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)

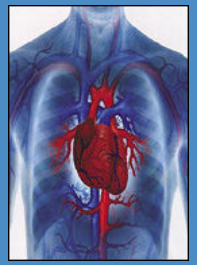
Agenda

Time	Agenda Item	Speaker(s)
2:00 pm	Welcome & Introduction	**José T. Montero, MD, MHCDS** Director, Center for State, Tribal, Local, and Territorial Support, CDC
2:05 pm	Vital Signs Overview	**Athena P. Kourtis, MD, PhD, MPH** Medical Officer, Associate Director for Data Activities, Division of Healthcare Quality Promotion, National Center for Emerging and Zoonotic Infectious Diseases, CDC
2:15 pm	Presentations	**Marion Kainer, MD, MPH, FRACP, FSHEA** Director, Healthcare Associated Infections and Antimicrobial Resistance Program, Tennessee Department of Health **Martin E. Evans, MD** Director, Veteran's Health Administration MRSA/MDRO Prevention Initiative, National Infectious Diseases Service; Professor Emeritus, Infectious Diseases, University of Kentucky School of Medicine **Susan Huang, MD, MPH** 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
2:40 pm	Q&A and Discussion	**Dr. José T. Montero**
3:00 pm	End of Call	

CDC Vitalsigns™

TOWN HALL TELECONFERENCE

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

Staphylococcus aureus (staph)

- 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

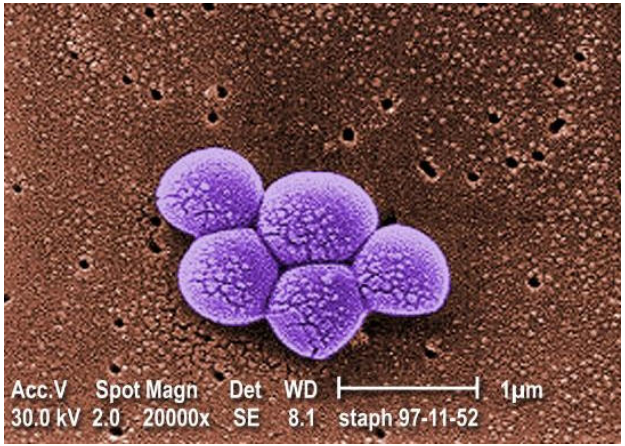
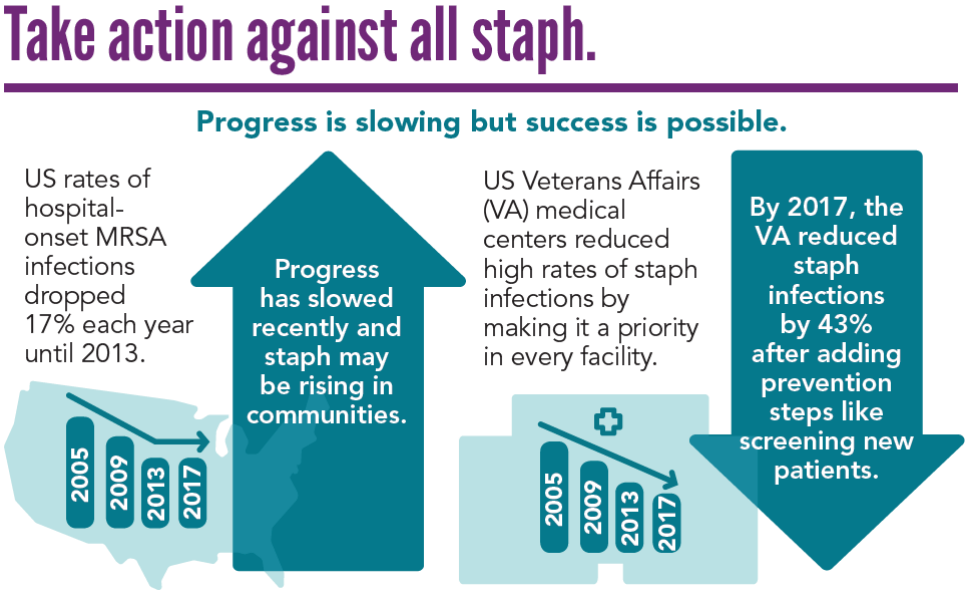


Image courtesy of CDC and Public Health Image Library (https://www.cdc.gov/mrsa/community/photos)

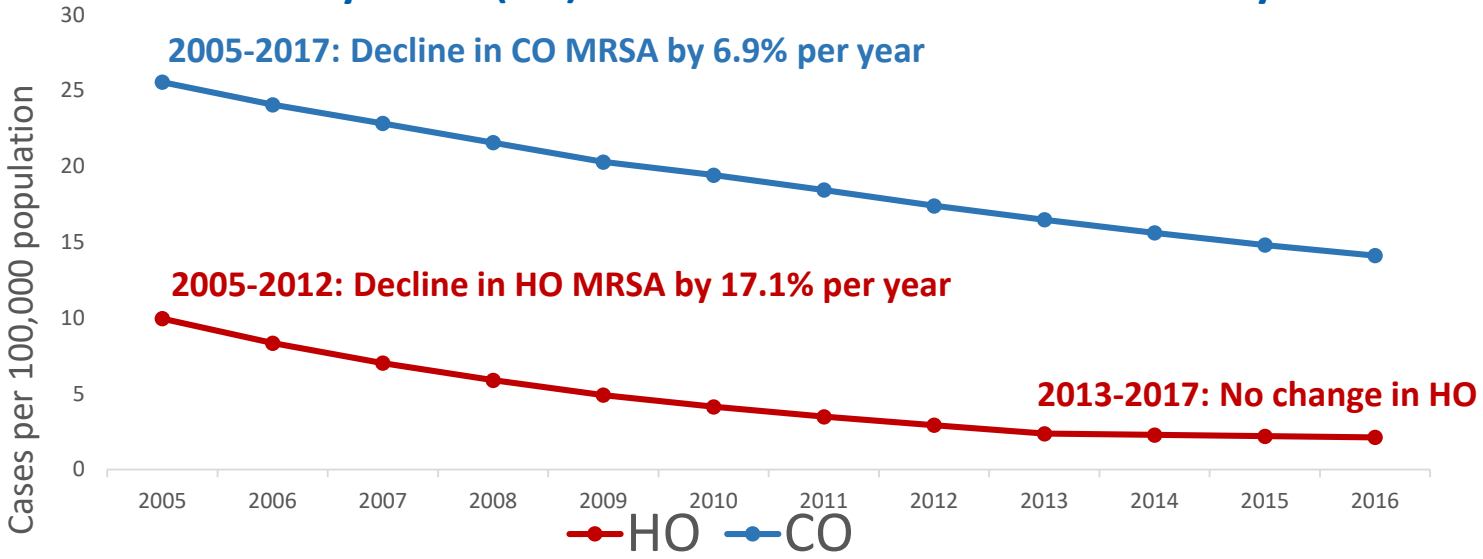
March 2019 *Vital Signs* Data Overview

- **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.



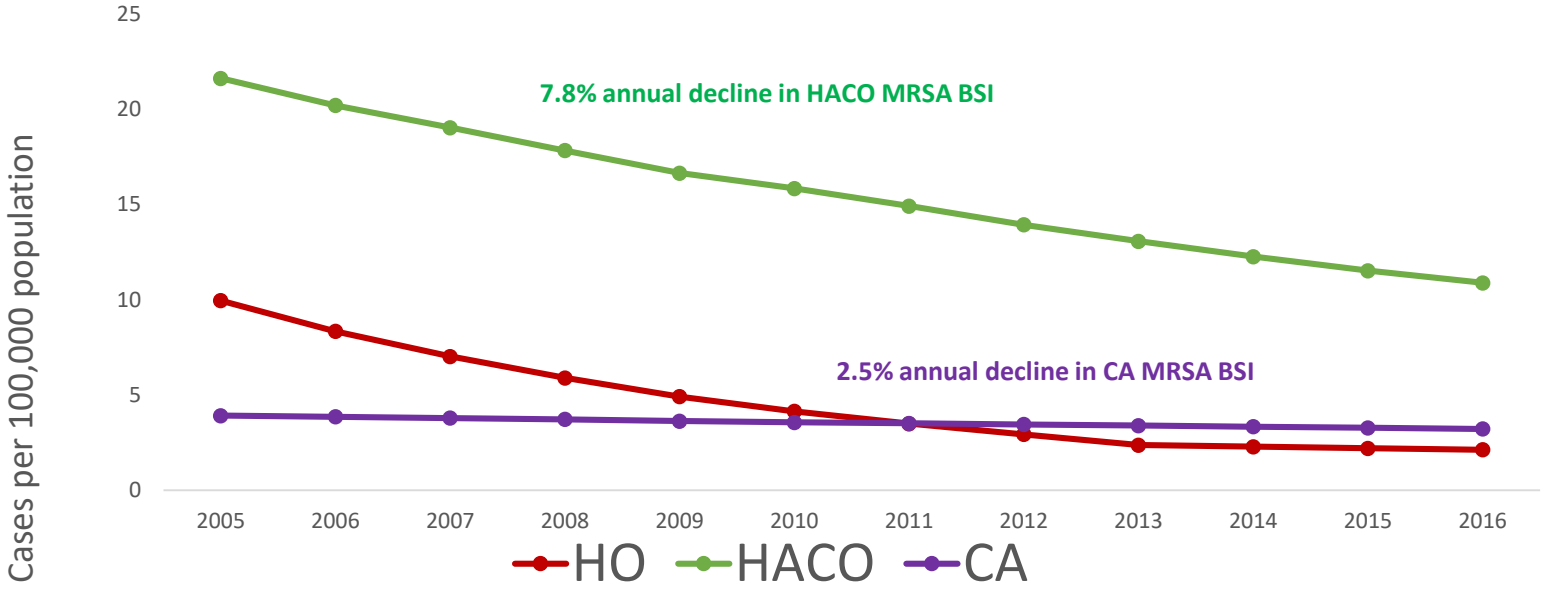
The Way Forward >> *Additional tactics in healthcare—such as decolonization before surgery—along with current CDC recommendations could prevent more staph infections.*

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.



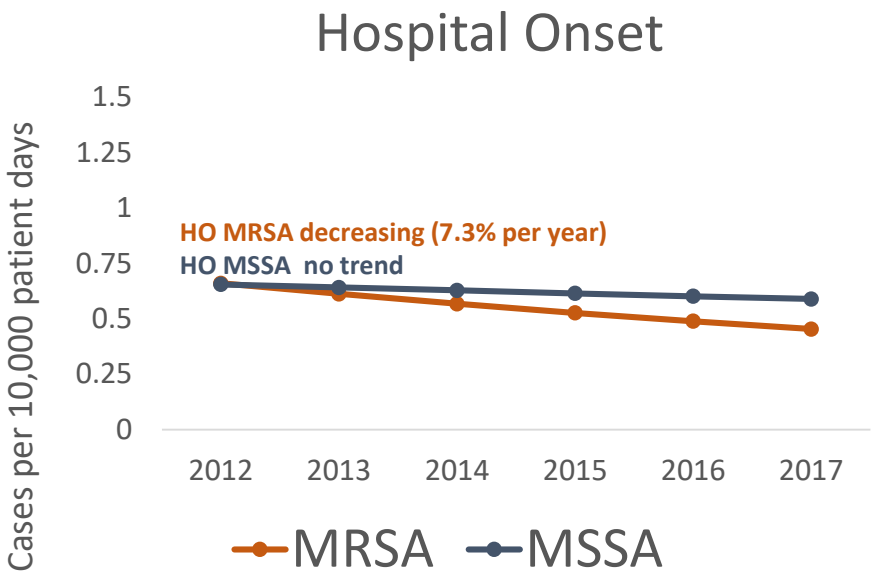
Adjusted MRSA BSI rates from population-based surveillance in 6 U.S. Emerging Infections Program (EIP) sites, 2005–2016.

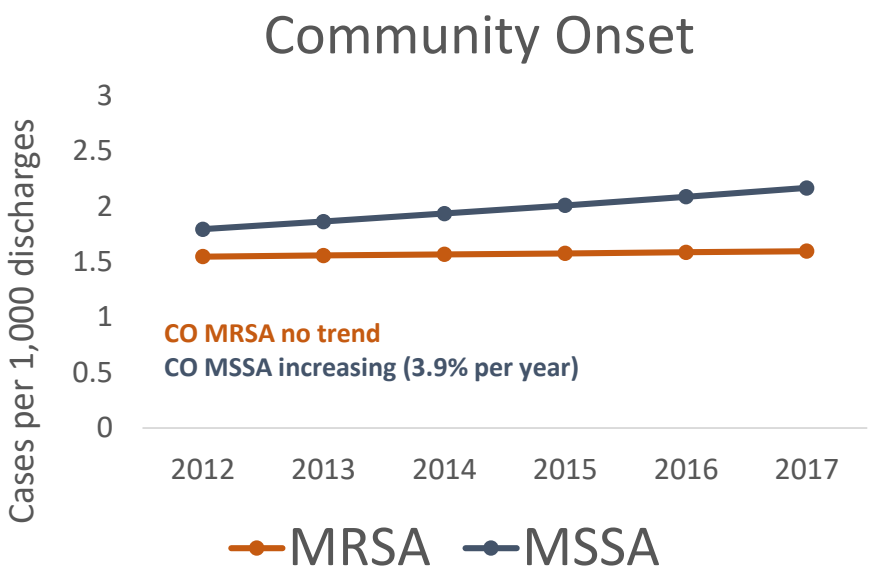
Most of the declines of community-onset (CO) MRSA BSI are due to healthcare-associated CO (HACO) declines. Very modest declines in community-associated (CA) MRSA BSI.



Adjusted MRSA BSI rates from population-based surveillance in 6 U.S. Emerging Infections Program (EIP) sites, 2005–2016.

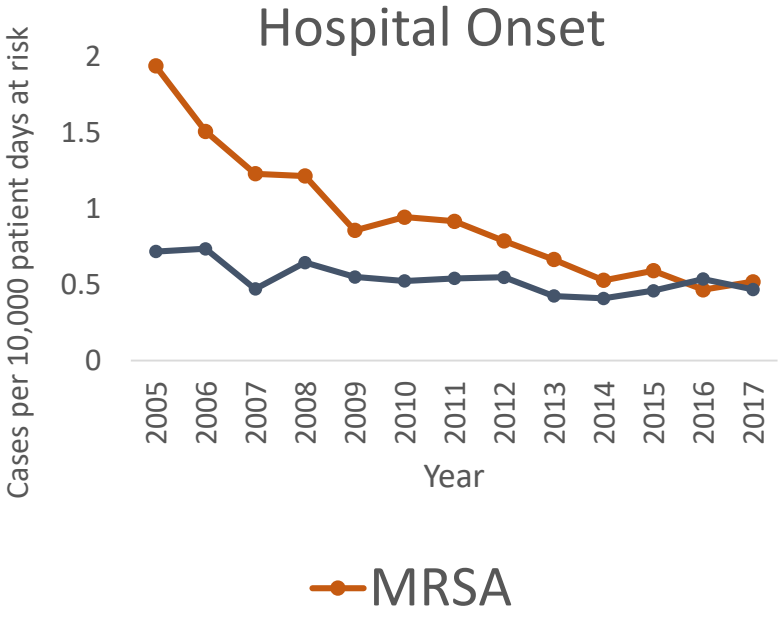
Nationally, hospital-onset (HO) MRSA decreasing while community-onset (CO) remain static;
HO MSSA remained static while CO increasing.

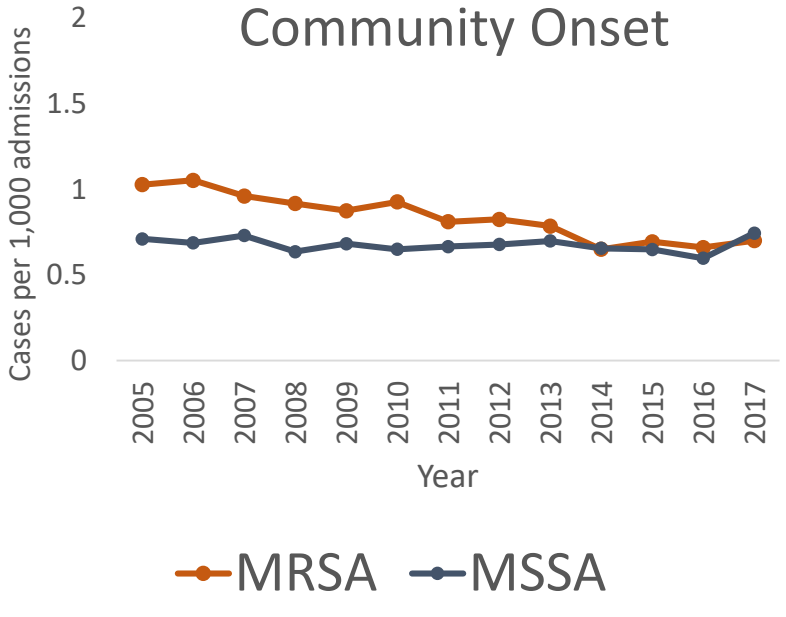




Adjusted rates for S. aureus *BSI, 447 Premier and Cerner Hospitals, 2012-2017.*

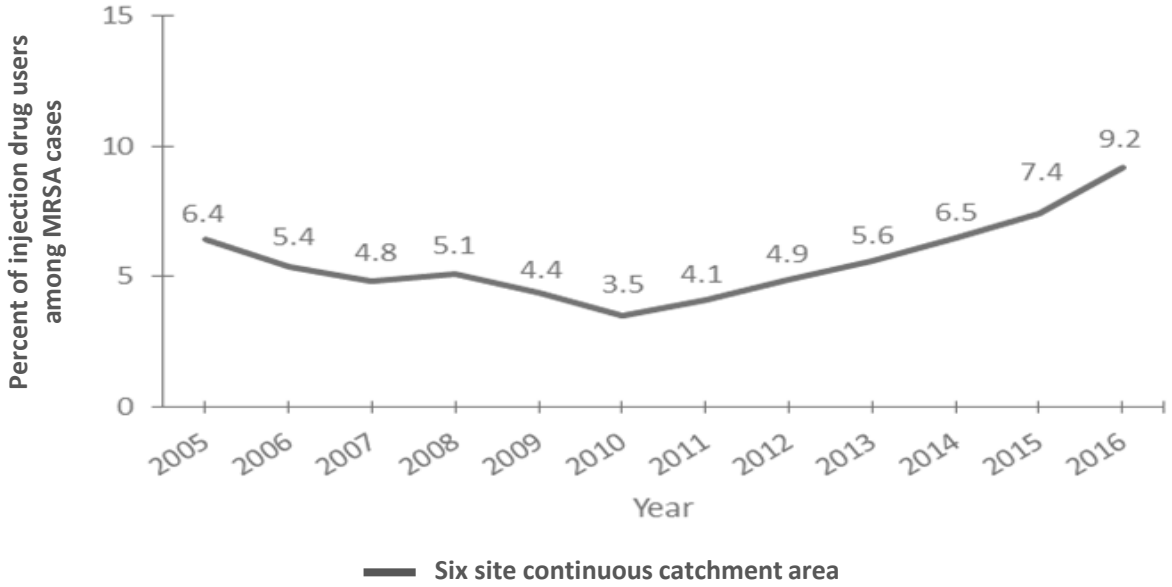
At Veterans Affairs Medical Centers, HO and CO MRSA decreasing; HO and CO MSSA less so





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.



EIP, 2005-2016, MMWR June 2018, Jackson et al: 67(22):625-8

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* blood stream 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:

Athena P. Kourtis, MD, PhD, MPH

DHQP, NCEZID, CDC

Tel. 770 488 5216

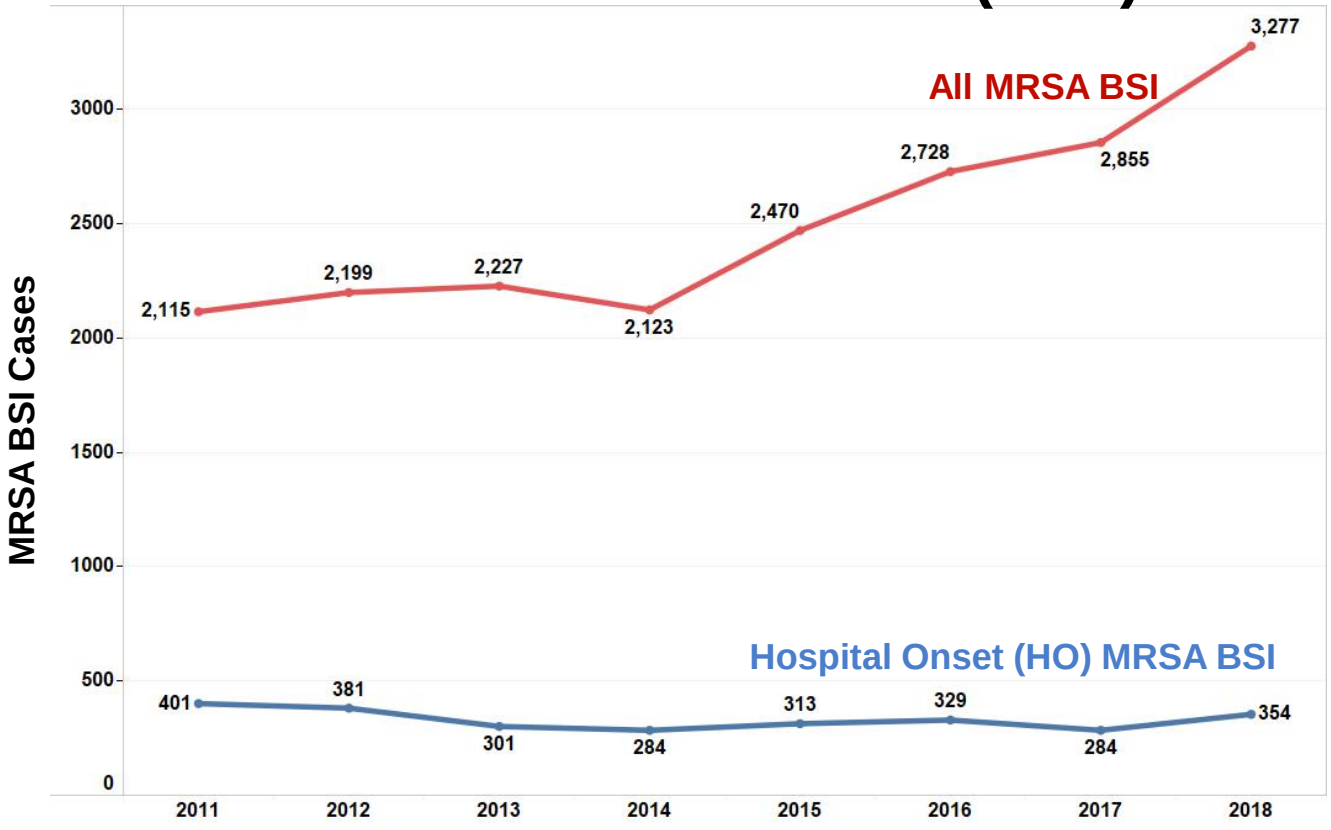
apk3@cdc.gov

Department of Health

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

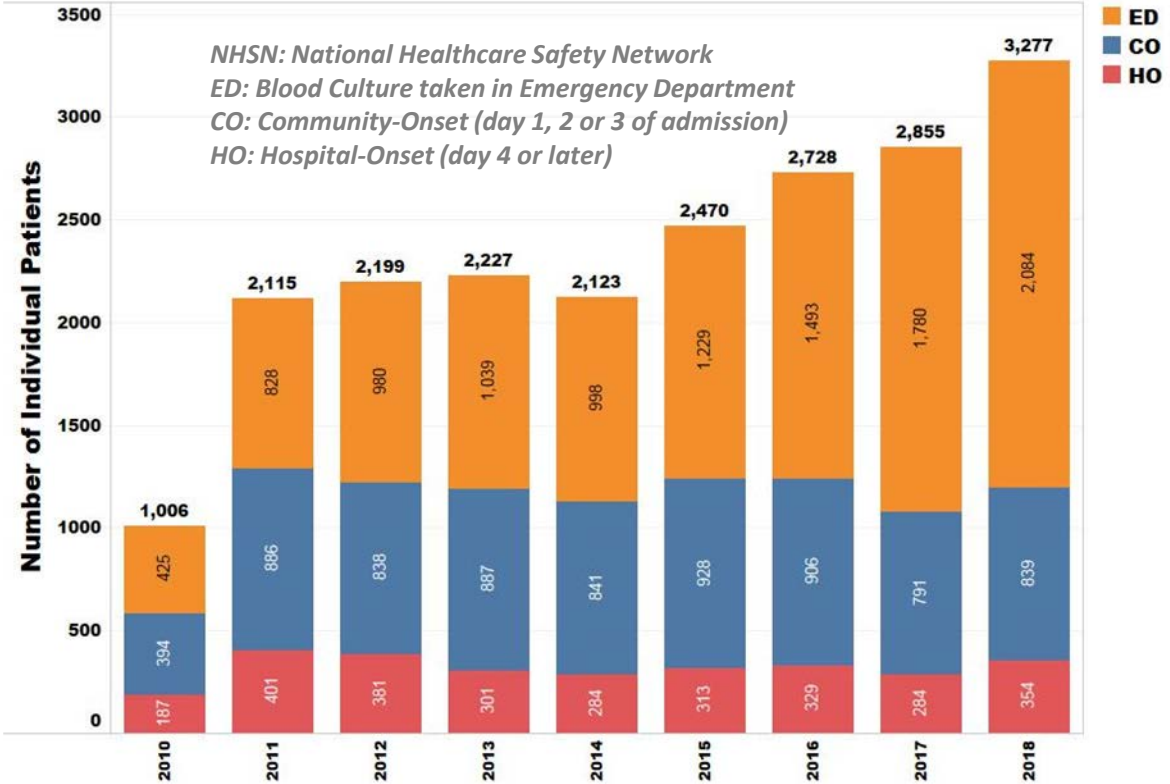
Marked Increase in All MRSA BSI Between 2014 and 2018 (54%)



Data obtained from NHSN (MRSA LabID for TN hospitals), counting one patient p.a. per facility

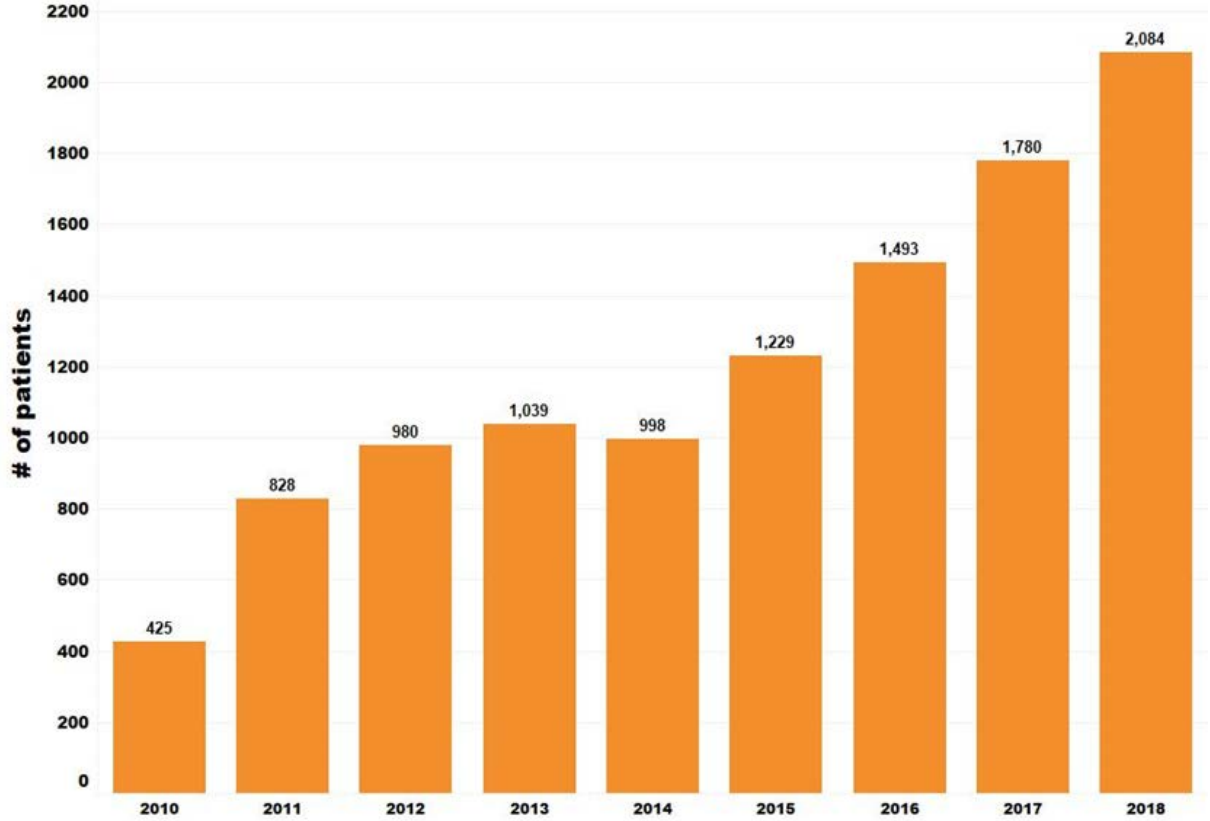
TN NHSN: Number of Individual Patients with MRSA BSI by Year

Surveillance Data: July 2010- December 2018 (count 1 patient per facility per year)



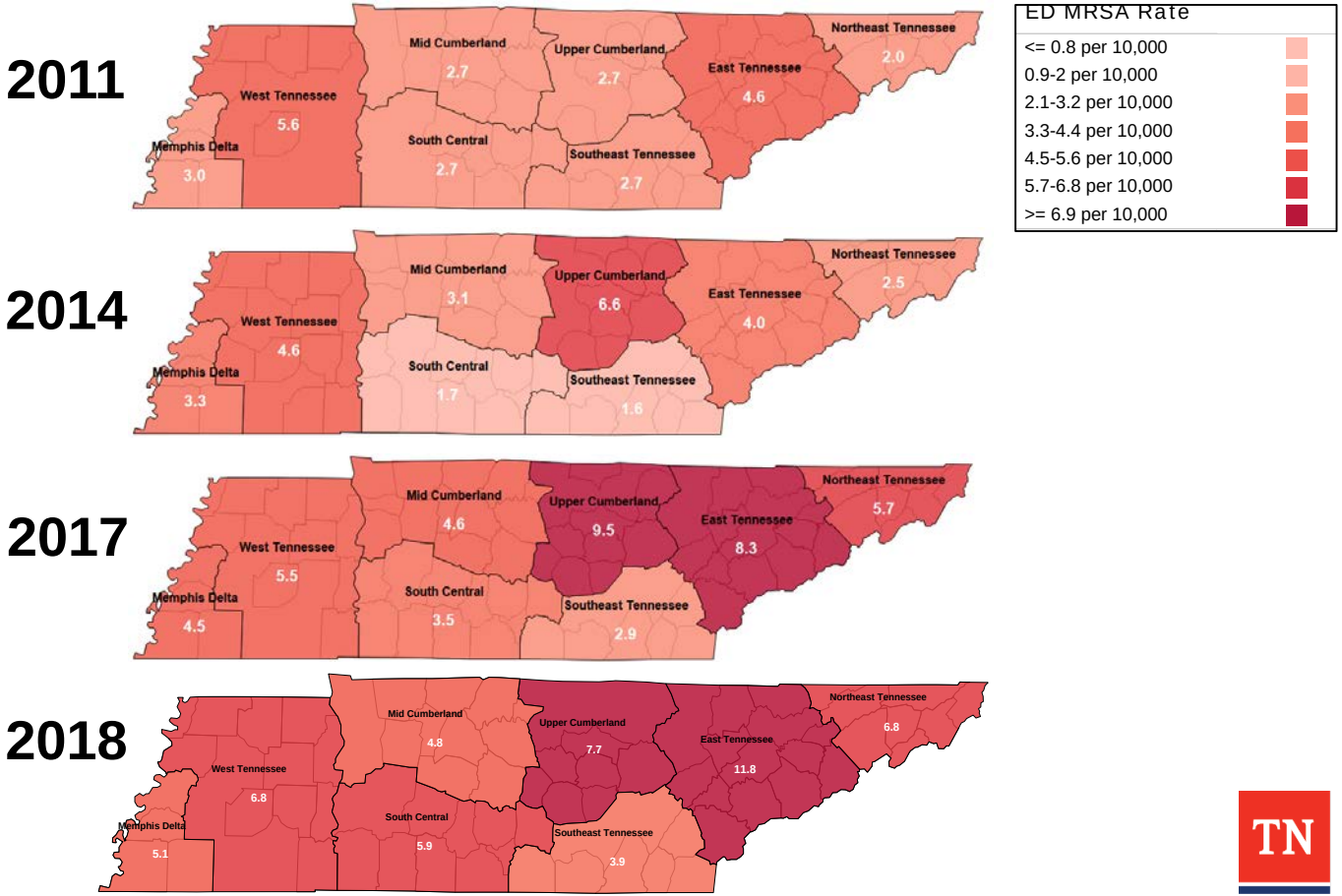
MRSA blood cultures taken in ED of TN Hospitals, reported to NHSN

Surveillance Data: July 2010 - December 2018 (Count once per year within a facility)

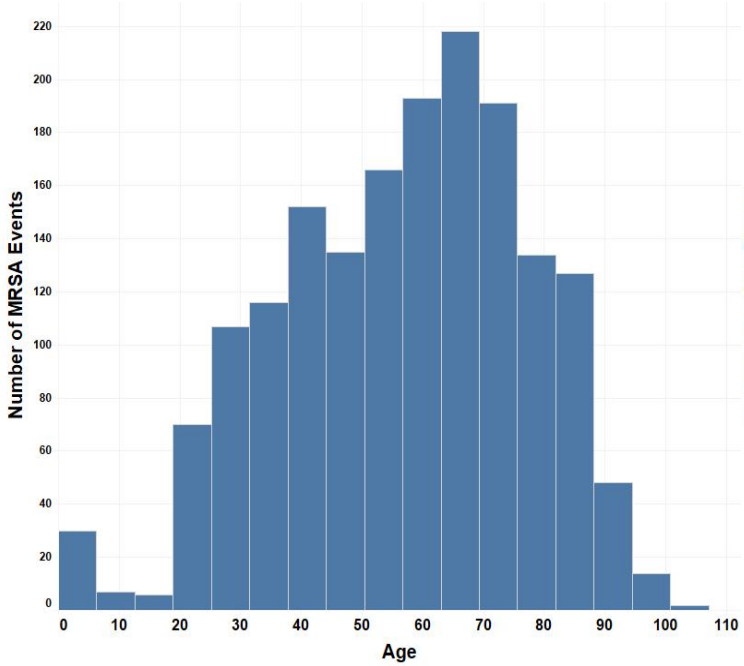


ED: Emergency Department

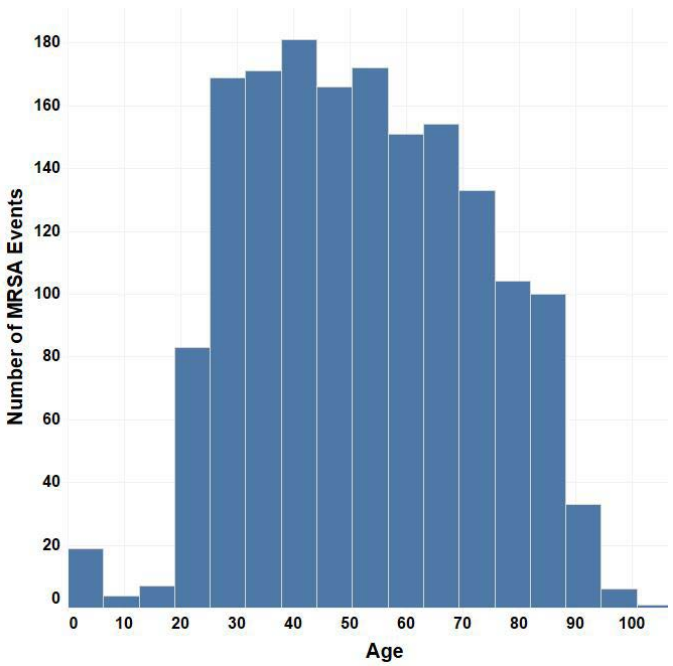
ED MRSA BSI per 10,000 Encounters



TN NHSN: Change in Age Distribution among Females, MRSA Blood Cultures taken in ED

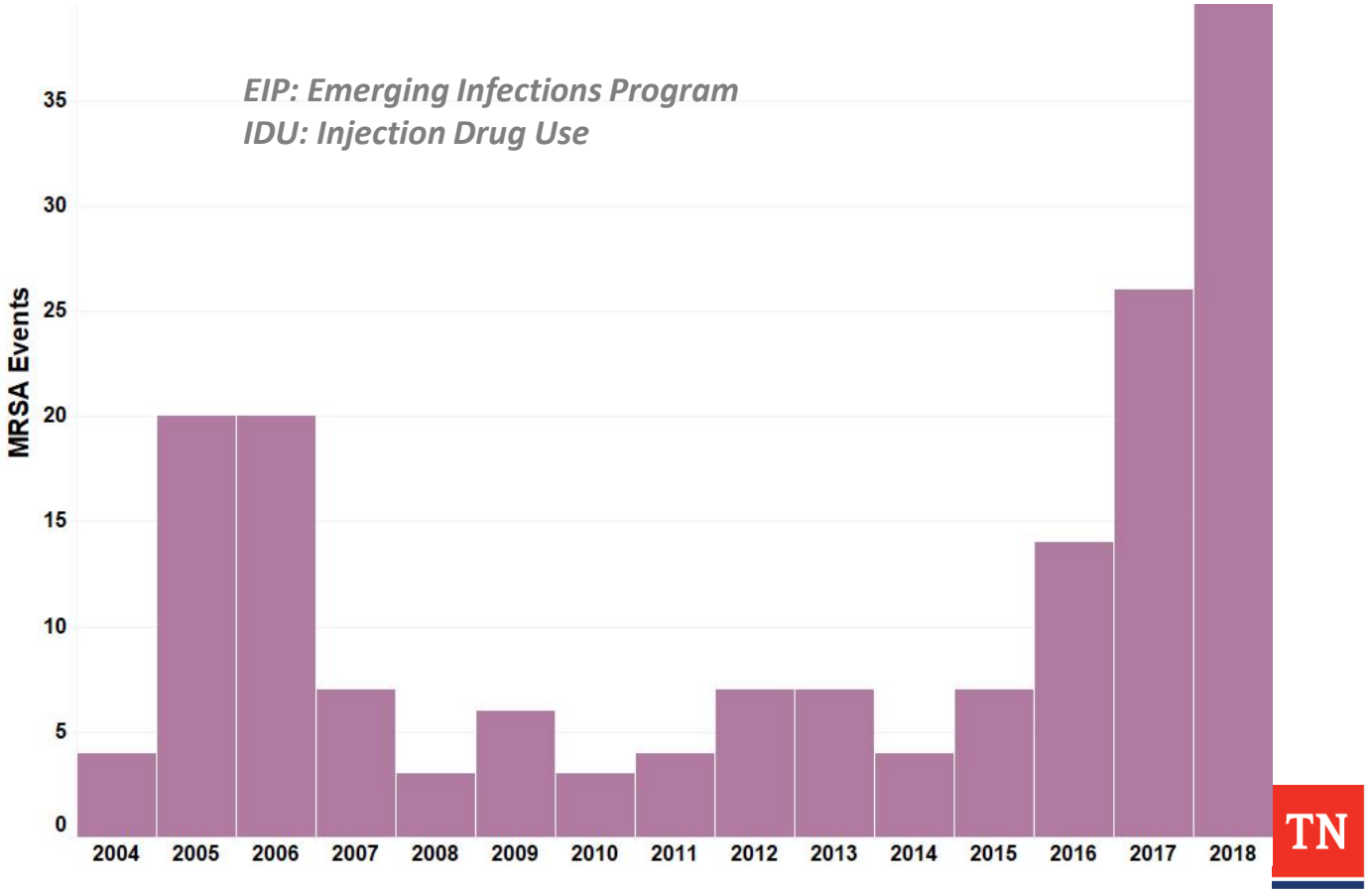


2011-2014

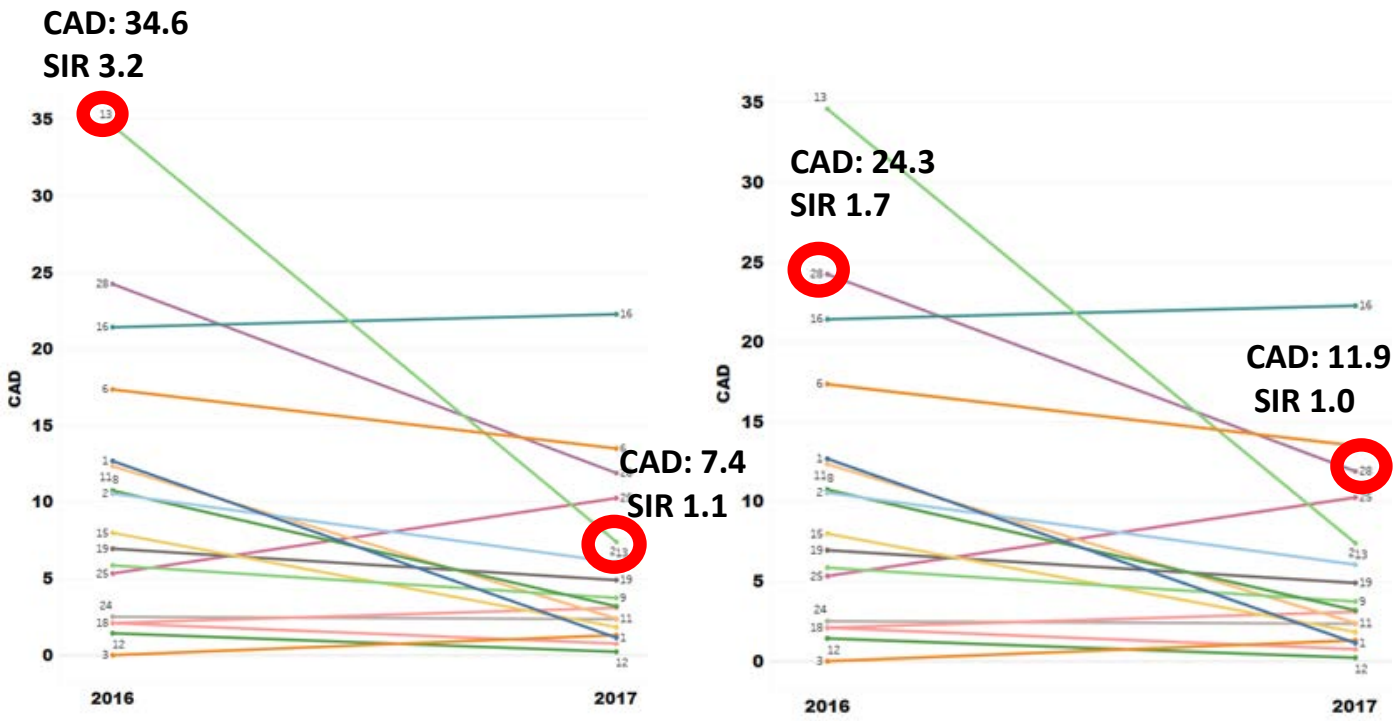


2017-2018

TN EIP: ED MRSA Events with IDU Noted in Chart

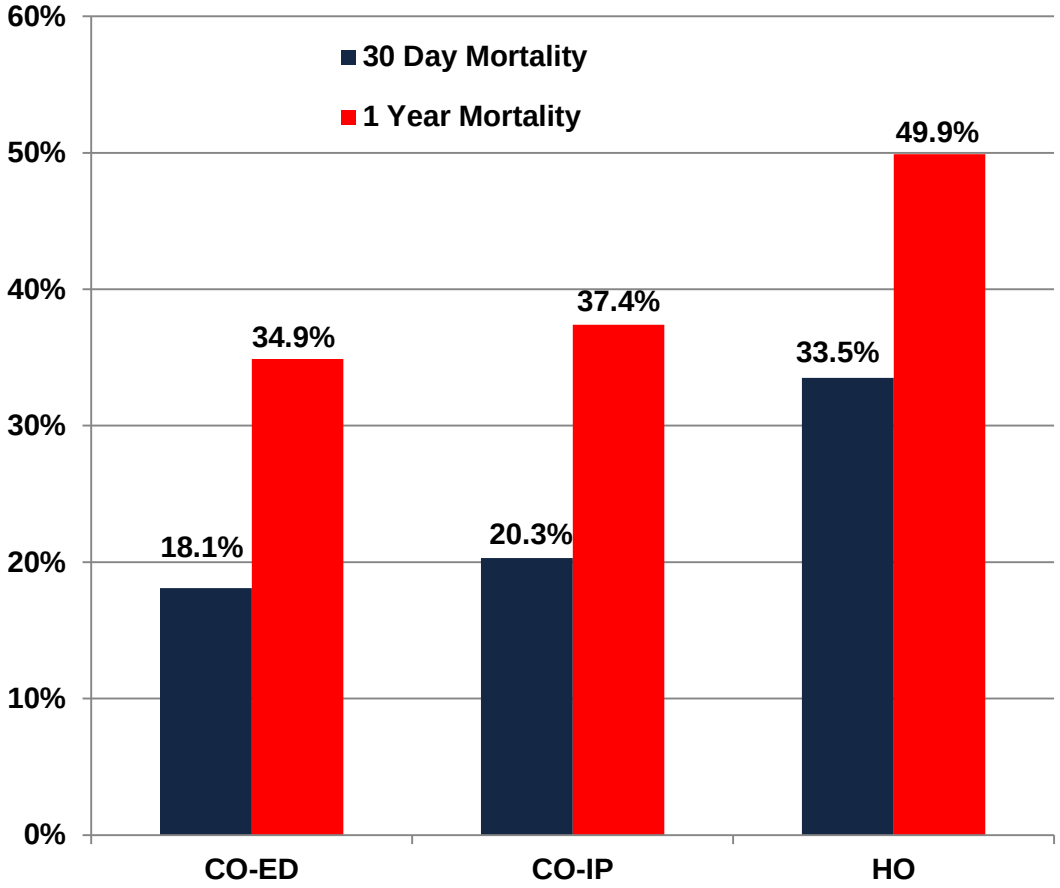


Changes in the Number of HO-MRSA BSIs Needed to Prevent to Reach the 2020 HHS Action Goal, by Facility, 2016-2017



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

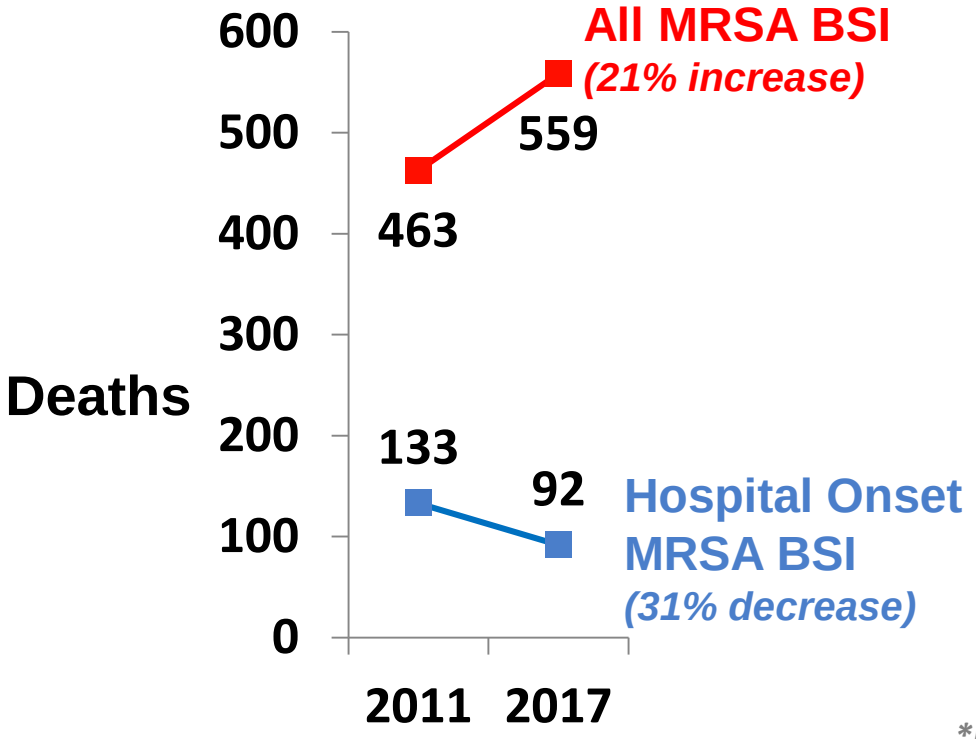


CO-ED: Blood Culture taken in Emergency Department

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*

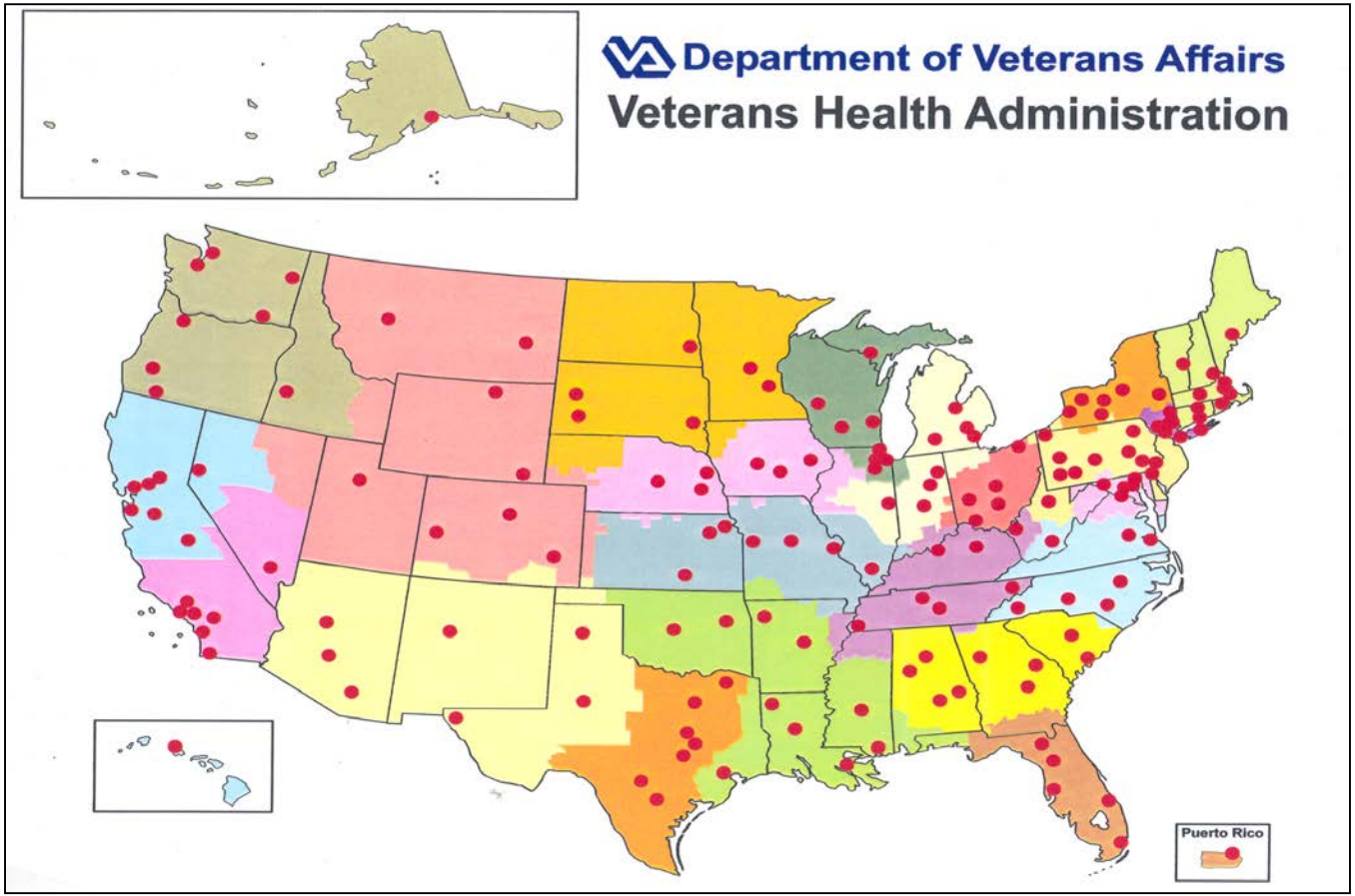
**Preliminary data*

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



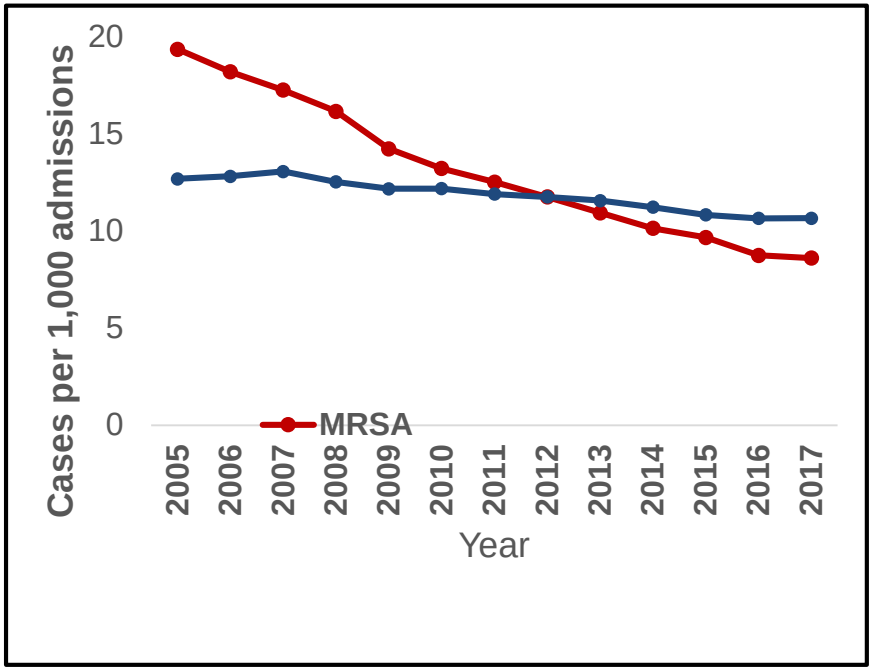
VHA MRSA Prevention Initiative

- ✓ 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

Vital Signs: Trends in *S. aureus* Infections in VAMCs, US, 2005-2017

- 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



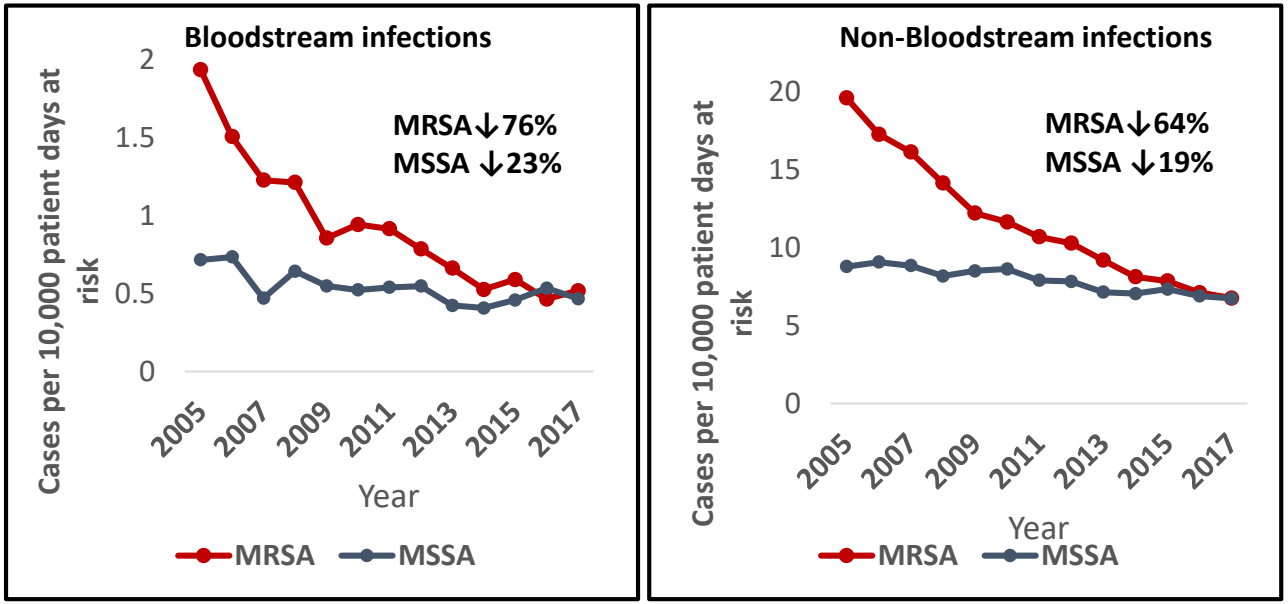
Total (figure):
MRSA ↓ 55%
MSSA ↓ 12%

Hospital-Onset:
MRSA ↓ 66%
MSSA ↓ 19%

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

* Unadjusted

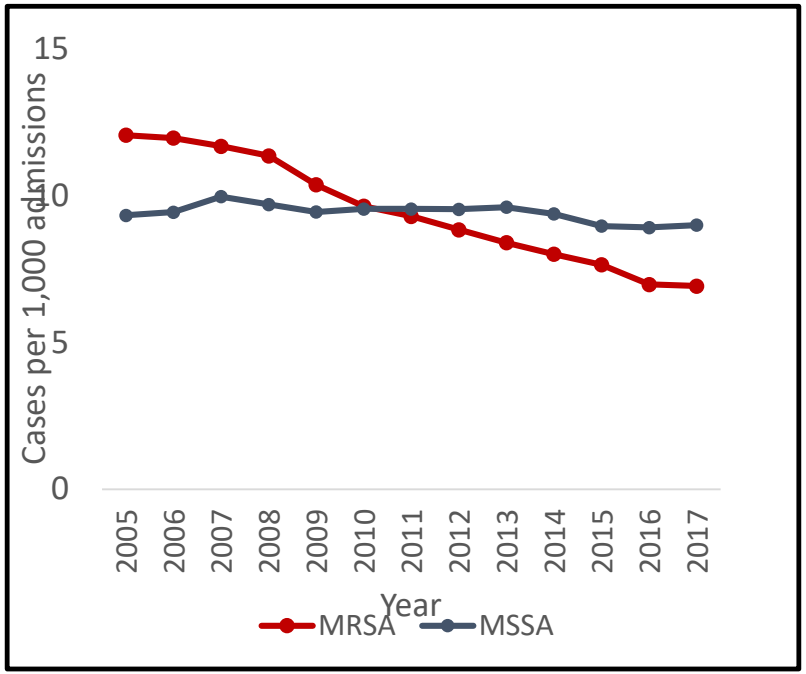
Hospital-onset *Staphylococcus aureus* bloodstream and non-bloodstream infection rates* by methicillin resistance status — 130 Veterans Affairs Medical Centers, United States, 2005–2017



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.

MRSA Colonization & Infection Rates

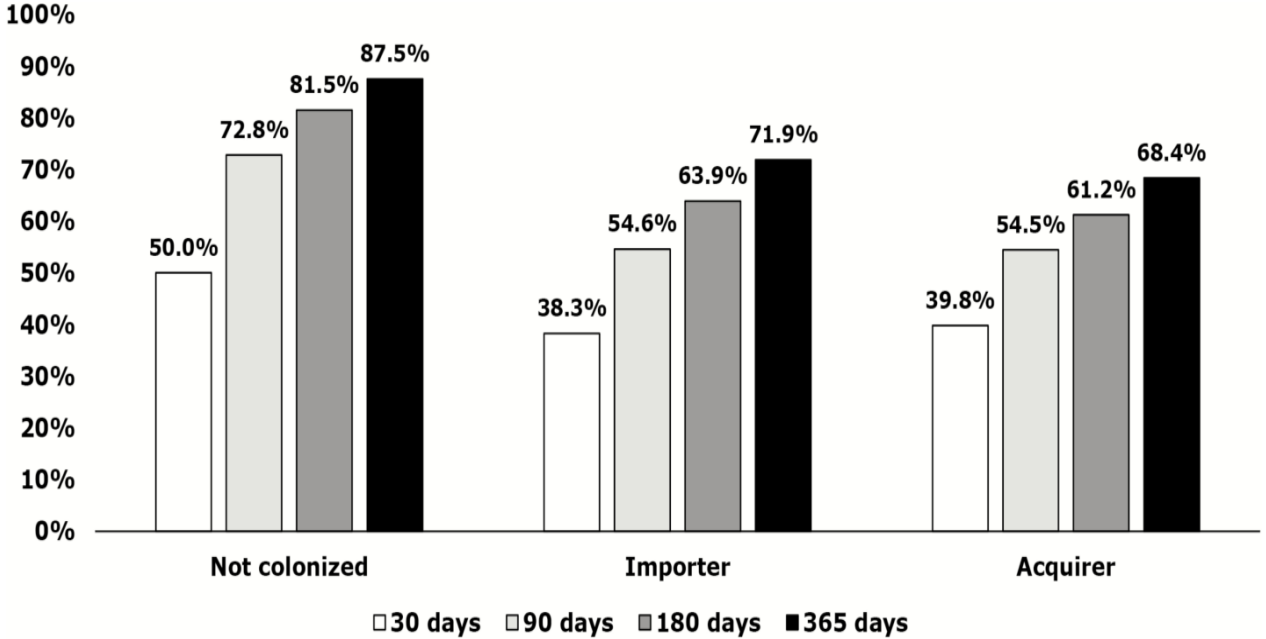
- Hospital-acquired MRSA colonization rates decreased during the study period.
- Infection rates:
  - Decreased 58% in those admitted MRSA negative, but later became positive (acquirers)
  - But only decreased 31% in those admitted already MRSA positive (importers)
  - $p<0.05$ comparing importers and acquirers

MRSA Colonization and Pre- and Post-hospital Discharge Infection Risk*

- 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



Nelson, RN, et. al. Methicillin-resistant *Staphylococcus aureus* Colonization and Pre- and Post-hospital Discharge Infection Risk, Clin Infect Dis. 2018;68(4):545-553. doi:10.1093/cid/ciy507

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 ← **Prevents shedding**
  - 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]

[1] Liu C CID 2011;52:285-92 (IDSA Guideline)
[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
[6] Milstone A Lancet 2013;381:1099-106
[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

Author	Study Year	Study Type	Hospital	ICU	N	Findings	Publication
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
Climo	8/07-2/09	Cluster RCT	6	9	7,727	23% less MRSA/VRE acquisition	N Engl J Med 2013; 368:533-42
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

IDWeek 2017
Lancet, published online
March 5, 2019

Decolonization in General Wards

- Did not see overall impact, unlike ICU trials
  - Lower risk and smaller effect size
  - 8.7% for MDROs, 6.2% bloodstream infection (P=NS)
- Benefit seen in **higher risk patients with lines and devices**
  - 37% reduction in MRSA and VRE clinical cultures
  - 32% reduction in all pathogen bloodstream infection
  - ~10% of population, but a third of MRSA+VRE cultures
  - ~10% of population, but 60% of bloodstream infections
  - Contact precautions were applied

IDWeek 2017
Lancet, published online March 5, 2019

CHANGING LIVES BY ERADICATING ANTIBIOTIC RESISTANCE

- 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

Number of Patients Needed to Treat to See Benefit	Overall	Full Adherence
MRSA Infection	30	26
MRSA Hospitalization	34	27
Any Infection	26	11
Hospitalization due to Infection	28	12

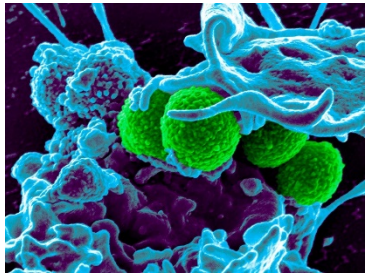
Evidence-Based Decolonization Options

- ***S. aureus* Carriers – Screen with Targeted Decolonization**
  - Recurrent infection [1]
  - Pre-operative [2-3]
  - Post-discharge [4]
- **Universal Decolonization**
  - Pre-operative bathing
  - ICU [5-8]
  - Non-ICU patients with medical devices [9]

[1] Liu C CID 2011;52:285-92 (IDSA Guideline)
[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
[6] Milstone A Lancet 2013;381:1099-106
[7] Huang SS NEJM 2013;368:2255-65
[8] Huang SS, clinicaltrials.gov NCT03140423
[9] Huang SS IDWeek 2017, Lancet, online March 5

Susan Huang, MD MPH

University of California, Irvine
sshuang@uci.edu



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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

1600 Clifton Rd, NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
Email: cdcinfo@cdc.gov
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