Welcome

The Center for State, Tribal, Local, and Territorial Support presents the

**CDC Vital Signs Town Hall on**

**Staph Infections Can Kill: Prevention at the Front Lines**

March 12, 2019
2:00–3:00 PM (EDT)
# Agenda

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<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Speaker(s)</th>
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<tr>
<td>2:00 pm</td>
<td>Welcome &amp; Introduction</td>
<td><strong>José T. Montero, MD, MHCDS</strong>&lt;br&gt;Director, Center for State, Tribal, Local, and Territorial Support, CDC</td>
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<tr>
<td>2:05 pm</td>
<td>Vital Signs Overview</td>
<td><strong>Athena P. Kourtis, MD, PhD, MPH</strong>&lt;br&gt;Medical Officer, Associate Director for Data Activities, Division of Healthcare Quality Promotion, National Center for Emerging and Zoonotic Infectious Diseases, CDC</td>
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<td>2:15 pm</td>
<td>Presentations</td>
<td><strong>Marion Kainer, MD, MPH, FRACP, FSHEA</strong>&lt;br&gt;Director, Healthcare Associated Infections and Antimicrobial Resistance Program, Tennessee Department of Health</td>
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<td><strong>Martin E. Evans, MD</strong>&lt;br&gt;Director, Veteran’s Health Administration MRSA/MDRO Prevention Initiative, National Infectious Diseases Service; Professor Emeritus, Infectious Diseases, University of Kentucky School of Medicine</td>
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<td><strong>Susan Huang, MD, MPH</strong>&lt;br&gt;Professor of Medicine, Division of Infectious Diseases and Health Policy Research Institute, University of California, Irvine School of Medicine; Medical Director, Epidemiology and Infection Prevention, UC Irvine Health</td>
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<tr>
<td>2:40 pm</td>
<td>Q&amp;A and Discussion</td>
<td><strong>Dr. José T. Montero</strong></td>
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<td>3:00 pm</td>
<td>End of Call</td>
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to support STLT efforts and build momentum around the monthly release of CDC Vital Signs
Staphylococcus Aureus bloodstream infections in the United States

Division of Healthcare Quality Promotion

Athena P. Kourtis, MD, PhD, MPH
Medical Officer
Division for Healthcare Quality Promotion, NCEZID, CDC
Vital Signs Town Hall, March 12, 2019
A leading cause of healthcare-associated infections, also causes infections in the community

Can be resistant to many commonly used first-line antibiotics (e.g., methicillin-resistant *S. aureus*, MRSA)

Causes variety of infections including skin and soft tissue, pneumonia, and bloodstream infections

Can lead to severe complications including sepsis and death

*Staphylococcus aureus* (staph)
March 2019 Vital Signs Data Overview

- **119,000**: More than 119,000 bloodstream staph infections occurred in the US in 2017.
- **20,000**: Nearly 20,000 people died with bloodstream staph infections in the US in 2017.
- **9%**: In 2016, 9% of all serious staph infections happened in people who inject drugs—rising from 4% in 2011.

*The Way Forward >> Additional tactics in healthcare—such as decolonization before surgery—along with current CDC recommendations could prevent more staph infections.*
Hospital onset (HO) MRSA bloodstream infections (BSI) declined rapidly from 2005-2012, but remained static from 2013-2016. Community onset (CO) MRSA BSI declined more modestly.

2005-2012: Decline in HO MRSA by 17.1% per year

2005-2017: Decline in CO MRSA by 6.9% per year

2013-2017: No change in HO
Most of the declines of community-onset (CO) MRSA BSI are due to healthcare-associated CO (HACO) declines. Very modest declines in community-associated (CA) MRSA BSI.
Nationally, hospital-onset (HO) MRSA decreasing while community-onset (CO) remain static; HO MSSA remained static while CO increasing.

At Veterans Affairs Medical Centers, HO and CO MRSA decreasing; HO and CO MSSA less so

Unadjusted *Staphylococcus aureus* bloodstream infection rates from 130 Veterans Affairs Medical Centers, 2005–2017.
A new challenge: persons who inject drugs represent a rising proportion of invasive MRSA infections in recent years in United States.

**S. aureus Bloodstream Infection National Estimates**

- Total *S. aureus* BSIs in 2017: 119,247
  - 13% (~15,500) were hospital-onset
  - 87% community-onset (most healthcare associated)
- In 2017 there were an estimated 19,832 deaths in-hospital associated with *S. aureus* bloodstream infections
- Unadjusted associated in-hospital mortality: 18% overall
  1. No change over time
  2. HO MRSA: 29%; HO MSSA: 24%; CO MRSA: 18%; CO MSSA: 14%
But what do we want HCPs to do?

- Focus on all staph
- Continue CDC recommendations, such as Contact Precautions, preventing infections, educating patients
- Review facility/system data to find areas for improvement
- Consider using additional tactics (ex: screening, decolonization) during high-risk periods
- Continue evaluating and closing prevention gaps
New Resources

- **Vital Signs** Online (www.cdc.gov/VitalSigns/staph)
- Strategies to Prevent HO Staph (www.cdc.gov/hai/prevent/staph-prevention-strategies.html)
  - New bundle
  - Harm reduction education materials
  - For patients who inject drugs
  - For providers who treat them
Thank you!

For more info:
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Tel. 770 488 5216
apk3@cdc.gov
Rapidly Evolving Epidemiology of MRSA Blood Stream Infections (BSI) in Tennessee: Additional Opportunities for Intervention

Marion A. Kainer MD, MPH, FRACP, FSHEA
Director, Healthcare Associated Infections and Antimicrobial Resistance Program
Marked Increase in **All MRSA BSI** Between 2014 and 2018 (54%)

Data obtained from NHSN (MRSA LabID for TN hospitals), counting one patient p.a. per facility
TN NHSN: Number of Individual Patients with MRSA BSI by Year

Surveillance Data: July 2010- December 2018 (count 1 patient per facility per year)
MRSA blood cultures taken in ED of TN Hospitals, reported to NHSN

Surveillance Data: July 2010 - December 2018 (Count once per year within a facility)
MRSA has been increasing throughout Tennessee especially in the Upper Cumberland and East Tennessee areas.
TN NHSN: Change in Age Distribution among Females, MRSA Blood Cultures taken in ED

2011-2014

2017-2018
TN EIP: ED MRSA Events with IDU Noted in Chart

EIP: Emerging Infections Program
IDU: Injection Drug Use
Changes in the Number of HO-MRSA BSIs Needed to Prevent to Reach the 2020 HHS Action Goal, by Facility, 2016-2017

CAD: Cumulative Attributable Difference (number needed to prevent)
SIR: Standardized Infection Ratio
30 Day and 1 Year All Cause Mortality, MRSA-BSI by Class, TN, 2015-2017

CO-ED: Blood Culture taken in Emergency Department

CO-IP: Community-Onset (day 1, 2 or 3 of admission)

HO: Hospital-Onset (day 4 or later)
Despite 31% Decrease in Hospital-Onset MRSA BSI deaths*, All MRSA BSI Deaths Increase by 21%

- 2011 estimates based on TN’s 30 day mortality rates for 2015-2017 by class (CO-ED, CO-IP, HO)
- 2017 estimates based on applying 2017 mortality by class
- Data obtained from NHSN (MRSA LabID for TN hospitals) matched to TN Vital statistics data

**Preliminary data**
Potential Interventions for Consideration

• MRSA BSI in ED could be a marker for persons who inject drugs [PWID] (individually, regionally)
  – Reduce injection drug use itself
  – Harm reduction
    • Better understanding of techniques used by PWID (including use of paraphernalia) to inform “injection safety / infection control practices for injecting drug users” → guidelines → dissemination (e.g., syringe services programs, methadone clinics, other healthcare encounters)
• Is there a role for decolonization in PWID?
Martin E. Evans, MD
Director, MRSA/MDRO Program
National Infectious Diseases Service
Veterans Health Administration
Acute Care Medical Centers
VHA MRSA Prevention Initiative

✓ Began in 2005 with 18 facilities; fully implemented nationwide as of October 2007; currently ongoing…

✓ MRSA bundle:
  1) Active surveillance: nasal swabs on admission, unit-to-unit transfer, and discharge
  2) Contact Precautions for those colonized or infected with MRSA
  3) Hand hygiene
  4) Institutional culture change where infection prevention and control becomes everyone’s business

✓ Addition of a MRSA Prevention Coordinator (MPC) at each site to implement the program locally and enter data monthly into a national database

- Is there evidence that this approach decreases MRSA HAIs?
- Compare MRSA and methicillin-sensitive *S. aureus* (MSSA) HAIs
  - √ Interventions that reduce the risk of progressing to infection (e.g. CLABSI bundle) should affect both MRSA and MSSA HAIs
  - √ Interventions that interrupt the transmission of only MRSA (e.g. the MRSA bundle) should affect primarily MRSA HAIs
- Clinical cultures and surveillance test data extracted from the electronic health record
Rate* of *Staphylococcus aureus* Infections among hospitalized patients, by methicillin resistance status — 130 Veterans Affairs Medical Centers, United States, 2005–2017

Abbreviations: MRSA = Methicillin-Resistant *Staphylococcus aureus; MSSA = Methicillin-Sensitive *Staphylococcus aureus.*

Total (figure):
- MRSA ↓ 55%
- MSSA ↓ 12%

Hospital-Onset:
- MRSA ↓ 66%
- MSSA ↓ 19%

* Unadjusted
Hospital-onset *Staphylococcus aureus* bloodstream and non-bloodstream infection rates* by methicillin resistance status —
130 Veterans Affairs Medical Centers, United States, 2005–2017

Abbreviations: MRSA = Methicillin-Resistant *Staphylococcus aureus*; MSSA = Methicillin-Sensitive *Staphylococcus aureus*.

* Unadjusted.
Community-onset *Staphylococcus aureus* infection rates* by methicillin resistance status—130 Veterans Affairs Medical Centers, United States, 2005–2017

All community-onset:
- MRSA ↓ 41%
- MSSA ↓ 0.4%

30-day post-discharge:
- *Bloodstream:*
  - MRSA ↓ 34%
  - MSSA ↓ 29%
- *Non-bloodstream:*
  - MRSA ↓ 55%
  - MSSA ↓ 0.1%

Abbreviations: MRSA = Methicillin-resistant *Staphylococcus aureus*; MSSA = Methicillin-sensitive *Staphylococcus aureus*.

* Unadjusted.
Hospital-acquired MRSA colonization rates decreased during the study period.

Infection rates:

- Decreased 58% in those admitted MRSA negative, but later became positive (acquirers)
- But only decreased 31% in those admitted already MRSA positive (importers)
- $p < 0.05$ comparing importers and acquirers
VA had >90% compliance nationwide with active MRSA surveillance on admission, unit-to-unit transfer and discharge from 2008-2015

985,626 unique patients were analyzed

- 92% of patients never got colonized with MRSA after admission
- Ratio of importers to acquirers:
  - Non-ICU = 8.8 to 1
  - ICU = 2.4 to 1
- Relative risk of pre-discharge MRSA infection (compared to not-colonized):
  - Acquirers = 11.7 – 60.3
  - Importers = 19.3 - 27.8

*Nelson, RE et al. CID 2019;68:545-553*
Percentage of pre- plus post-discharge MRSA infections identified after hospital discharge by pre-discharge colonization status

Summary

- VA MRSA HAIs continue to fall in the context of a MRSA Bundle which includes active surveillance and contact precautions.
- The relative importance of each component of the Bundle is unknown, but the disconnect between MSSA and MRSA HAI rates suggests that interruption of transmission is important.
- Data on the effect of colonization show that the relative risk of MRSA infection in colonized patients is much higher than those that never become colonized.
- There are roughly 2- to 9-times more importers than acquirers pre-discharge.
- Most of pre-discharge HAIs are in importers (and would not be impacted by continuing/discontinuing contact precautions).
- A large portion of MRSA infections in colonized patients appear after discharge.
Acknowledgements

- Rajiv Jain, MD
- Gary Roselle, MD
- John Jernigan, MD
- Makoto Jones, MD
- Matt Samore, MD
- VHA National Infectious Disease MDRO Program staff

- All the MRSA Prevention Coordinators, Infection Preventionists, Hospital Epidemiologists, and clinical laboratorians who make VA facilities safer for Veterans
- Contact Information: martin.evans@va.gov
S. aureus Infections: Recent Clinical Trials Supporting Decolonization as an Effective Strategy

Susan Huang, MD MPH
Professor of Medicine
Medical Director, Epidemiology & Infection Prevention
Division of Infectious Diseases & Health Policy Research Institute
University of California, Irvine School of Medicine
Disclosures

• Conducting clinical studies in which participating hospitals and nursing homes receive contributed products from Sage Products, Molnlycke, 3M, Xttrium, Clorox, and Medline

• Companies contributing product have no role in design, conduct, analysis, or publication
Decolonization Prevents a Cascade of Unfortunate Events

- Shedding of pathogens
  - Environmental contamination
  - Contamination persists
  - Failure to clean or disinfect
  - Staff acquires
    - Staff fails to remove
    - Transfer to patient
  - Risk for infection

Broad solution for all MDROs
Prevents MDRO spread
Prevents infection in MDRO carriers
Decolonization Trials for *S. aureus*

- **Targeted Prevention**
  - Recurrent *S. aureus* infection \(^1\)
  - Pre-operative *S. aureus* carriers \(^2\-^3\)
  - Post-Discharge \(^4\)

- **Universal Prevention**
  - ICU \(^5\-^7\)
  - Non-ICU \(^8\)
  - Nursing Homes \(^9\)

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2. Bode LGM NEJM 2010;362:9-17
3. Perl T NEJM 2002;346:1871-7
4. Huang SS NEJM 2019; 380:638-50
5. Climo M NEJM 2013;368:533-42
7. Huang SS NEJM 2013;368:2255-65
8. Huang SS Lancet, 2019, in press
9. Huang SS, clinicaltrials.gov NCT03118232
## ICU Decolonization Evidence Summary

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Year</th>
<th>Study Type</th>
<th>Hospital</th>
<th>ICU</th>
<th>N</th>
<th>Findings</th>
<th>Publication</th>
</tr>
</thead>
</table>
| Vernon  | 10/02-12/03      | Obs        | 1        | 1   | 1,787 | 65% less VRE acquisition  
40-70% less VRE on skin, HCW hands, environment | Arch Int Med 2006; 166:306-312                                             |
| Climo   | 12/04-1/06       | Obs        | 4        | 6   | 5,293 | 66% less VRE BSI  
32% less MRSA acquisition  
50% less VRE acquisition | Crit care Med 2009; 37:1858-1865                                            |
| Bleasdale| 12/05-6/06      | Obs        | 1        | 2   | 836  | 61% less primary BSI                                                                                             | Arch Int Med 2007; 167(19):2073-2079                                       |
| Popovich| 9/04-10/06       | Obs        | 1        | 1   | 3,816 | 87% less CLABSI  
41% less blood contaminants | ICHE 2009; 30(10):959-63                                                   |
| Milstone| 2/08-9/10        | Cluster RCT| 5        | 10  | 4,947 | 36% less total BSI (as treated)                                                                                   | Lancet. 2013; 381(9872):1099-106                                         |
| Huang   | 1/09-9/11        | Cluster RCT| 43       | 74  | 122,646 | 37% less MRSA clinical cultures  
44% less all-cause BSI                                                                                           | N Engl J Med 2013; 368:2255-2265                                          |
Non-ICUs: ABATE Infection Trial
Active Bathing to Eliminate Infection

Trial Design
- 21 month cluster randomized trial with HCA Healthcare
- 53 hospitals, 194 adult non critical care units
- Includes: adult medical, surgical, step down, oncology
- 339,904 patients, 1,294,153 patient days

Decolonization Group
- Daily 4% rinse off CHG shower or 2% leave-on CHG bed bath
- Mupirocin x 5 days if MRSA+ by history, culture, or screen

Routine Care Group
- Routine policy for showering/bathing
Decolonization in General Wards

• Did not see overall impact, unlike ICU trials
  o Lower risk and smaller effect size
  o 8.7% for MDROs, 6.2% bloodstream infection (P=NS)
• Benefit seen in higher risk patients with lines and devices
  o 37% reduction in MRSA and VRE clinical cultures
  o 32% reduction in all pathogen bloodstream infection
  o ~10% of population, but a third of MRSA+VRE cultures
  o ~10% of population, but 60% of bloodstream infections
  o Contact precautions were applied
• Individual randomized clinical trial
• MRSA+ patients on hospital discharge
• Education vs repeat decolonization
• Follow up for 1 year for infection

Huang SS NEJM 2019; 380:638-50
Funded by AHRQ
clinicaltrials.gov: NCT01209234
Project CLEAR Post-Discharge Trial

- 2,121 patients, ~535,000 days of follow up
- 1 in 10 developed MRSA infection within 1 year of discharge
  - 29% bacteremic, 85% required hospitalization
- 1 in 4 developed any infection within 1 year of discharge
- Inclusion Criteria
  - ≥18 years old
  - Hospitalized within the past 30 days
  - MRSA+ culture within 30 days of hospitalization
- Decolonization Group Regimen: 5 days, 2x/month x 6 months
  - Mupirocin 2% ointment, twice daily
  - CHG mouthwash (0.12%) plus CHG bath/shower (4%)
Decolonization Reduces Infection

- 30% reduction in MRSA infection in 1 year post-discharge
- 17% reduction in all-cause infection in 1 year post-discharge
- If fully adherent:
  - 44% reduction in MRSA infection
  - 40% reduction in all-cause infections

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<tr>
<th>Number of Patients Needed to Treat to See Benefit</th>
<th>Overall</th>
<th>Full Adherence</th>
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<tbody>
<tr>
<td>MRSA Infection</td>
<td>30</td>
<td>26</td>
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<tr>
<td>MRSA Hospitalization</td>
<td>34</td>
<td>27</td>
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<tr>
<td>Any Infection</td>
<td>26</td>
<td>11</td>
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<tr>
<td>Hospitalization due to Infection</td>
<td>28</td>
<td>12</td>
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Evidence-Based Decolonization Options

- **S. aureus Carriers – Screen with Targeted Decolonization**
  - Recurrent infection
  - Pre-operative
  - Post-discharge

- **Universal Decolonization**
  - Pre-operative bathing
  - ICU
  - Non-ICU patients with medical devices

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3. Perl T NEJM 2002;346:1871-7
4. Huang SS NEJM 2019;380:638-50
5. Climo M NEJM 2013;368:533-42
7. Huang SS NEJM 2013;368:2255-65
8. Huang SS, clinicaltrials.gov NCT03140423
9. Huang SS IDWeek 2017, Lancet, online March 5
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- Syndicate Vital Signs on your website
  https://tools.cdc.gov/medialibrary/index.aspx#/media/id/305883
- Vital Signs interactive buttons and banners
  https://www.cdc.gov/socialmedia/tools/buttons/vitalsigns
Thank You

Provide feedback on this teleconference: CSTLTSFeedback@cdc.gov

Please mark your calendars for the next Vital Signs Town Hall Teleconference

For more information, please contact Centers for Disease Control and Prevention

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