# Emerging Infections Program Network Report
# Methicillin-Resistant *Staphylococcus aureus*, 2015

## EIP Areas

California (3 county San Francisco Bay area); Connecticut; Georgia (8 county Atlanta area); Minnesota (2 metro Twin City counties); New York (1 Rochester county); Tennessee (1 Nashville county).
**Note: The population under surveillance changed from 2014; it was reduced by 10 counties located in 3 states.**

## Population

The surveillance areas represent 14,402,040 persons
Source: National Center for Health Statistics bridged-race vintage 2015 postcensal file.

## Case Definition

Invasive methicillin-resistant *Staphylococcus aureus* (MRSA) disease:  isolation of MRSA from a normally sterile site in a resident of the surveillance area in 2015.  Cases of disease are classified into one of three epidemiologic classifications.  A case is classified as hospital-onset (HO) if the MRSA culture was obtained on or after the fourth calendar day of hospitalization, where admission is hospital day 1; as healthcare-associated community-onset (HACO) if the culture was obtained in an outpatient setting  or before the fourth calendar day of hospitalization and had one or more of the following: 1) a history of hospitalization, surgery, dialysis, or residence in a long term care facility in the previous year, or 2) the presence of a central vascular catheter (CVC) within 2 days prior to MRSA culture; and as community-associated (CA) if none of the previously mentioned criteria are met.

## Methodology

EIP personnel routinely contacted all microbiology laboratories serving healthcare facilities in their area to identify cases. Standardized case report forms that include information on demographic characteristics, clinical syndrome, and outcome of illness were completed for each identified case. Convenience samples of isolates were collected and sent to CDC for routine testing, including antimicrobial susceptibility testing, toxin testing, *SCCmec* typing, and spa typing. Pulsed field gel electrophoresis (PFGE) of all isolates was discontinued in 2008; up until 2012, PFGE was inferred based on a validated algorithm (http://www.cdc.gov/HAI/settings/lab/inferred-PFGE-algorithm.html).  Starting in 2012, spa typing was added to the routine laboratory testing.  Pulsed field type is currently inferred based on spa type, inferred MLST clonal complex and molecular characteristics of the isolates (http://www.cdc.gov/HAI/settings/lab/CCalgorithm.html).  In 2015, isolates were only collected in three sites (Georgia, Minnesota, and Tennessee). Regular laboratory audits were performed to ensure completeness of case detection.

In 2015, some sites collected limited data from most hospital-onset cases, with full case report form data collected only for a random sample of 10–25% of hospital-onset cases.  Data not collected because of sampling were estimated based on the distribution of collected data to calculate incidence.  Detailed case data below only reflect data from full case report forms unless otherwise specified.  Rates of invasive MRSA disease among all patients were calculated using population estimates for 2015.  Cases with unknown race were assigned race based on distribution of known age, race, and gender by EIP site.

Rates of invasive MRSA disease among patients who were undergoing chronic dialysis treatment were calculated using the December 31, 2014 point prevalent counts of patients on dialysis from the United States Renal Data System (USRDS) (http://www.usrds.org/adr.htm).

## Results

### Reported Race among 2,705 Cases

| Race | No.  (Rate [a]) |
|------|-----------------|
| White | 1665 (17.7) |
| Black | 919 (29.9) |
| Other | 121 (6.4) |

Unknown race (n=321) distributed amongst known
[a] Cases per 100,000 population for EIP areas (crude rates)

### Reported Cases on Chronic Dialysis (n=365)

| Dialysis and Access Type | No.  (%) |
|--------------------------|----------|
| Type of dialysis | |
| Peritoneal | 18 (4.9) |
| Hemodialysis[a] | 346 (94.8) |
| AV Fistula/Graft | 172 (49.7) |
| CVC | 168 (48.6) |
| Unknown | 8 (2.3) |
| Unknown | 1 (0.3) |

[a] Two patients had AV Fistula/Graft and CVC

### Cases, Deaths & Inferred PFGE Type by Epidemiological Classification

| MRSA Class | No. (Rate) Cases [b] | No. (Rate) Deaths [c] | No. (%) Inferred PFGE Type | | | |
|------------|----------------------|-----------------------|---------|---------|---------|------------------|
| | | | Total N | USA100 | USA300 | USA500/ Iberian |
| CA | 560 (3.9) | 53 (0.4) | 85 | 8(9.4) | 56 (65.9) | 5 (5.9) |
| HCA [a] | 2117 (14.8) | 279 (1.9) | 372 | 141 (37.9) | 124 (33.3) | 59 (15.9) |
| HO | 439 (3.1) | 74 (0.5) | 75 | 34 (45.3) | 22 (29.3) | 14 (18.7) |
| HACO | 1678 (11.7) | 205 (1.4) | 297 | 107 (36.0) | 102 (34.3) | 45 (15.2) |

[a] HCA: Healthcare-associated invasive MRSA infection; sum of patients that are classified as either the HO or HACO classes
[b] n= 28 epidemiologic category unknown
[c] n=2 epidemiologic category unknown.  HO rate imputed from a sample of cases.

**Reported Clinical Syndrome by Epidemiological Class**

| Syndrome [a] | CA (n=560) No. (%) | HACO (n=1678) No. (%) | HO (n=133) No. (%) |
|---|---|---|---|
| Bloodstream Infection [b] | | | |
| with other syndrome | 343 (61.3) | 946 (56.4) | 47 (35.3) |
| with no other syndrome | 87 (15.5) | 495 (29.5) | 62 (46.6) |
| Pneumonia | 72 (12.9) | 220 (13.1) | 19 (14.3) |
| Osteomyelitis | 98 (17.5) | 241 (14.4) | 13 (9.8) |
| Endocarditis | 56 (10.0) | 93 (5.5) | 2 (1.5) |
| Cellulitis | 140 (25.0) | 178 (10.6) | 12 (9.0) |
| Wounds | | | |
| Surgical [c] | 9 (1.6) | 113 (6.7) | 2 (1.5) |
| Decubitus/Pressure Ulcers | 10 (1.8) | 60 (3.6) | 1 (0.8) |
| Skin Abscesses [d] | 63 (11.3) | 69 (4.1) | 2 (1.5) |
| Other Wounds [e] | 13 (2.3) | 89 (5.3) | 1 (0.8) |
| Traumatic | 2 (0.42) | 3 (0.2) | 0 (0.0) |

[a] Some case patients had more than one syndrome.
[b] Catheter site infection or AV fistula infection only are included in BSI with other syndrome.
[c] Combines deep tissue/organ infection and infection of a surgical wound, post operatively.
[d] Category includes skin abscess, necrotizing fasciitis, gangrene.
[e] Category includes non-traumatic and other chronic wound infections.

**Number and Incidence Rates of Invasive MRSA Infections by Dialysis Status and Epidemiologic Category**

| Epidemiologic Category | Dialysis Status | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Non-Dialysis Patients[a] | | | | Dialysis Patients[b] | | | | Total[a] | | | |
| | 2014[e] | | 2015 | | 2014[e] | | 2015 | | 2014[e] | | 2015 | |
| | No. | Incidence Rate | No. | Incidence Rate | No. | Incidence Rate | No. | Incidence Rate | No. | Incidence Rate | No. | Incidence Rate |
| CA | 692 | 4.9 | 560 | 3.9 | 0 | 0 | 0 | 0 | 692 | 4.9 | 560 | 3.9 |
| HCA | 1875 | 13.2 | 1695 | 11.8 | 472 | 1637.9 | 422 | 1478.6 | 1866 | 16.5 | 2117 | 14.8 |
| HO | 443 | 3.1 | 378 | 2.6 | 38 | 137.5 | 61 | 213.7 | 481 | 3.4 | 439 | 3.1 |
| HACO | 1432 | 10.1 | 1317 | 9.2 | 434 | 1570.4 | 361 | 1264.9 | 1866 | 13.1 | 1678 | 11.7 |
| Overall[c] | 2589 | 18.9 | 2283 | 15.9 | 472 | 1707.9 | 422 | 1478.7 | 3061 | 21.5 | 2705 | 18.8 |

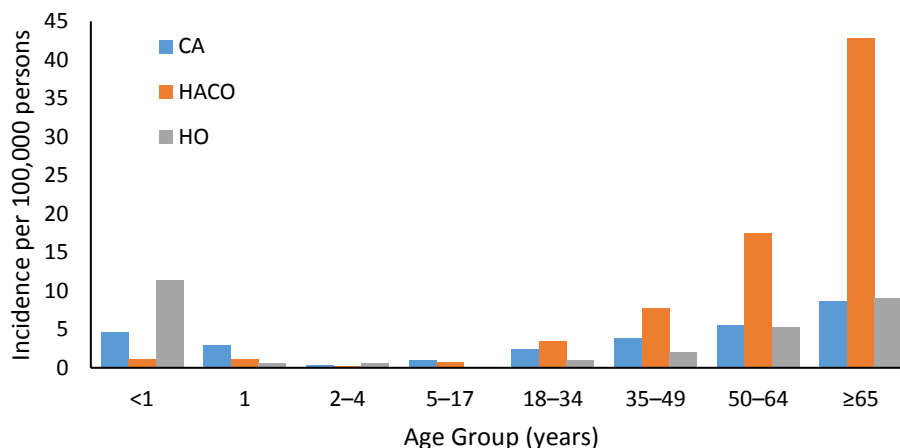[a] Incidence (no. per 100,000 population per year) are calculated using 2014 and 2015 US Census Data.
[b] Incidence (no. per 100,000 dialysis patients per year) for dialysis patients are calculated using 2013 and 2014 USRDS point prevalence data.
[c] Non-dialysis and dialysis estimated number and incidence based on data from a sample of HO cases.
[d] 38 cases could not be classified into an epidemiological category or category is unknown and therefore are counted in the overall estimate **only**
[e] 2014 data limited to the reduced 2015 catchment area and therefore will not be equal to incidence in the 2014 annual report.

## Incidence of Invasive MRSA, by Epidemiological Class and Age Group, 2015

## Discussion

Surveillance data from 2015 represents the eleventh full year of performing population-based surveillance for invasive MRSA infections through the Emerging Infections Program.  Compared to 2014, incidence of invasive HCA MRSA decreased by 10%.

Beginning in 2015, MRSA targets for the HHS Action Plan are calculated using a different methodology and are no longer included in this report.

## Citation

1. Centers for Disease Control and Prevention. 2015. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, Methicillin-Resistant *Staphylococcus aureus*, 2015*.*  Available via the Internet: https://www.cdc.gov/hai/eip/pdf/2015-mrsa-annual-summary.pdf
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