Is Methicillin-Susceptible *Staphylococcus aureus* (MSSA) Sequence Type 398 Confined to Northern Manhattan? Rising Prevalence of Erythromycin- and Clindamycin-Resistant MSSA Clinical Isolates in the United States

To the Editor—We read with great interest the study by Uhlemann et al [1] reporting the emergence of methicillin-susceptible *Staphylococcus aureus* (MSSA) clone sequence type (ST) 398 as a major community- and hospital-associated pathogen in the Dominican neighborhood of northern Manhattan. The authors report certain unique antimicrobial susceptibility patterns among the 64 nonbloodstream ST398 MSSA isolates compared to controls (non-ST398 MSSA isolates). In this study, 97% (62/64) of ST398 MSSA isolates were resistant to both erythromycin and clindamycin compared to 38% of controls. Also, none of the ST398 MSSA isolates were resistant to both erythromycin and clindamycin compared to 38% of controls. Also, none of the ST398 MSSA isolates were resistant to tetracycline. Similar findings were reported in a French study of 17 ST398 MSSA strains isolated from bloodstream infections [2]. In this study, 88.2% (15/17) of ST398 MSSA strains were resistant to erythromycin compared to 8.7% (52/598) of non-ST398 MSSA strains and none of these 17 strains were resistant to tetracycline. Several other studies reported a similar susceptibility pattern [3–5]. Assuming that this pattern of antimicrobial susceptibility could be the phenotypic expression of ST398 MSSA, we examined the national trends of MSSA susceptibility to erythromycin, clindamycin, and tetracycline using a large database of clinical isolates from across the United States.

We used data for antimicrobial susceptibility from The Surveillance Network Database–USA (Eurofins-Medinet, Chantilly, Virginia). This dataset has been widely used to characterize regional and national trends in antibiotic susceptibility [6–9]. The analysis considered all outpatient and inpatient (including intensive care units) MSSA isolates reported between January 1999 and December 2011 and examined the national and regional proportions of MSSA that was resistant to both erythromycin and clindamycin and susceptible to tetracycline. The data were filtered to retain only MSSA isolates from blood, wounds, and respiratory tract. Categorical susceptibility results are based on the Clinical and Laboratory Standards Institute criteria adopted by the facility at time of testing.

Of the 979,587 nonduplicate MSSA isolates in the data, 800,870 were tested against all 3 drugs (erythromycin, clindamycin, and tetracycline). The percentage of MSSA isolates that were resistant to both erythromycin and clindamycin and at the same time susceptible to tetracycline increased from 2.7% in 1999 to 10.1% in 2011, peaking at 11.2% in 2008. The Northeast region (excluding the state of New York) has 16% of these isolates compared to the national average of 10.1% in 2011. Similarly, New York has a very high percentage of these isolates compared to other Northeastern states (see Figure 1 for yearly national and regional trends).

The significant increase in the proportion of MSSA isolates that are resistant to both erythromycin and clindamycin and susceptible to tetracycline from 1999 to 2011 in the United States raises the question of whether the strain ST398 MSSA is confined to northern Manhattan. We acknowledge that our findings are not specific to ST398 MSSA and a significant proportion of non-ST398 MSSA isolates...
could have a similar pattern of antimicrobial susceptibility as reported in this study. However, these findings have important epidemiological implications. Our results identify regions of high prevalence (New York and neighboring states) of erythromycin- and clindamycin-resistant MSSA, which will aid in selectively screening for the presence of ST398 and motivate future research into the molecular epidemiology of this strain.

Note

Potential conflicts of interest. All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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Figure 1. Percentage of methicillin-susceptible Staphylococcus aureus (MSSA) isolates that were resistant to clindamycin and erythromycin and susceptible to tetracycline, 1999–2011. The line graph shows the annual percentage of MSSA isolates in The Surveillance Network (TSN) database resistant to clindamycin and erythromycin and susceptible to tetracycline. Results are shown at the national level, New York state, and the four US census regions (excluding New York state). Numbers are shown for the national-level data. Categorical susceptibility results in TSN are based on the Clinical and Laboratory Standards Institute criteria adopted by participating facilities at the time of testing.