Trends in Incidence and Epidemiology of Methicillin-Resistant *Staphylococcus aureus* Bloodstream Infection, 2005–2020

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BACKGROUND

- Methicillin-resistant *Staphylococcus aureus* (MRSA) is a serious antimicrobial resistance threat.
- Prevention efforts have focused primarily on healthcare-associated MRSA infections.
- We assessed progress in MRSA bloodstream infection (BSI) prevention during 2005-2020.

METHODS

- Active, population- and laboratory-based surveillance for invasive MRSA was conducted in 17 continuously participating counties in 6 states (sites) through the CDC Emerging Infections Program during 2005-2020.
- A case was defined as isolation of MRSA from a blood culture in a surveillance area resident.
- Epidemiologic classifications of cases were:
  - **Hospital-onset (HO)** if the culture was obtained ≥3 days after hospitalization.
  - **Healthcare-associated community-onset (HACO)** if the culture was obtained in an outpatient setting or <3 days after hospitalization in a patient with ≥1 major healthcare exposures (history of hospitalization, surgery, dialysis, or long-term care facility residence in the previous year or presence of a central venous catheter within 2 days before culture).
  - **Community-associated (CA)** if neither HO or HACO.
- Annual incidence was calculated per 100,000 census population for each epidemiologic classification.
- The rate ratio of CA:HO BSI was calculated for each site for 2020.

FINDINGS

- MRSA BSI incidence decreased from 32.2 (per 100,000 population) in 2005 to a nadir of 15.7 in 2016, then increased slightly during 2017-2019 to 17.0 followed by a decrease in 2020 to 16.4.
- HACO comprised >50% of all cases throughout 2005-2020 and mirrored the overall rate pattern.
- HO rates decreased from 9.2 to 2.3 during 2005-2013 and fell below CA rates starting in 2012.
- HO rates were lowest during 2017-2019 (1.8-2.1) and increased in 2020 to 2.4.
- CA rates remained 3.0-4.6 throughout surveillance; during 2015-2019, rates increased from 3.0 to 4.0, then 2020 decreased to 3.4.
- All sites saw decreases in overall MRSA BSI rates by >50% during 2005-2020, and HACO rates in 2020 were at least 50% of total rates for each site.
- The relative proportion of CA and HO rates during 2020 varied by site.
  - CA MRSA BSI was more than twice as common as HO MRSA BSI in two sites.

CONCLUSIONS

- The decline in overall MRSA BSI rates by >50% during the surveillance period reflects substantial reductions in HACO and HO cases.
- The recent plateau in progress, however, suggests a need for additional preventive measures.
- The increase in the HO rate during 2020 warrants further assessment, including for potential pandemic-related impacts.
- Increased focus on community-associated MRSA BSI prevention may be needed in some areas depending on the local epidemiology.

LIMITATIONS

- The surveillance population may not be representative of the overall U.S. population.
- Variation in rates between sites exists.

ACKNOWLEDGMENTS

- Emerging Infections Program site staff
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MRSA bloodstream infection rates fell by more than half during the 16-year surveillance period.

The recent plateau suggests a need for additional preventive measures that restore previous progress.
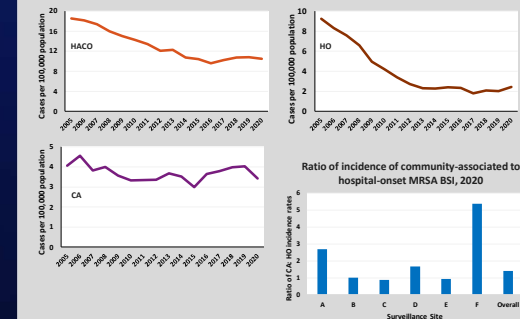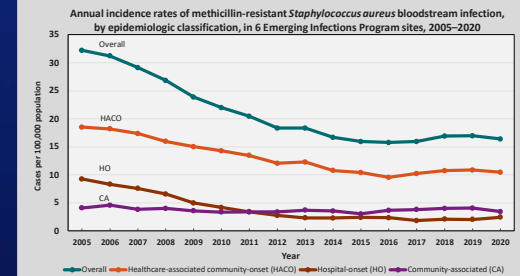
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https://www.cdc.gov/hai/eip/saureus.html

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Illustration of methicillin-resistant *Staphylococcus aureus* bacteria, by Meredith Newlove. CDC Public Health Image Library, ID #23234.

EIP Program Site	Area Under Continuous Surveillance, 2005-2020	2020 Surveillance Population *
California	3 county metropolitan San Francisco Bay area	3,681,262
Connecticut	3 county area	2,683,600
Georgia	8 counties in metropolitan Atlanta	4,189,850
Minnesota	1 county in metropolitan Minneapolis-St. Paul	547,903
New York	1 county in metropolitan Rochester	740,900
Tennessee	1 county in metropolitan Nashville	694,176
Total	17 counties in 6 states	12,537,691

* US Census Bureau bridged-race vintage post-census population estimates; https://www.cdc.gov/nchs/nvss/bridged_race.htm

Annual incidence rates of methicillin-resistant *Staphylococcus aureus* bloodstream infection, by epidemiologic classification, in 6 Emerging Infections Program sites, 2005–2020

Ratio of incidence of community-associated to hospital-onset MRSA BSI, 2020

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