



# **MRSA Surveillance: Challenges and Lessons Learned— Tennessee**

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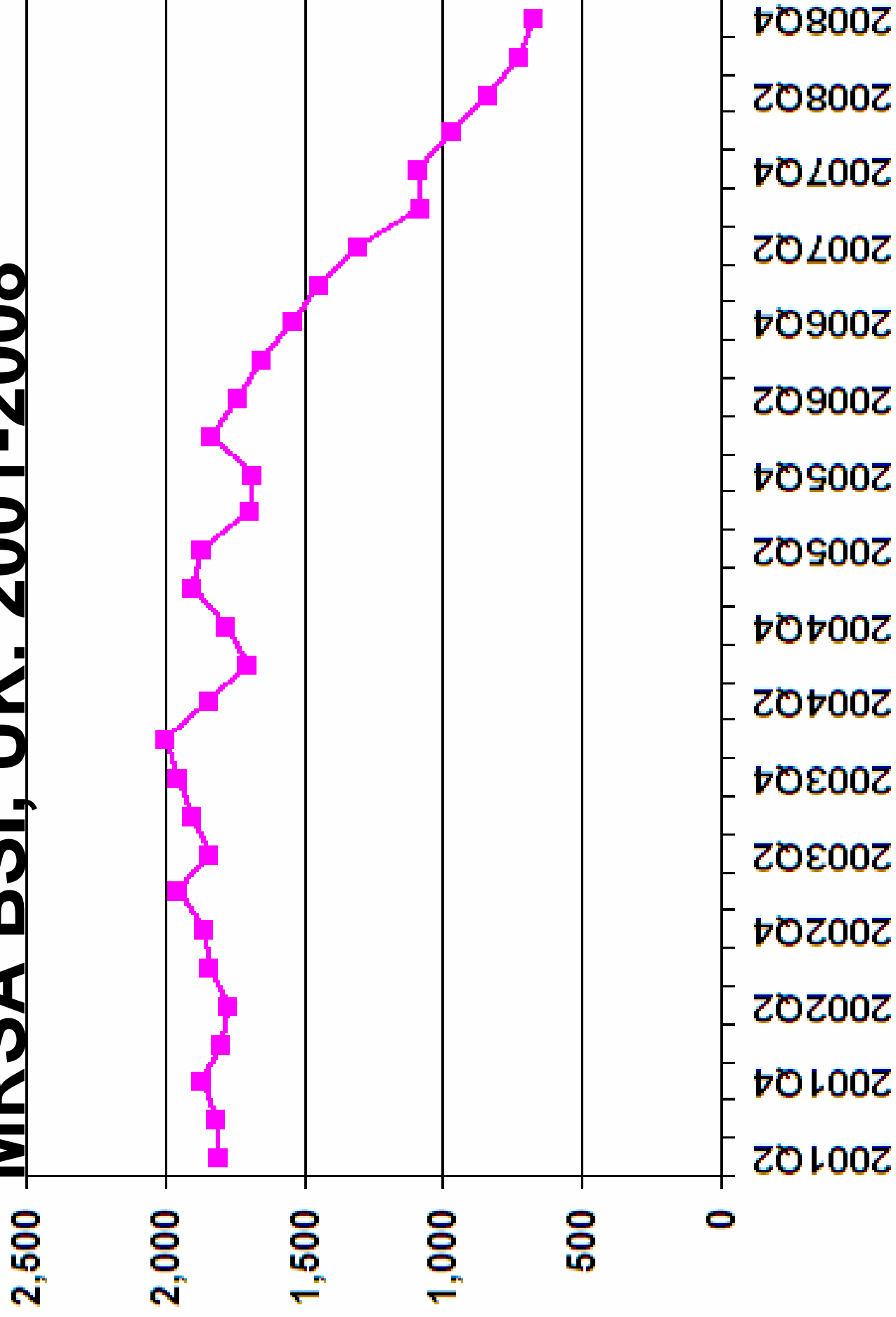
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**ARRA HAI Grantee Meeting, Oct 19, 2009**

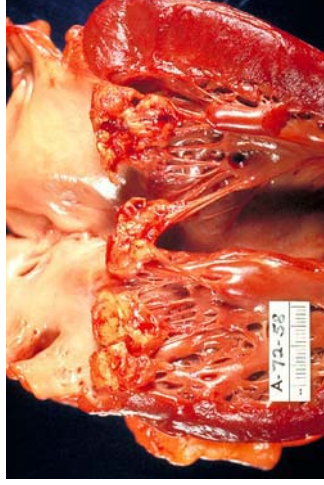
# Why Should Public Health Conduct MRSA Surveillance?

- Significant Public Health Burden
  - Morbidity, Mortality, Cost
- Emerging Factors in Disease
  - Community-associated MRSA [CA-MRSA]
  - Changes in antibiotic susceptibility
- Preventable
  - Exact proportion not known, probably much larger than most people think

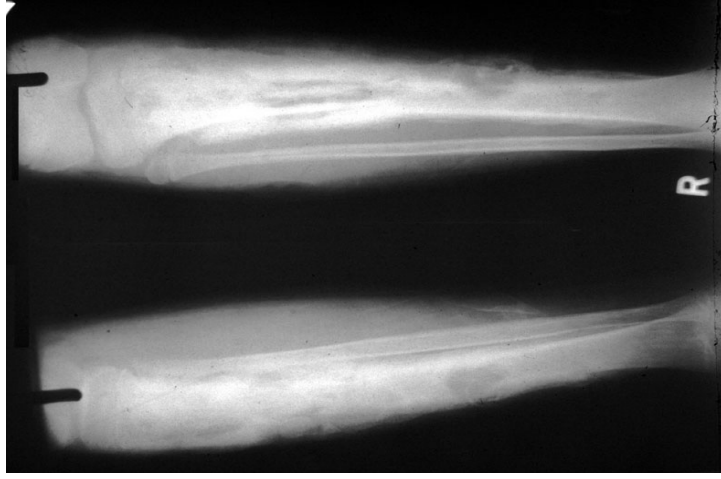
# MRSA BSI, UK: 2001-2008



# Invasive MRSA (I-MRSA) Surveillance in Tennessee

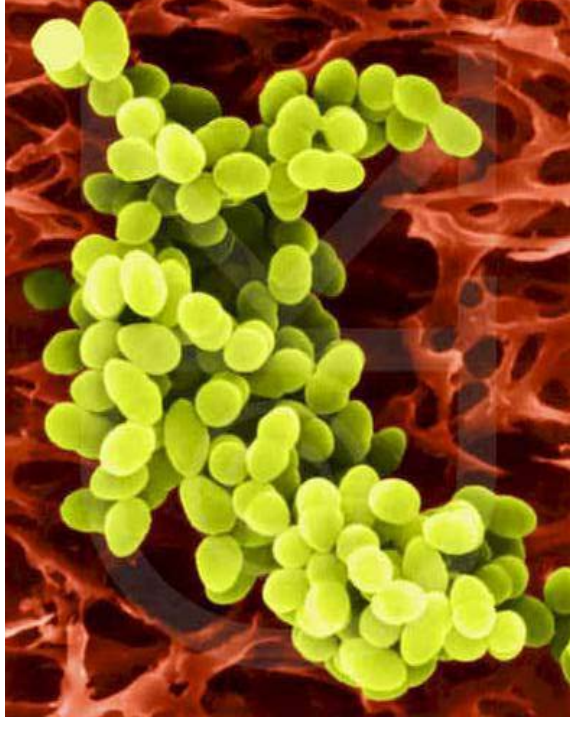


- Made reportable in June 2004
- Laboratory based surveillance
  - Specimen source= sterile (blood, joint, bone, CSF, pericardial, peritoneal, pleural).
    - Not urine, wounds, resp. tract, catheter tips
- Basic demographics (age, gender, race, county)
- NOT differentiate between healthcare and community-associated (no med. chart review)

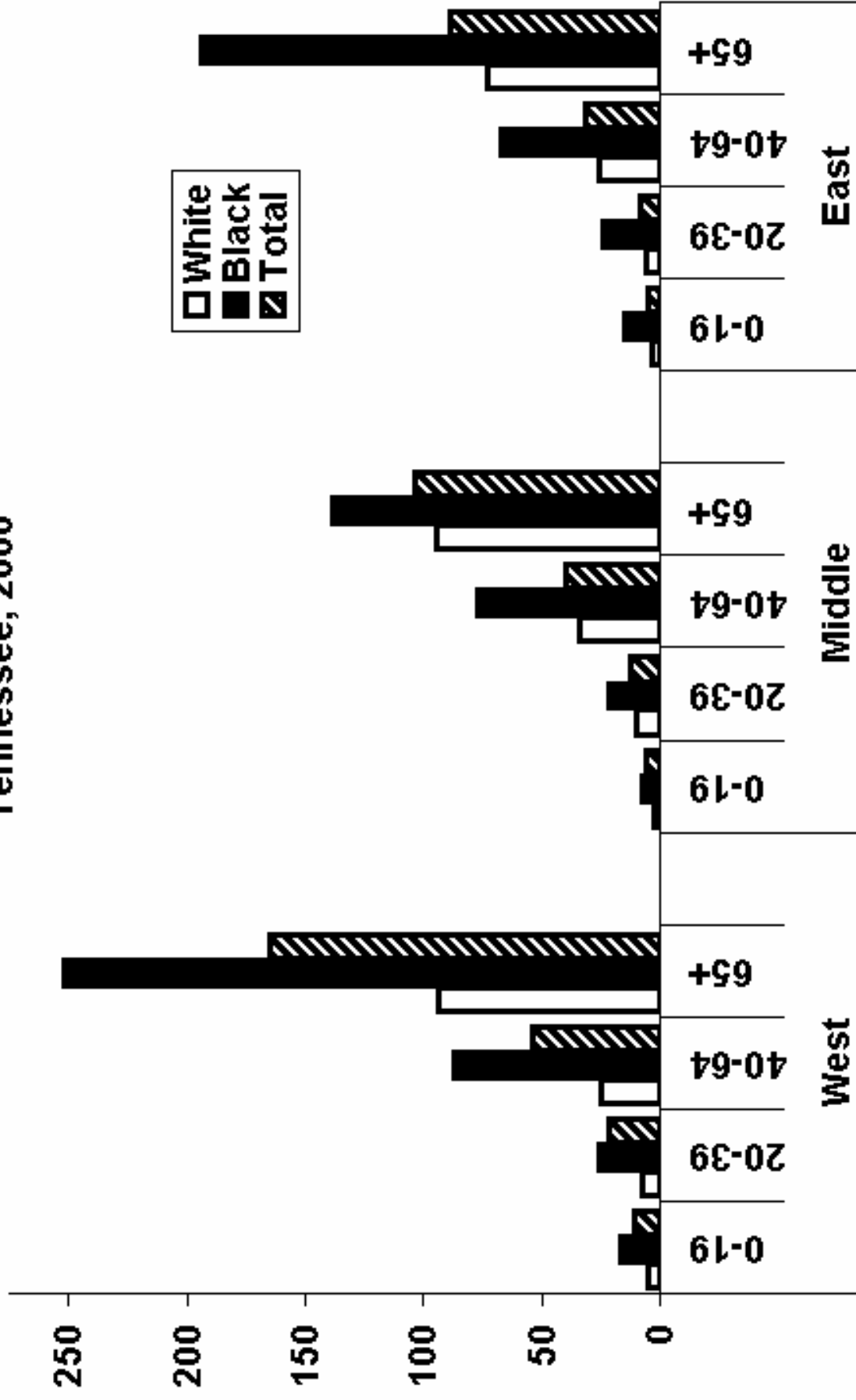


# **Invasive MRSA (I-MRSA) Surveillance in Tennessee**

- **~2,000 cases per year**
  - ~90% Blood cultures (BSI)
- **Incidence: 33 per 100,000**
  - Stable 2005 -2007
- **3<sup>rd</sup> most common reportable  
communicable disease in Tennessee**



# Invasive MRSA per 100,000 by Race, Age, and Grand Division, Tennessee, 2006



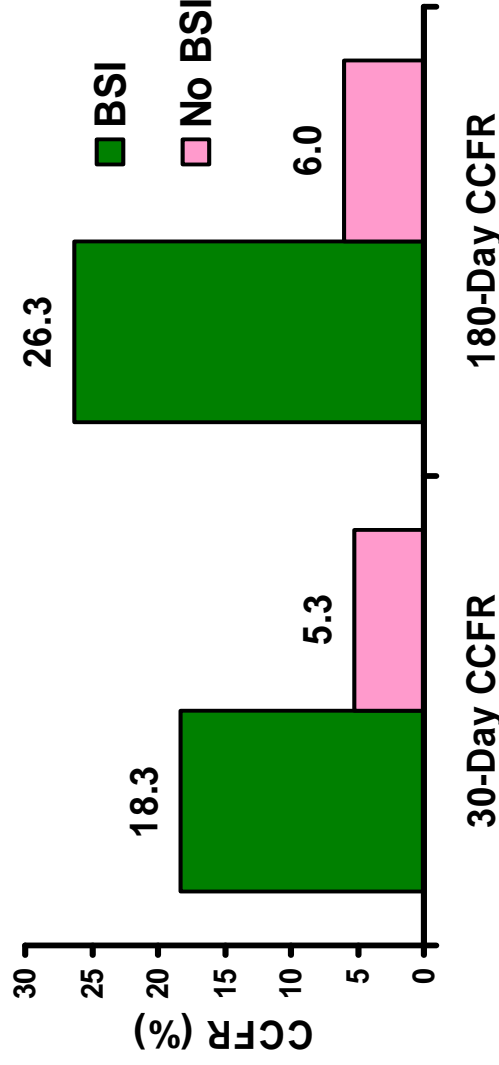
Grand Division and Age Group (Years)

<http://health.state.tn.us/Downloads/MRSAreport307.pdf>

# Surveillance: MRSA-BSI or I-MRSA?

- MRSA-BSI = 85% of invasive MRSA infections
  - Easier & more reliable to obtain from Laboratory Information Systems (coding of specimen source)

30- and 180-Day Crude Case Fatality Ratios Among I-MRSA Patients with Bloodstream Infections, Tennessee, 2004-2007 (N=889)



- MRSA-BSI: 30 day Crude Case Fatality Rate (CCFR) = 3.5 x higher than non-BSI



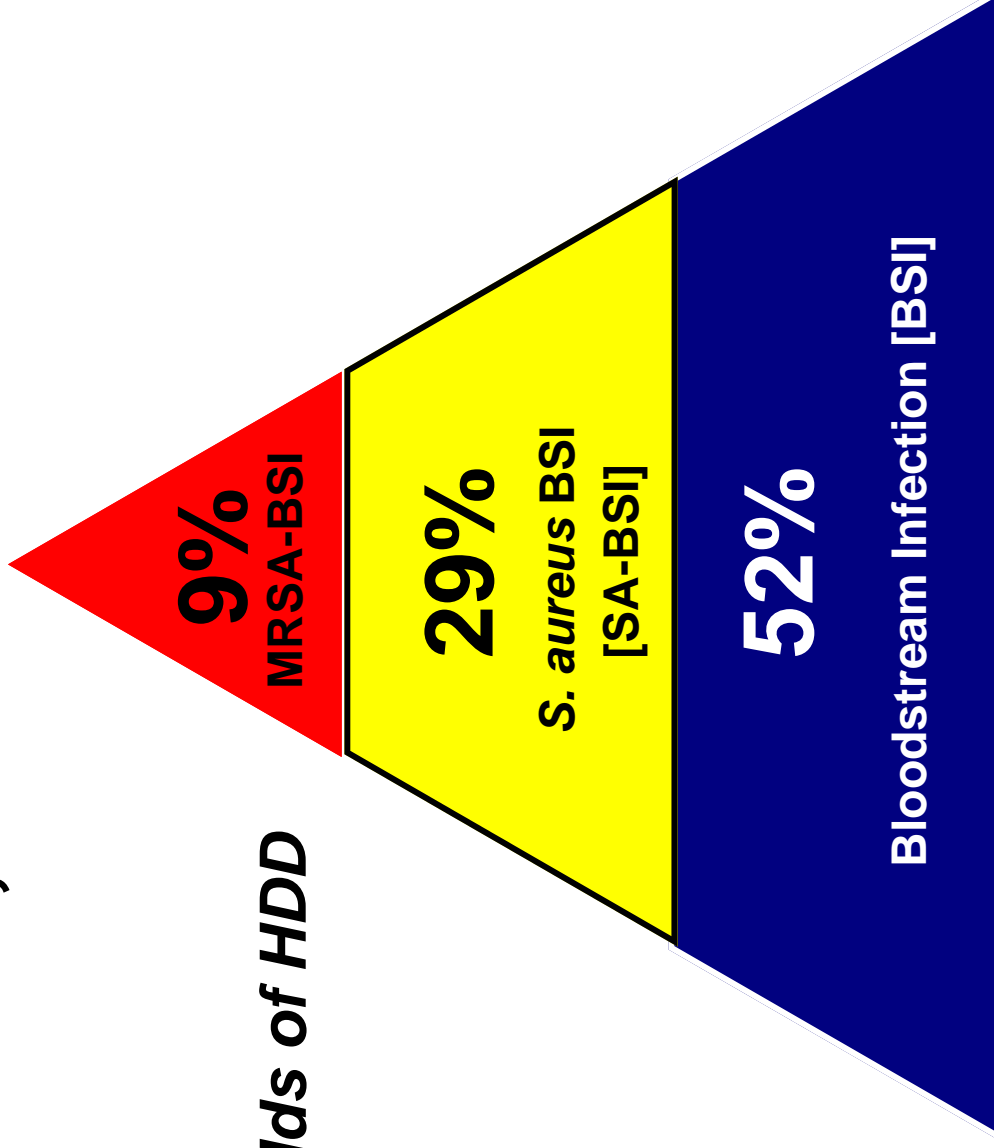
# Administrative data: Hospital Discharge Dataset [HDD]



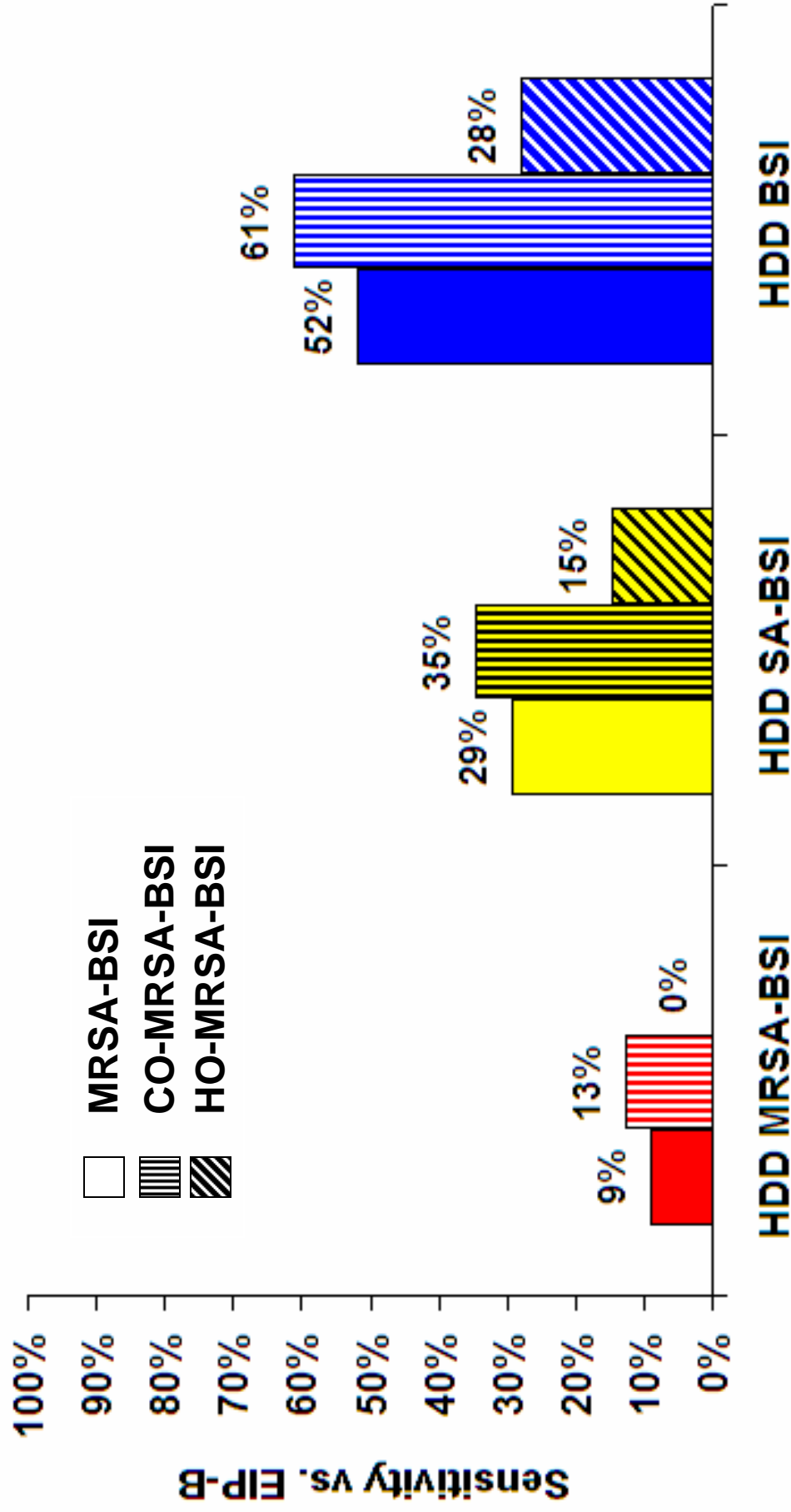
# Sensitivity of Hospital Discharge Database [HDD]\* in Detecting MRSA-BSI

- Tennessee, 2005

*\* First 9 Fields of HDD*



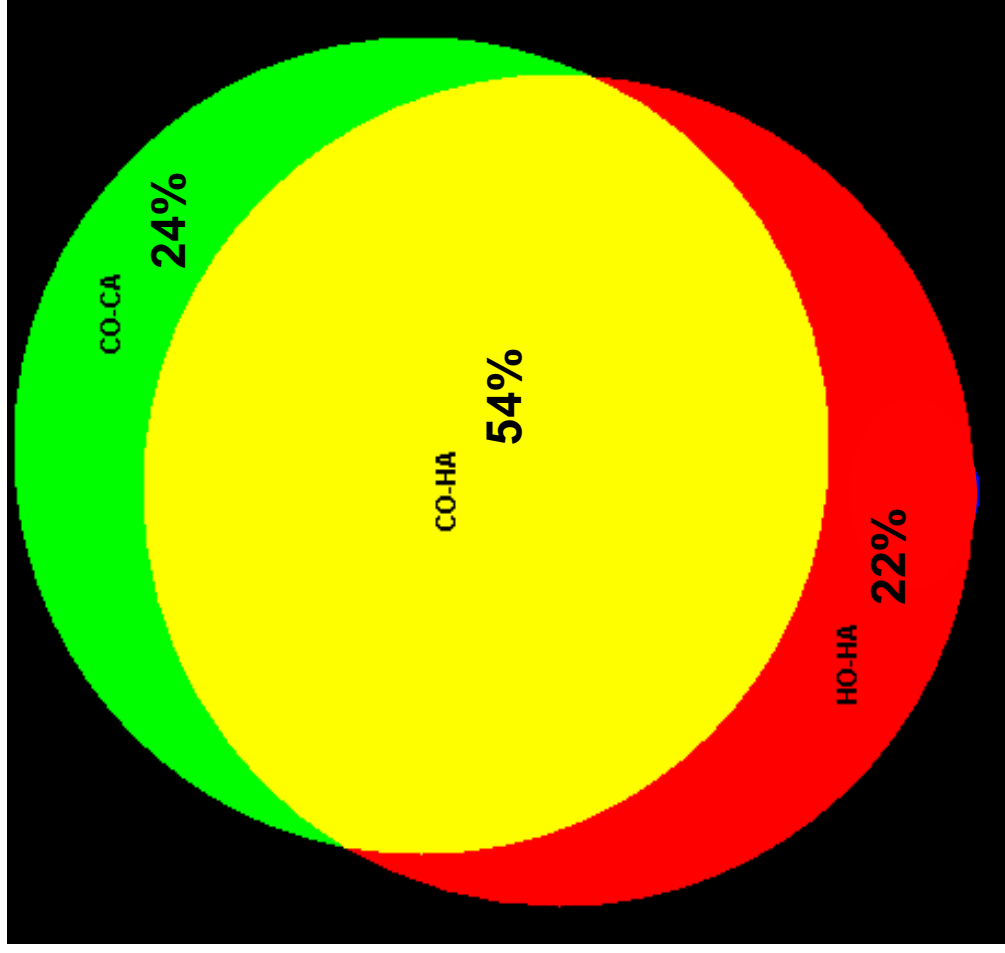
# Sensitivity of Hospital Discharge Database [HDD] in Detecting MRSA-BSI by Onset, --Tennessee, 2005



# Which MRSA-BSI?

**Community-associated? [CA]  
Healthcare-associated? [HA]  
Community-onset? [CO]  
Hospital-onset? [HO]**

# MRSA-BSI: Onset and Association, Tennessee 2004-2007 (N=756)



 CO-CA: Community Onset, Community Associated

 CO-HA: Community Onset, Healthcare Associated

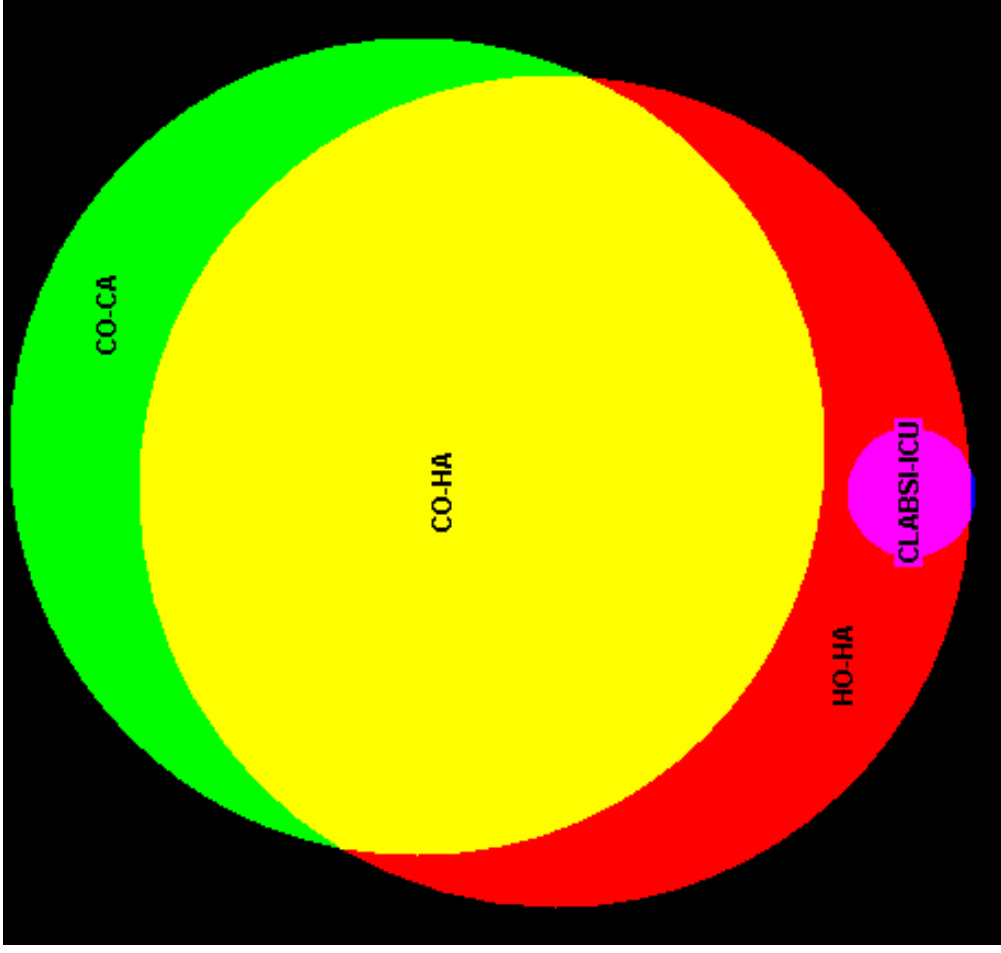
 HO-HA: Hospital Onset, Healthcare Associated

# MRSA-BSI Associated with Central Lines, TN 2004-2007 (N=756)



- For 5.4% of MRSA-BSI events, patients were in the ICU when blood cultures were drawn and had a central line (proxy for CLABSI in ICU)

# MRSA-BSI: Onset and Association, Tennessee 2004-2007 (N=756)



 CO-CA: Community Onset,  
Community Associated

 CO-HA: Community Onset,  
Healthcare Associated

 HO-HA: Hospital Onset,  
Healthcare Associated

 CLABSI-ICU: Central Line-  
Associated BSI in  
Intensive Care Units [ICU]

*ABC data, TN 2004-2007*

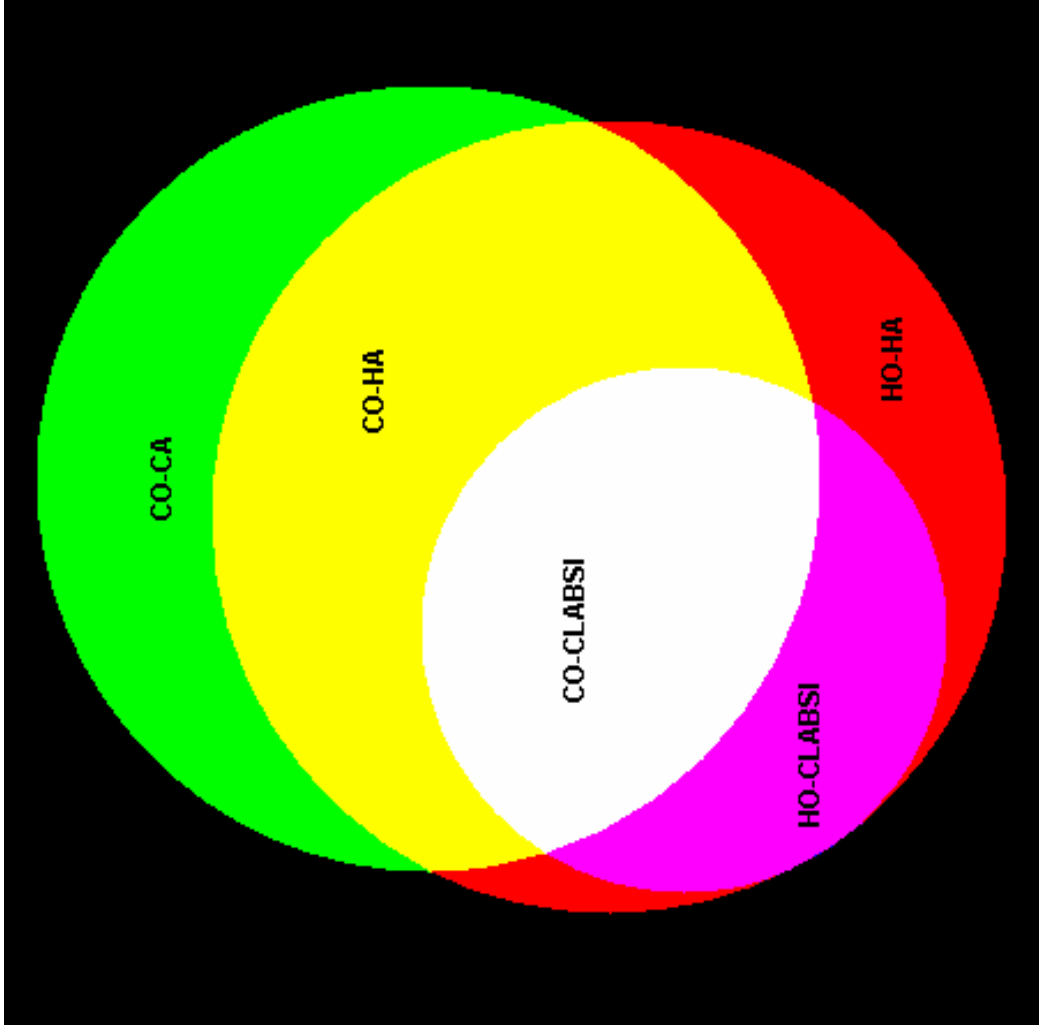
# MRSA-BSI Associated with Central Lines, TN 2004-2007 (N=756)



- Central lines were associated with:
  - 30% of all MRSA-BSI
  - 40% of all HA-MRSA-BSI
    - 1/3 Hospital-onset
    - 2/3 Community-onset



# MRSA-BSI: Central Line-Associated, Tennessee, 2004-2007 (N=756)



 CO-CA: Community Onset, Community Associated

 CO-HA: Community Onset, Healthcare Associated


 HO-HA: Hospital Onset, Healthcare Associated

 HO-CLABSI: Hospital Onset Central Line-Associated BSI


 CO-CLABSI: Community Onset Central Line-Associated BSI

*ABC data, TN 2004-2007*



A decorative graphic consisting of several overlapping rectangular blocks of different shades of blue and purple. A cluster of realistic images of various nuts and bolts is positioned on the left side, partially overlapping the blue blocks.

# Nuts and Bolts: Basic Definitions

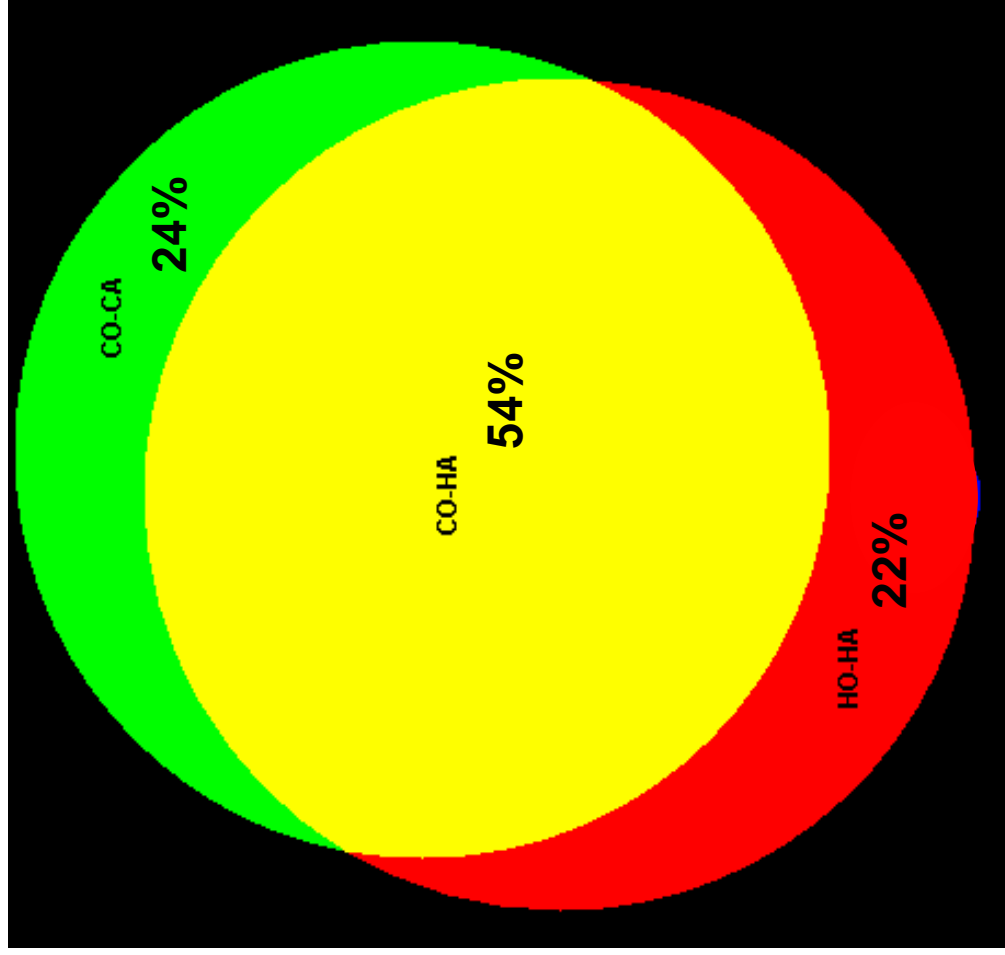


# Definition: Hospital Onset

**48 Hours or  
Day 4 of Admission  
(Day of Admission= Day 1)**

# MRSA-BSI: Hospital Onset Definition: 48 Hours vs. Day 4 of Admission

- Changed classification of only 3/756 (0.4%)



CO-CA: Community Onset,  
Community Associated

CO-HA: Community Onset,  
Healthcare Associated

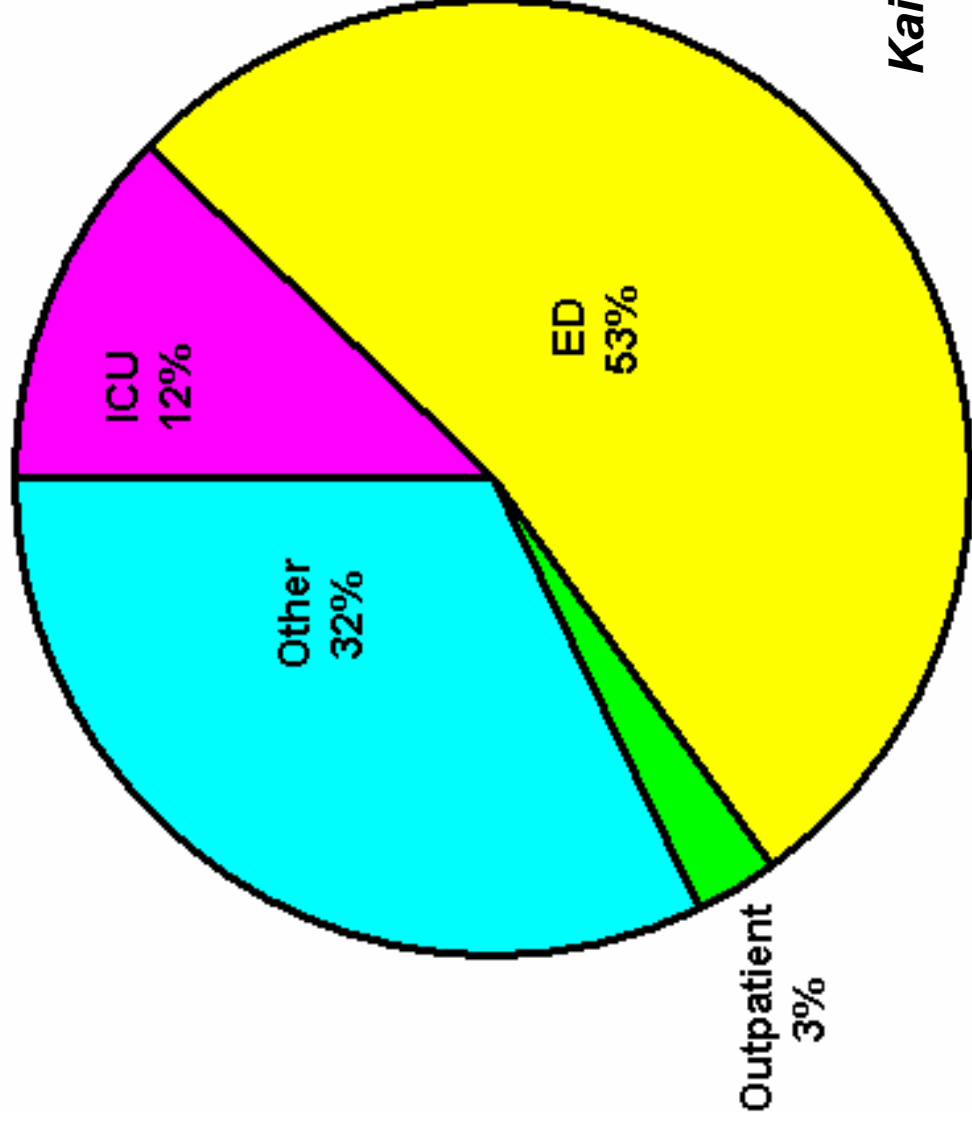
HO-HA: Hospital Onset,  
Healthcare Associated

ABC data, TN 2004-2007



# Should one include cultures taken in the Emergency Dept?

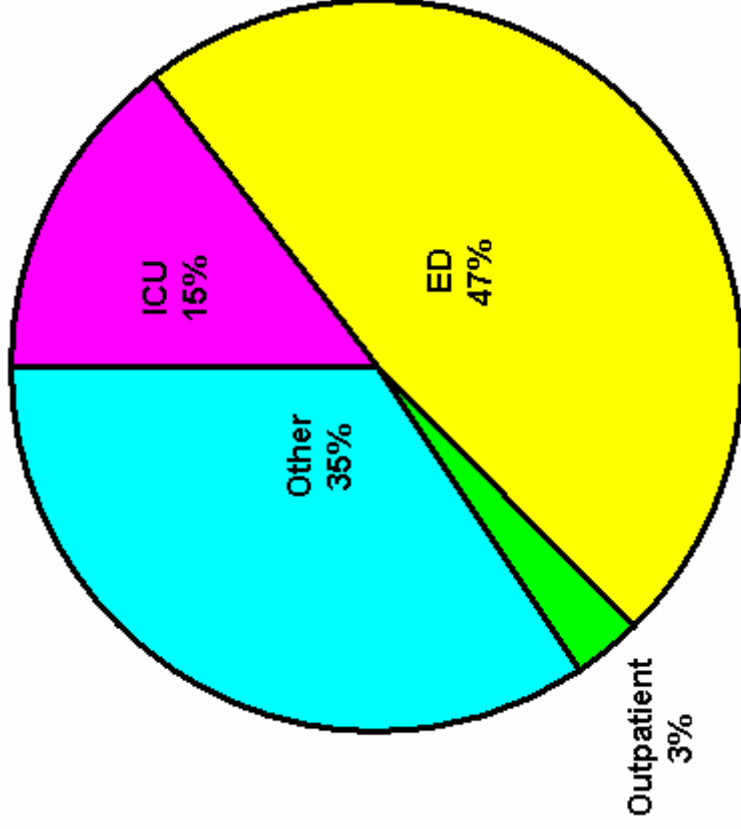
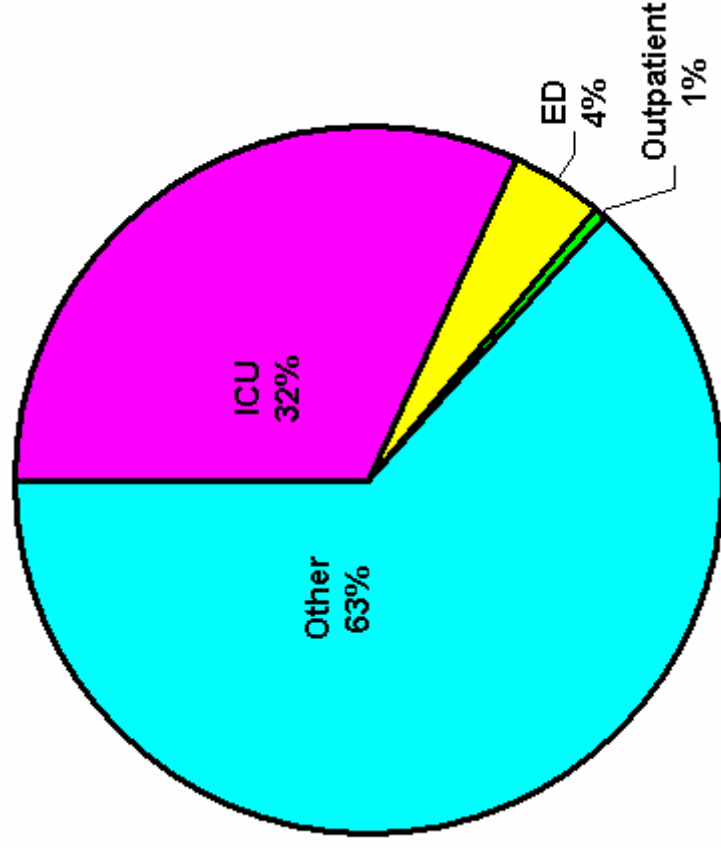
# MRSA-BSI by Patient Location At Time of Culture Collection, Tennessee Oct. 2004-Jul. 2007(N=756)



# MRSA-BSI by Patient Location At Time of Culture Collection, TN, Oct. 2004- Jul. 2007

Hospital-Onset (N=166)

Healthcare-Associated (N=573)



*Kainer, CSTE 2009*

# TN Center for Patient Safety

*Kainer, CSTE 2009*

# Required Data: TCPS-MRSA

- Definition: NHSN MDRO Lab ID Event
- COUNT data only (no patient-level data, no antibiograms)
- Required:
  - ☐ # HO-MRSA clinical cultures
  - ☐ # admissions
  - ☐ # patient-days
- Optional:
  - ☐ # CO-MRSA clinical cultures
  - ☐ # CO-MRSA blood cultures (14 day rule)
  - ☐ # HO-MRSA blood cultures (14 day rule)





# **“Required” Facilities: TCPS-MRSA**

- **Voluntary- NOT required**
- **Acute care hospitals**
- **Long term acute care (LTAC)**
- **Rehabilitation hospitals**

# Data Collection **TCPs-MRSA**

- Stand alone database housed at the TN Hospital Association/TCPs
- Web-based
- If facilities use NHSN/MDRO module, can provide rights to TN DOH→ extract counts→ TCPs

## Tennessee Center for Patient Safety MRSA Monthly Data Reporting Form

Facility Name:

How would you like to report?

☒ By Individual Unit

☐ Facility-wide

Unit Type:

Specific Unit Location:

Unit Name:

1. Please select the timeframe for this reporting period:

Month:

Year:

2. During this period, how many **Healthcare Facility Onset (HO)** cases of MRSA occurred in this unit?

3. During this period, how many total patient days were in this unit?

4. During this period, how many admissions were there to this unit?

### MRSA Infections Surveillance Definitions

- Definition of MRSA** - MRSA includes *S. aureus* cultured from any specimen that tests oxacillin (or cefoxitin for oxacillin) resistant by standard susceptibility testing methods, or by a positive result from molecular testing for *mecA* and *PBP2a*; these methods may also include positive results of specimens tested by any other FDA approved PCR test for MRSA.
- Healthcare Facility Onset (HO) Cases of MRSA** - Number of cases of MRSA (as defined above) for which the specimen used to test for MRSA was collected more than 3 days after the admission date (day 4 or greater after admission). Report only those cases identified during the reporting month and assign each case to the unit where the patient was located when the specimen was drawn to complete the test. Do not include results from active surveillance tests.
- Community Onset (CO) Cases of MRSA** - Number of cases of MRSA (as defined above) for which the specimen used to test for MRSA was collected less than 4 days after the admission date (day 3 or less after admission). Report only those cases identified during the reporting month and assign each case to the unit where the patient was located when the specimen was drawn to complete the test. If the patient was admitted from the emergency department, and cultures were taken in the

### Optional Data Elements

5. During this period, how many **Community Onset (CO)** cases of MRSA were identified in this unit?

6. During this period, how many **Healthcare Facility Onset (HO)** cases of MRSA, identified through **positive blood cultures**, were in this unit?

7. During this period, how many **Community Onset (CO)** cases of MRSA, identified through **positive blood cultures**, were in this unit?

Please provide your name and email address so that we can contact you in the event we have questions about the provided data.

Name:

Email:

[Submit Form](#)

department, and cultures were taken in the ED, assign the case to the location where the patient was first admitted. Do not include results from active surveillance tests.


#### 4. **Healthcare Facility Onset (HO) Cases of MRSA identified through a positive blood culture**

- Count only patients with blood cultures positive for MRSA for which the blood used to test for MRSA was collected more than 3 days after the admission date (day 4 or greater after admission). Report only those cases identified during the reporting month and assign each case to the unit where the patient was located when the blood was drawn to complete the test. These cases also will be reported in question 2 but should be a subset of the HO case reported for that variable. Repeat blood cultures are counted if they occur >14 days after a previous positive blood culture.

#### 5. **Community Onset (CO) Cases of MRSA identified through a positive blood culture**

- Count only patients with blood cultures positive for MRSA for which the blood used to test for MRSA was collected less than 4 days after the admission date (day 3 or sooner after admission). Report only those cases identified during the reporting month. These cases also will be reported in question 5 but should be a subset of the CO case reported for that variable. Repeat blood cultures are counted if they occur >14 days after a previous positive blood culture.

**Reporting Requirements:** Submit your data to THA within 30 days following the end of the reporting month.

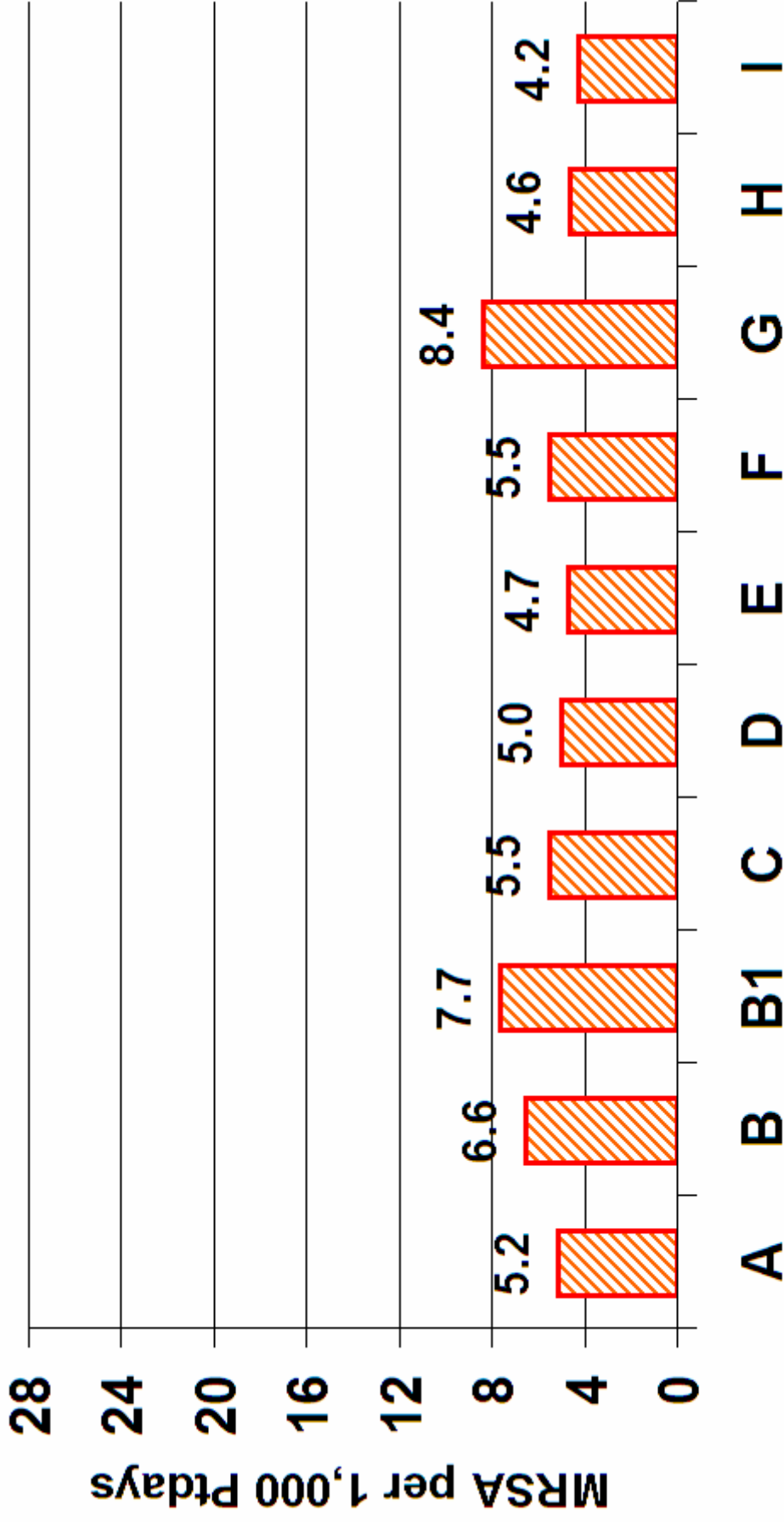


# Hospital-based MRSA Rates

**Hospital-wide?**

**Which Locations to Aggregate?**

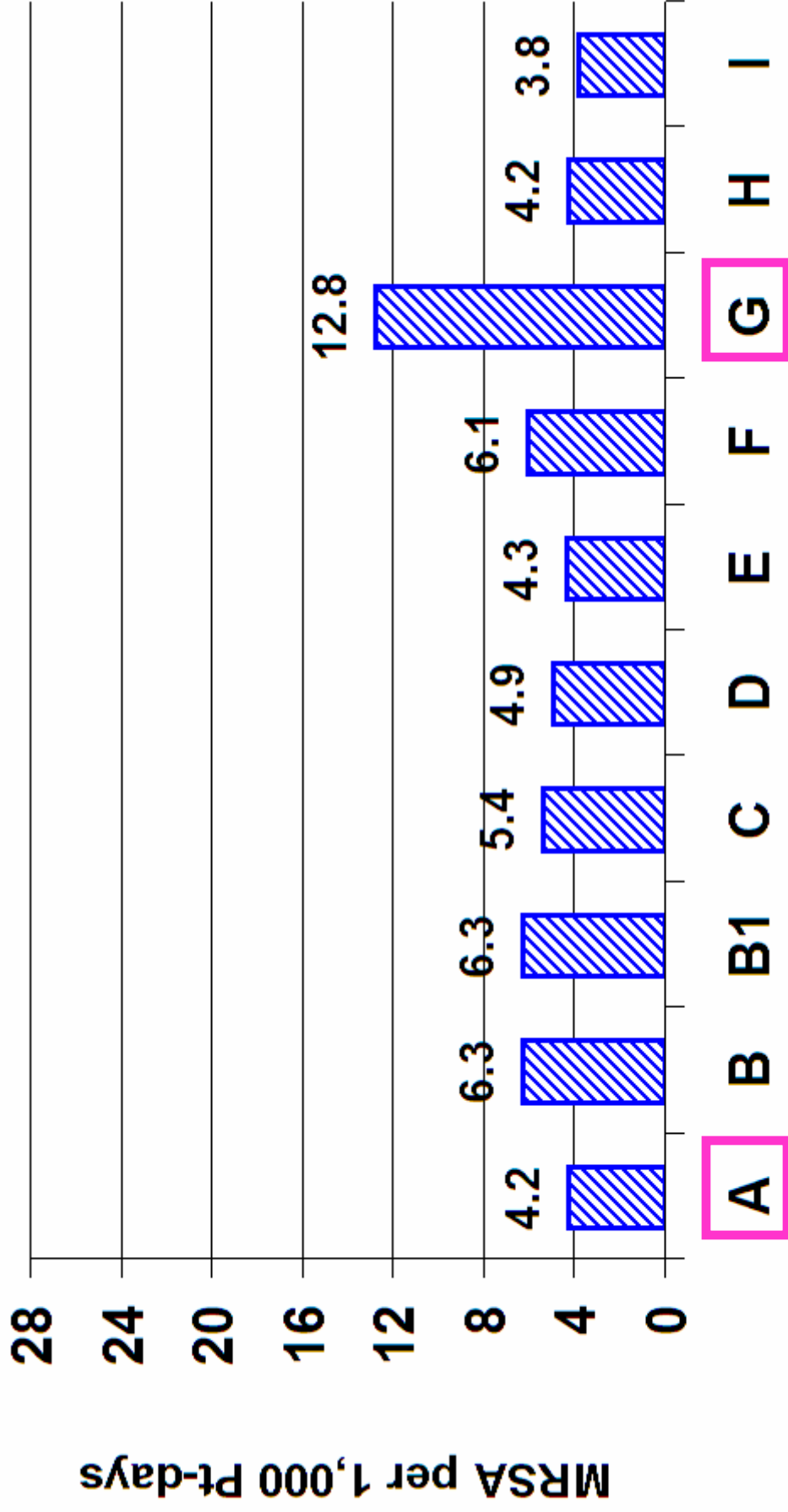
# MRSA Rates: Hospital-wide per 1,000 Patient-days



Hospital

*Kainer, CSTE 2009*

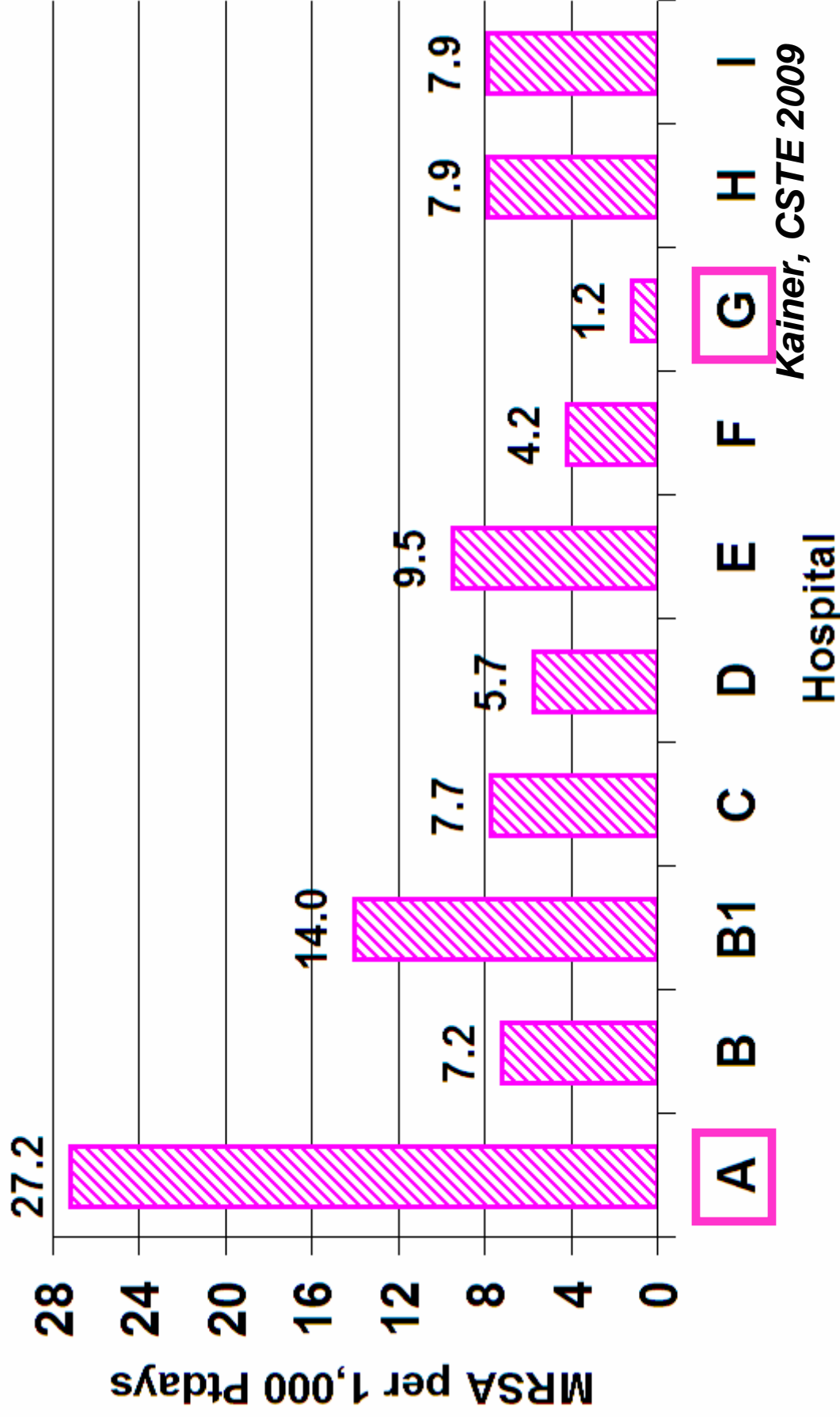
# MRSA Rates: General Floor per 1,000 Patient-days



Hospital

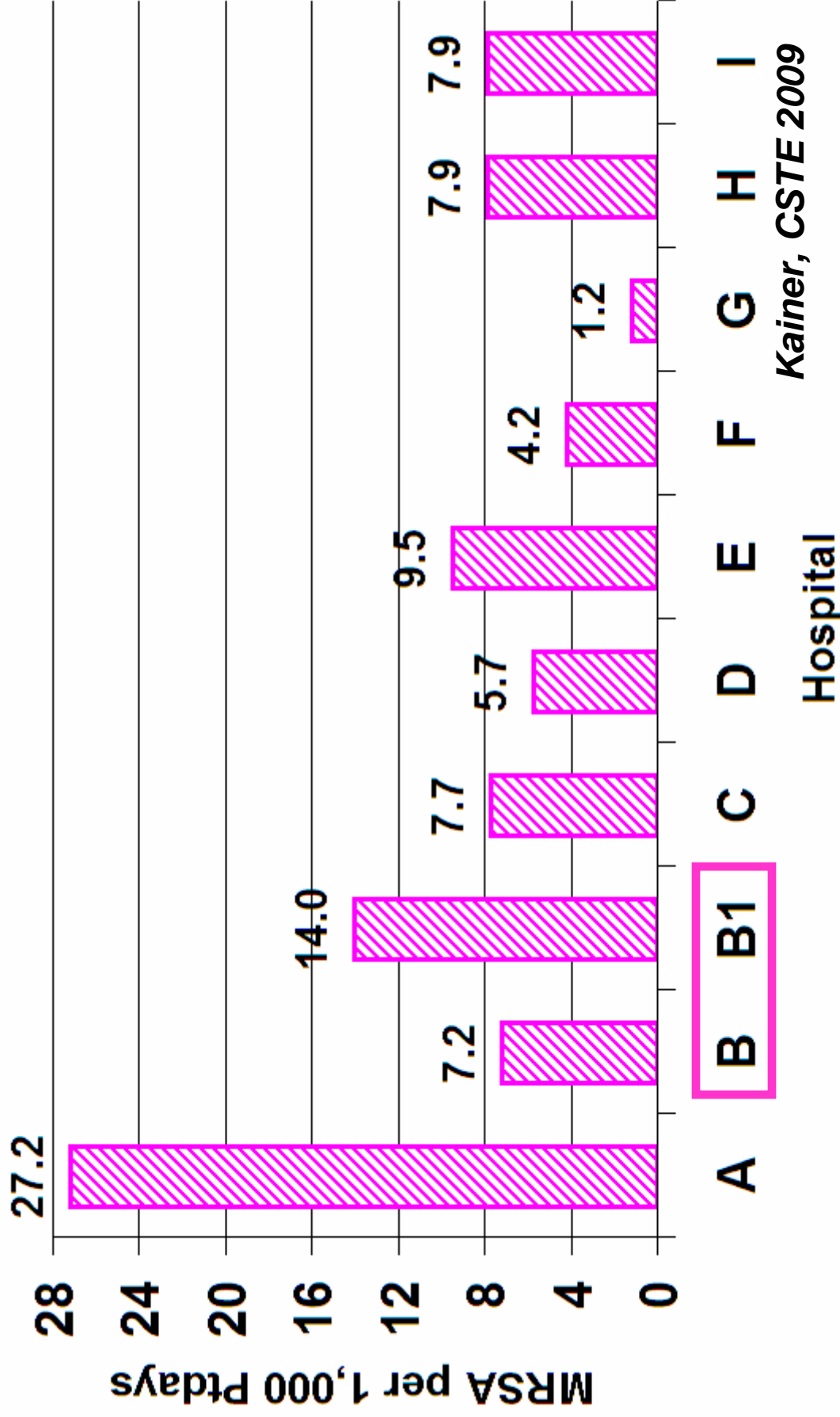
Kainer, CSTE 2009

# MRSA Rates: Critical Care Areas per 1,000 Patient-days





# MRSA Rates: Critical Care Areas per 1,000 Patient-days





# Acknowledgements

- **Kimberly Glenn (CSTE fellow)**
- **Infection Preventionists**
- **ABC/ Emerging Infection Program Staff**