2 (online). Briefly, among patients from the IDU/alcoholics facility, the use of inhaled cocaine was associated with greater likelihood of colonization (prevalence ratio [PR], 2.26; 95% confidence interval [CI], 1.02–5.00; $P = .04$). Among patients admitted to the psychiatric hospital, overall *S. aureus* colonization was negatively associated with age (PR, 0.96; 95% CI, 0.93–0.99; $P = .03$).

Supplementary Table 3 (online) lists the characteristics of 10 patients harboring MRSA. Briefly, 5 had diagnoses of alcoholism, 5 used illicit drugs (mostly crack cocaine), and 4 reported previous hospital admissions. Counterintuitively, study participants with recent hospital admissions carried MRSA with the usually community-associated SCCmec type IV. The number of patients colonized with MRSA was too small to warrant statistical analysis of predictors, yet molecular typing results were noteworthy. MRSA isolates harbored SCCmec types IV (7 patients), II (2 patients) and I (1 patient). There was no association of SCCmec type with previous hospital admissions. Most remarkably, a single similarity cluster grouped 5 of 10 MRSA identified in our survey, along with the USA500 clone (Fig. 1).

In the past decade, it has been increasingly recognized that the classical distinction between community-associated (CA-) and healthcare-associated (HA-) MRSA is not precise.⁷ Hospitals that harbor short- and long-term patients with behavioral disorders are an interesting, perhaps intermediate, setting for MRSA transmission. Not surprisingly, we found both clones that are usually associated with community-associated (type IV) and healthcare-associated (type I and II) MRSA infections. Interestingly, the

patients colonized with SCCmec I and II isolates reported no history of recent hospital admissions.

We interpret our findings to indicate potential instances of introduction of MRSA strains in the hospitals, either from IDUs or patients recently admitted with psychiatric disorders. The presence of a cluster grouping half MRSA isolates is noteworthy. Although some transfer of patients between the 2 hospitals occurred, no MRSA carrier in this study had been admitted to both facilities. Transmission in community networks of illicit drug users is always possible, and this hypothesis is coherent with findings of previous studies.^{8,9} Also, interesting simulations using agent-based modelling have emphasized the relevance of community networks in the spread of MRSA clones.¹⁰

In this study, SCCmec types usually related to community-associated (type IV) and healthcare-associated infections (types I and II). However, there was no epidemiological link between SCCmec type and previous history of admission to an acute-care hospital.

Our study has some limitations, including the relatively small sample population. Also, we did not perform multilocus sequence typing (MLST). However, the simultaneous use of molecular and classical epidemiology strengthened the analysis of our findings.

In conclusion, overall *S. aureus* colonization was similar to that in the general population, but we found relevant rates of MRSA carriage among the study groups. Those patients may be either at greater risk for MRSA infection or act as spreaders of potentially hazardous clones. In both cases, they constitute a target population for interventions aimed at preventing and controlling severe staphylococcal infections.

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