



Active Bacterial Core Surveillance (ABCs) Report

Emerging Infections Program Network

Methicillin-Resistant *Staphylococcus aureus*, 2009



ABCs Areas

California (3 county San Francisco Bay area); Colorado (5 Denver area county); Connecticut; Georgia (8 county Atlanta area); **Maryland (Baltimore City and County)**; Minnesota (2 metro Twin City counties); New York (1 Rochester county); Oregon (3 county Portland area); Tennessee (1 Nashville county). Note, the population under surveillance changed from 2008 (Bold).

ABCs Population

The surveillance areas represent **19,311,576** persons

Source: National Center for Health Statistics bridged-race vintage 2009 postcensal file.

ABCs 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 2009. 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 of 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 within 2 days prior to MRSA culture; and as community-associated (CA) if none of the previously mentioned criteria are met.

ABCs Methodology

ABCs personnel routinely contacted all microbiology laboratories serving acute care hospitals 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 and *SCCmec* typing. Pulsed field gel electrophoresis (PFGE) of all isolates was discontinued in 2008; an inferred PFGE algorithm was developed based on microbiologic and molecular characteristics of isolates. The algorithm has been validated for use with isolates collected though this surveillance only (<http://www.cdc.gov/HAI/settings/lab/inferred-PFGE-algorithm.html>). Regular laboratory audits were performed to ensure completeness of case detection.

Rates of invasive MRSA disease among all patients were calculated using population estimates for 2009. Cases with unknown race were assigned race based on distribution of known race and gender by EIP site. Confidence intervals for nationally estimated incidence rates of disease and mortality were calculated based on the gamma distribution (Stat Med, 1997 16:791-801). Rates of invasive MRSA disease among patients who are undergoing chronic dialysis treatment were calculated using the December 31, 2008 point prevalent counts of patients on dialysis from the United States Renal Data System (USRDS) (<http://www.usrds.org/adr.htm>).

ABCs Results

Reported Racial/Ethnic ABCs Profiles

Race	No. (Rate) ^a
White	3,301 (23.7)
Black	2,067 (57.6)
Other	237 (13.3)

Unknown race (n=642) distributed amongst known

^a Cases per 100,000 population for ABCs areas (crude rates)

Distribution of cases, deaths and PFGE type by Epidemiological Classification

MRSA Class	No. (Rate) Cases ^b	No. (Rate) Death ^c	Inferred PFGE Type (n,%) ^d			
			Tot N	USA100	USA300	USA500/Iberian
CA	982 (5.1)	102 (0.5)	300	63 (21.0)	213 (71.0)	9 (3.0)
HCA ^a	4,508 (23.3)	720 (3.7)	1,037	560 (54.0)	353 (34.0)	82 (8.9)
HO	1,198 (6.2)	281 (1.5)	264	150 (56.8)	80 (30.3)	28 (10.6)
HACO	3,310 (17.1)	439 (2.3)	773	410 (53.0)	273 (35.3)	64 (8.3)

^a HCA: Healthcare-associated invasive MRSA infections; sum of patients that are classified as either HO or HACO

^b n= 115 epidemiologic category unknown

^c n=10; epidemiologic category unknown

^d isolates were eligible for testing at CDC

Reported Cases on Chronic Dialysis (n=1003)

Dialysis and Access Type	No. (%)
Type of dialysis	
Peritoneal	28 (2.8)
Hemodialysis	973 (97.0)
AV Fistula/Graft	339 (34.8)
CVC	550 (56.5)
Unknown	84 (8.6)
Unknown	0 (0)

Reported Clinical Syndrome by Epidemiological Class

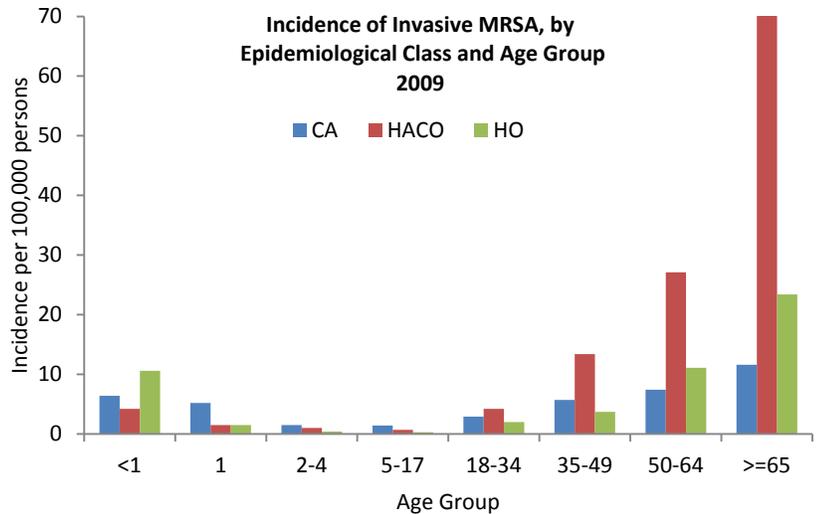
Syndrome ^a	CA (n=982)	HACO (n=3310)	HO (n=1198)
Bloodstream infection			
with other syndrome	551	1813	468
with no other syndrome	205	1063	461
Pneumonia	175	461	243
Lower Respiratory Infection ^b	61	123	93
Osteomyelitis	125	374	114
Endocarditis	79	178	44
Cellulitis	175	260	70
Wounds			
Surgical ^c	15	194	59
Decubitus/Pressure Ulcers	32	150	35
Other wounds/skin abscesses ^d	16	39	9
Traumatic	18	13	12

^a Some case patients had more than one syndrome.

^b Lower Respiratory Infection is defined as: a patient with pneumonia documented in their discharge summary, who has a positive MRSA non-sterile respiratory specimen with accompanying chest radiology results documenting any of the following: bronchopneumonia/pneumonia, air space density/opacity, new or changed infiltrates.

^c Combines deep tissue/organ infection and infection of a surgical wound, post operatively.

^d Category includes skin abscess, necrotizing fasciitis, gangrene, non-traumatic wounds.



National Estimates and Adjusted Incidence Rates for Mortality among Cases

Epidemiologic Class	Estimated No.	Mortality Rate (Confidence Interval) ^a
CA	1,675	0.55 (0.44-0.67)
HCA	12,262	4.00 (3.71-4.32)
HO	4,786	1.56 (1.38-1.77)
HACO	7,476	2.44 (2.21-2.69)
Overall ^b	14,100	4.59 (4.28-4.93)

^a National Estimates and Mortality Rate (no. per 100,000 population per year) are adjusted for age, race, gender and receipt of chronic dialysis using 2009 US Census Data

^b 10 cases could not be classified into an epidemiological category or category is unknown, and therefore are counted in the overall estimate **only**.

National Estimates and Adjusted Incidence Rates of Invasive MRSA Infections

Epidemiologic Category	Estimated Cases of Infection					
	Non-Dialysis Patients		Dialysis Patients		Total	
	Estimated No.	Incidence Rate (Confidence Interval) ^a	Estimated No.	Incidence Rate (Confidence Interval) ^b	Estimated No.	Incidence Rate (Confidence Interval)
CA	15,211	4.96 (4.65-5.29)	NA	NA	15,211	4.96 (4.65-5.29)
HCA	56,785	18.53 (17.91-19.17)	16,094	4190.52 (3926.26-4474.32)	72,879	23.75 (23.04-24.47)
HO	17,294	5.64 (5.30-6.00)	1,941	505.94 (414.97-618.29)	19,235	6.27 (5.91-6.65)
HACO	39,491	12.88 (12.36-13.42)	14,153	3688.96 (3441.69-3955.81)	53,644	17.47 (16.87-18.10)
Overall ^c	73,810	24.07 (23.37-24.79)	16,056	4184.99 (3921.04-4468.50)	89,867	29.27 (28.49-30.08)

^a National Estimates and Incidence (no. per 100,000 population per year) are adjusted for age, race, gender and receipt of chronic dialysis using 2009 US Census Data.

^b National Estimates and Incidence (no. per 100,000 dialysis patients per year) for dialysis patients are adjusted for age, race and gender using 2008 USRDS point prevalence data.

^c 115 cases could not be classified into an epidemiological category or category is unknown, and therefore are counted in the overall estimate **only**.

National Metric for Healthy People 2020 and the Department of Health and Human Services Action Plan to Prevent Healthcare-Associated Infections

	Disease Rate			Estimate of Cases in United States. ^a		
	Baseline (07-08)	2009	% Change	Baseline (07-08)	2009	Difference
HCA	27.08	23.75	-12.3	82,000	72,900	-9,100

^a Disease Rate (no. per 100,000 population per year) and National Estimates are adjusted for age, race, gender and receipt of chronic dialysis using 2009 US Census Data

ABCs Discussion

Surveillance data from 2009 represent the fifth full year of performing population-based surveillance for invasive MRSA infections through the Emerging Infections Program/Active Bacterial Core Surveillance Activity. Several changes in operations include addition of new variables to capture details on dialysis and access type and presentation of target measures to evaluate the reduction of healthcare-associated invasive MRSA infections.

Tables/figures have been added to (1) summarize details regarding type of dialysis and the type of access used for hemodialysis, indicating the majority of cases on chronic dialysis treatment were using central venous catheter for hemodialysis at the time of invasive MRSA culture; and (2) report metrics to measure progress in prevention of healthcare-associated invasive MRSA infections in the United States as part of Healthy People 2020 and the Department of Health and Human Services Action Plan to Prevent Healthcare-Associated Infections (<http://www.hhs.gov/ash/initiatives/hai/actionplan/>). Overall, compared to the baseline incidence (2007-2008 calendar years) identified in the HHS Action Plan, there was a decrease of 12.3%: a decrease on course to reach the target of a 50% reduction in 2013.

Because incidence of invasive MRSA infection is higher among dialysis patients compared to the general population,² and increasing awareness and importance is being placed on preventing bloodstream infections among this population in the United States, we are displaying national estimates overall, and separately for dialysis and non-dialysis patients. Also, adjustment for dialysis was refined to account for receipt of chronic dialysis only whereas previous reports adjusted for receipt of chronic and acute dialysis in the past year. Receipt of acute dialysis accounts for ~7% of all cases with a history of dialysis in the prior year.

Citation

- Centers for Disease Control and Prevention. 2009. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, Methicillin-Resistant *Staphylococcus aureus*, 2009. Available via the Internet: <http://www.cdc.gov/abcs/reports-findings/survreports/mrsa09.html>
- Centers for Disease Control and Prevention. 2007. Invasive Methicillin-Resistant *Staphylococcus aureus* Infections Among Dialysis Patients --- United States, 2005. *MMWR Morb Mortal Wkly Rep.* 2007; 56(09):197.

For more information, visit our web sites: <http://www.cdc.gov/abcs>, <http://www.cdc.gov/mrsa>