California Department of Public Health
MEMORANDUM

Date: June 25, 2009

To: The Record

From: Infectious Diseases Branch
Division of Communicable Disease Control
Center for Infectious Diseases
850 Marina Bay Parkway
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Subject: CA EPI 09-02: Severe *Staphylococcus aureus* Infections, Community-Associated, First Year of Reporting, 2008-09

We are pleased to provide the following report summarizing these surveillance data, which were collected by the California Department of Public Health in collaboration with local health departments.

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Summary

This report is a summary of the first year of reporting community-associated severe *Staphylococcus aureus* (*S. aureus)* infections. The reporting period summarized was from February 14, 2008 through February 28, 2009. There were 186 cases reported to the California Department of Public Health (CDPH) from 32 counties; among these, there were 70 deaths (38% of cases). Nearly two-thirds of *S. aureus* isolates were methicillin-resistant; all others were methicillin-sensitive.

Background

In response to the significant public health burden and potential severity of community-associated *S. aureus* infections, the CA Code of Regulations ch. 4 §2500, §2593, §2641.5-2643.20, §2800-2812 was amended to require healthcare providers to report cases of severe community-associated *S. aureus* infections to local health departments. This condition became reportable on February 14, 2008. Individual cases are reported on a standard case report form developed by CDPH.

Methods

Surveillance Case Definition

A case of community-associated severe *S. aureus* infection is defined as a laboratory-confirmed *S. aureus* infection in a person resulting in admission to an intensive care unit (ICU) or death who had not been hospitalized or had surgery, dialysis, or residency in a long-term care facility in the year prior to illness, and did not have an indwelling catheter or percutaneous medical device at the onset of illness. If any of these conditions were present, the case would have been considered healthcare-associated.

Data Collection

Potential cases are initially reported by healthcare providers to local health departments. Most reporting providers are hospital infection preventionists or related hospital staff. There are two sets of concerns in determining whether a patient meets the surveillance case definition: (1) did the patient have a *S. aureus* infection that resulted in admission to an ICU or death, and (2) did the patient have any of the factors that would result in classification as a healthcare-associated instead of a community-associated case? CDPH issued written instructions on data collection to local health departments that included (1) relying on the judgment of clinicians responsible for the patient's care regarding the nature of the illness, and (2) leaving to the local health department the decision to interview patients or relatives regarding past medical history rather than relying on the information in the medical record. Local health departments vary in the degree of follow-up they conduct for patients.

Data are reported to CDPH using a standard case report form developed by the department and modified slightly during the year. Case report forms are reviewed by a subject matter expert to determine case status, and those which meet the surveillance case definition are entered into a database.

Results

Description of Cases

The descriptive results are shown in Tables 1 through 3. In the first year of reporting (February 14, 2008 through February 28, 2009), 186 cases of community-associated severe *S. aureus* infection were reported from 32 counties to CDPH (Table 1). The median age among patients was 53 years, with the youngest being 11 days and the oldest 94 years (Table 2). Nearly two-thirds (62%) of patients were male. The majority were White (70%; race was unknown for 18% of patients); 22% of patients were of Hispanic/Latino ethnicity (ethnicity was unknown for 28% of patients).

Bacteremia (defined as a positive blood culture) was diagnosed in 120 patients (65% of the cases). Of these, 28 (25%) had bacteremia only, while the majority had bacteremia in conjunction with another type of infection. Pneumonia was diagnosed in 77 patients (41% of cases), of which 34 (44%) had pneumonia only and 34 (44%) had pneumonia together with bacteremia. Susceptibility to methicillin was included for all cases reported; a majority of isolates was methicillin-resistant (117, 63%).

The most common medical conditions reported were diabetes (20%), current smoker (16%), emphysema/chronic obstructive pulmonary disease (COPD, 11%), alcohol abuse (10%), injecting drug use (IDU, 10%), liver disease (6%), and asthma (5%, Table 3). Other medical conditions reported among patients included hypertension, coronary artery disease, drug abuse (not IDU), and thyroid disorders. Nearly all patients (183, 98%) were hospitalized (three died without hospitalization) and 70 (38%) died. Most surviving patients had infections that had resolved at the time of report. The median number of days from illness onset to hospital admission was three (range 0-33). The median number of days between illness onset and death was four (range 0-49 days). No verification of the actual onset date has been made.

Description of Deaths

Table 4 lists the characteristics of patients who died. The median age of the 70 patients who died was 56 years (range 7-94 years). Among those who died, 42 (60%) were male. Most of the patients who died were White (71%; race was unknown for 17% of these patients); 24% of Hispanic/Latino (ethnicity was unknown for 34% of these patients). The most common infections among patients who died were pneumonia (38%), bacteremia only (27%), and skin/soft tissue infection (5%). The majority (60%) of patients who died had isolates that were resistant to methicillin. The most common medical conditions

among severe *S. aureus* deaths were diabetes (17%), current smoker (17%), alcohol abuse (14%), injecting drug use (11%), emphysema/COPD (11%), liver disease (8%), and asthma (8%).

Nearly all patients who died (67, 96%) were hospitalized. The median number of days between illness onset and hospitalization among severe *S. aureus* deaths was two (range 0-30 days). The median number of days between illness onset and death was four (range 0-49 days).

Limitations of the Surveillance Data

Surveillance data, especially data from a passive surveillance system, should be analyzed and interpreted with caution. Because reporting of severe *S. aureus* infections is passive, CDPH relies on providers and local health departments to submit case report forms. Competing demands on time and staffing impact the amount of follow-up at a local health department. Some local health departments have dedicated staff to follow up on each case report to determine whether the patient meets all criteria of the case definition. Other local health departments rely solely on information that is provided in the medical record to determine whether the case should be reported. As a result, there may be cases that are not reported or are misclassified, especially if medical history information is not available.

The management of patients with severe *S. aureus* infection may vary by hospital depending on a particular facility's resources and approach to treatment of specific conditions. In other words, a patient with severe *S. aureus* infection may be treated in an ICU in one hospital but in a non-ICU ward in another hospital, so that the same patient might be reported to the local health department in the first situation but not the second. Overall this may result in underreporting statewide. Also, it was difficult to determine for some patients whether death or ICU admission was primarily due to the *S. aureus* infection, or if the infection was secondary to another acute illness or condition.

Finally, although the severe *S. aureus* surveillance data may be underreported due to the limitations noted above, data on methicillin susceptibility were complete for all case reports. The proportion of isolates that was reported as methicillin-resistant is consistent with what has been published from similar surveillance data. This indicates that the cases reported during the first year are representative of the population at risk for severe community-associated *S. aureus* infection.

CDPH has modified the case report form based on data that have been collected and in anticipation of transitioning to a web-based disease reporting system. This will help capture data in a more accurate and systematic way. Community-associated severe *S. aureus* infections will continue to be a reportable disease in California. CDPH thanks all local health departments and healthcare providers for their dedication and participation in reporting community-associated severe *S. aureus* infections.

Table 1. Severe *Staphylococcus aureus* case counts by county.

County	Number (%)
Total number of cases	186
Los Angeles	27 (14%)
Orange	23 (12%)
Fresno	14 (7%)
San Bernardino	13 (7%)
Contra Costa	11 (6%)
Alameda	10 (5%)
Humboldt	10 (5%)
Riverside	8 (4%)
Sacramento	8 (4%)
San Diego	7 (3%)
Sonoma	7 (3%)
Kern	5 (2%)
Monterey	5 (2%)
San Francisco	5 (2%)
Stanislaus	5 (2%)
Santa Clara	4 (2%)
Imperial	3 (1%)
Tulare	3 (1%)
Amador	2 (1%)
El Dorado	2 (1%)
Placer	2 (1%)
Tuolumne	2 (1%)
Calaveras	1 (0.5%)
Marin	1 (0.5%)
Mendocino	1 (0.5%)
Merced	1 (0.5%)
San Benito	1 (0.5%)
San Joaquin	1 (0.5%)
San Luis Obispo	1 (0.5%)
Santa Cruz	1 (0.5%)
Siskiyou	1 (0.5%)
Solano	1 (0.5%)

Table 2. Characteristics of severe *Staphylococcus aureus* infections reported to the California Department of Public Health between February 14, 2008 and February 28, 2009.

Indicators	Number (%)*
Total number of cases	186
Median age (years)	53
Minimum, Maximum	11 days, 94 years
Sex	
Male	116 (62%)
Female	70 (38%)
Race	
White	131 (70%)
African American	13 (7%)
Asian/Pacific Islander	9 (5%)
Unknown	33 (18%)
Ethnicity	
Hispanic/Latino	41 (22%)
Non-Hispanic/non-Latino	92 (49%)
Unknown	53 (28%)
Type of infection**	
Bacteremia total	120 (65%)
Bacteremia only	*28/120 (23%)*
Pneumonia total	77 (41%)
Pneumonia only	*34/77 (44%)*
Pneumonia and bacteremia	*34/77 (44%)*
Pneumonia and other	*9/77 (12%)*
Skin/soft tissue	42 (23%)
Other	67 (36%)
Isolate	
MRSA†	117 (63%)
MSSA‡	69 (37%)

*Percents may not add up to 100% due to rounding. **Patients may have more than one condition.
†MRSA: Methicillin-resistant *Staphylococcus aureus*
‡MSSA: Methicillin-sensitive *Staphylococcus aureus*

Table 3. Conditions, hospitalizations, and deaths among severe *Staphylococcus aureus* infections, reported to CDPH between February 14, 2008 and February 28, 2009.

Other Indicators	Number (%)
Total number of cases	186
Medical conditions*	
Diabetes	38 (20%)
Current smoker	30 (16%)
Emphysema/COPD	21 (11%)
Alcohol abuse	19 (10%)
Injecting drug use	19 (10%)
Liver disease	11 (6%)
Asthma	10 (5%)
Other	86 (46%)
Hospitalized	183 (98%)
Median days between onset and hospitalization**	3.0
Minimum, Maximum	0, 33 days
Deaths	70 (38%)
Median days between onset and death**	4.0
Minimum, Maximum	0, 49 days

*A patient may have more than one condition. **No verification on actual onset date.

Table 4. Characteristics of patients with severe *Staphylococcus aureus* who died.

Indicators	Number (%)*
Total number of deaths	70
Median age (years)	56
Minimum, Maximum	7, 94
Sex	
Male	42 (60%)
Female	28 (40%)
Race	
White	50 (71%)
African American	6 (8%)
Asian/Pacific Islander	2 (3%)
Unknown	12 (17%)
Ethnicity	
Hispanic/Latino	17 (24%)
Non-Hispanic/non-Latino	29 (41%)
Unknown	24 (34%)
Type of infection (includes only selected infections)**	
Pneumonia	27 (38%)
Bacteremia only	19 (27%)
Skin/soft tissue	4 (5%)
Isolate	
MRSA†	42 (60%)
MSSA‡	28 (40%)
Medical conditions**	
Diabetes	12 (17%)
Current smoker	12 (17%)
Alcohol abuse	10 (14%)
Emphysema/COPD	8 (11%)
Injecting drug use	8 (11%)
Liver disease	6 (8%)
Asthma	6 (8%)
Other	28 (40%)
Hospitalized	67 (96%)
Median days between onset and hospitalization***	2.0
Minimum, Maximum	0, 30 days
Median days between onset and death***	4.0
Minimum, Maximum	0, 49 days

*Percents may not add up to 100% due to rounding. **A patient may have more than one condition
***No verification on actual onset date.
†MRSA: Methicillin-resistant *Staphylococcus aureus*
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