



# Preventing Healthcare-associated Infections

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# Estimates of Healthcare-associated Infections in U.S. Hospitals



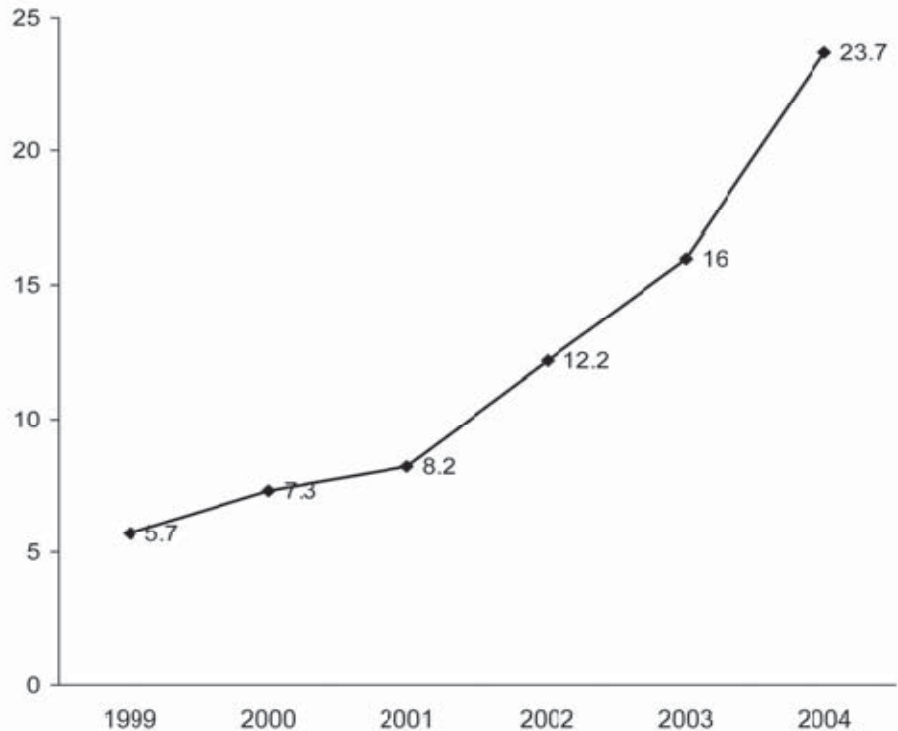
- 1.7 million infections in hospitals
  - 9.3 infections per 1,000 patient-days
  - 4.5 per 100 admissions (1 out of 20 patients acquire an infection in US)
  - Most frequent infections: bloodstream infections, urinary tract infections, surgical site infections, pneumonia
- 99,000 deaths associated with infections

Klevens, et al. *Pub Health Rep* 2007;122:160-6

# Emerging Threats in Healthcare



Yearly *Clostridium difficile*-related mortality rates per million population, United States, 1999–2004.



Redelings MD et al. *Emerg Infect Dis* 2007;13: 1417-19

ORIGINAL CONTRIBUTION

**JAMA**<sup>®</sup>  
The Journal of the American Medical Association

## Invasive Methicillin-Resistant *Staphylococcus aureus* Infections in the United States

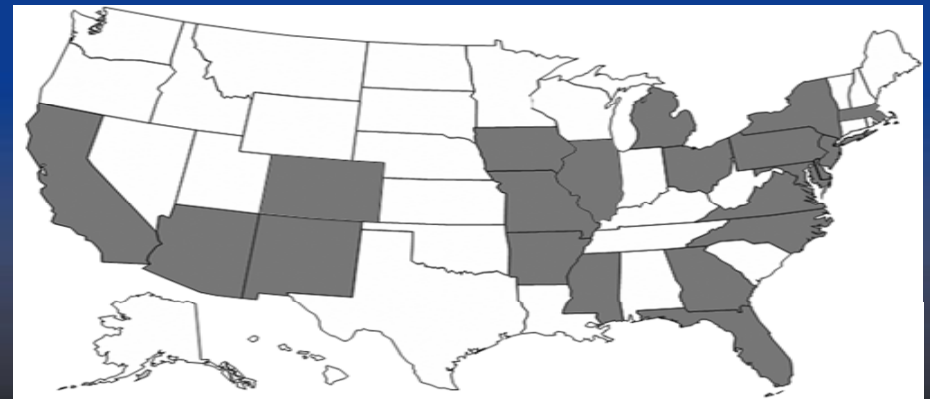
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Melissa A. Morrison, MPH  
Joelle Nadel, MPH  
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**Context:** As the epidemiology of infections with methicillin-resistant *Staphylococcus aureus* (MRSA) changes, accurate information on the scope and magnitude of MRSA infections in the US population is needed.

**Objectives:** To describe the incidence and distribution of invasive MRSA disease in 9 US communities and to estimate the burden of invasive MRSA infections in the United States in 2005.

**Design and Setting:** Active, population-based surveillance for invasive MRSA in 9 sites participating in the Active Bacterial Core surveillance (ABCs)/Emerging Infections Program Network from July 2004 through December 2005. Reports of MRSA were investigated and classified as either health care-associated (either hospital-onset or community-onset) or community-associated (patients without established health

Multi-drug resistant *Acinetobacter*



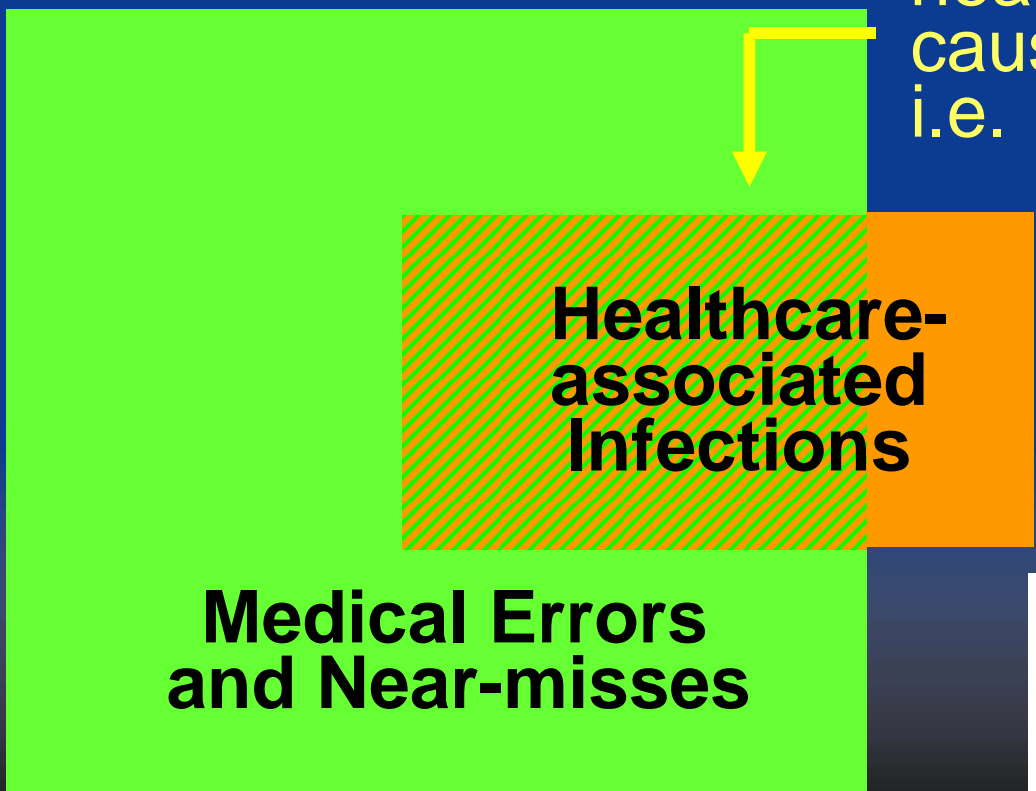
States with KPC-Producing Enterobacteriaceae





# Preventability of Healthcare-associated Infections

What proportion of healthcare infections are caused by errors... i.e. are preventable?



**Medical Errors and Near-misses**

**Healthcare-associated Infections**

**Goal: Best quality of patient care and elimination of preventable hospital-associated infections**

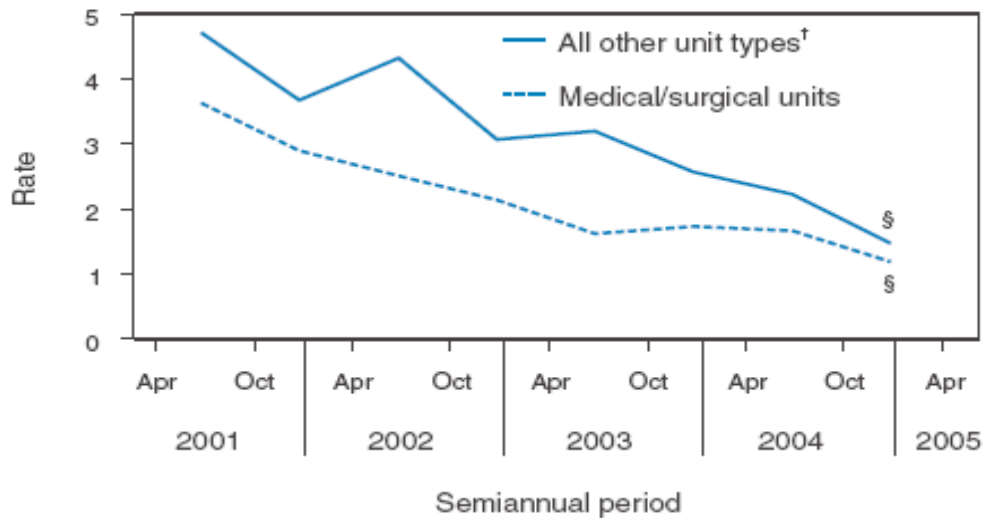


# CDC's Role in the Elimination of Healthcare-associated Infections

- Investigate outbreaks
- Conduct applied research
- Identify research needs
- Turn research into recommendations
- Produce evidence-based guidelines
- Disseminate information
- Track infections and progress toward prevention

# Following CDC Guidelines Reduces Healthcare-associated Infections in States- Examples of Success: Pennsylvania, Michigan

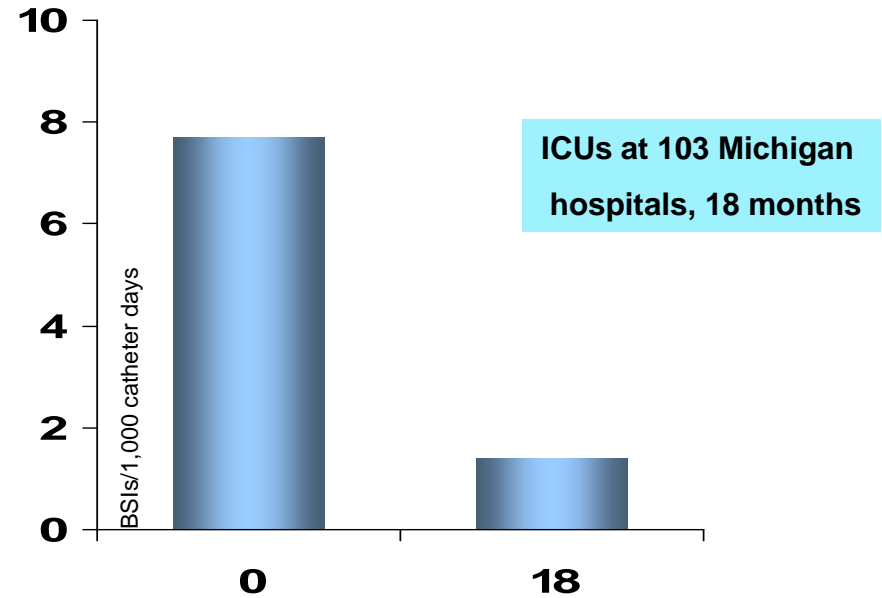
**FIGURE. Central line-associated bloodstream infection rate\* in 66 intensive care units (ICUs), by ICU type and semiannual period — southwestern Pennsylvania, April 2001–March 2005**



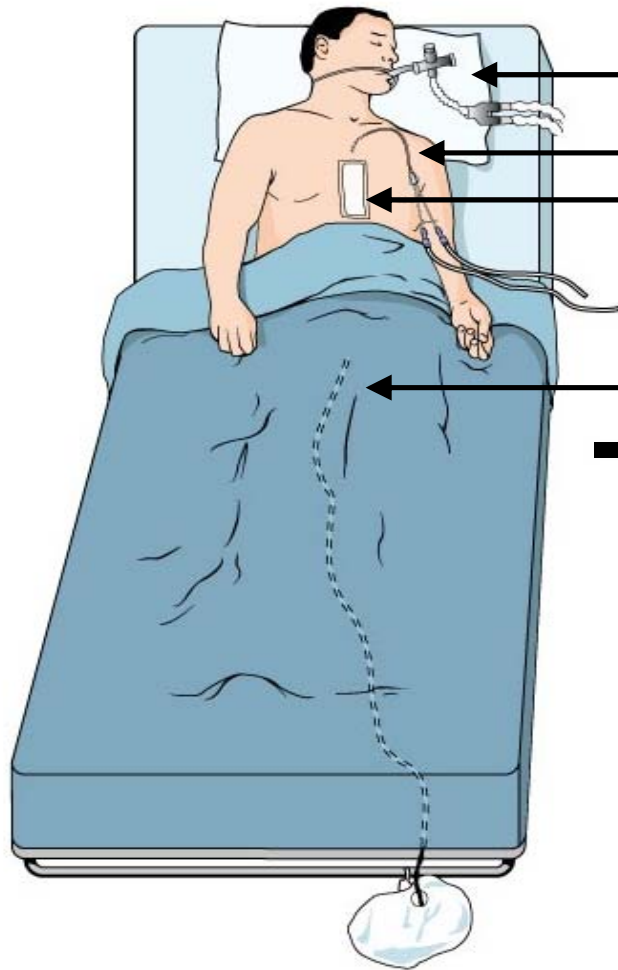
\* Pooled mean rate per 1,000 central line days.

† Includes cardiothoracic, coronary, surgical, neurosurgical, trauma, medical, burn, and pediatric ICUs.

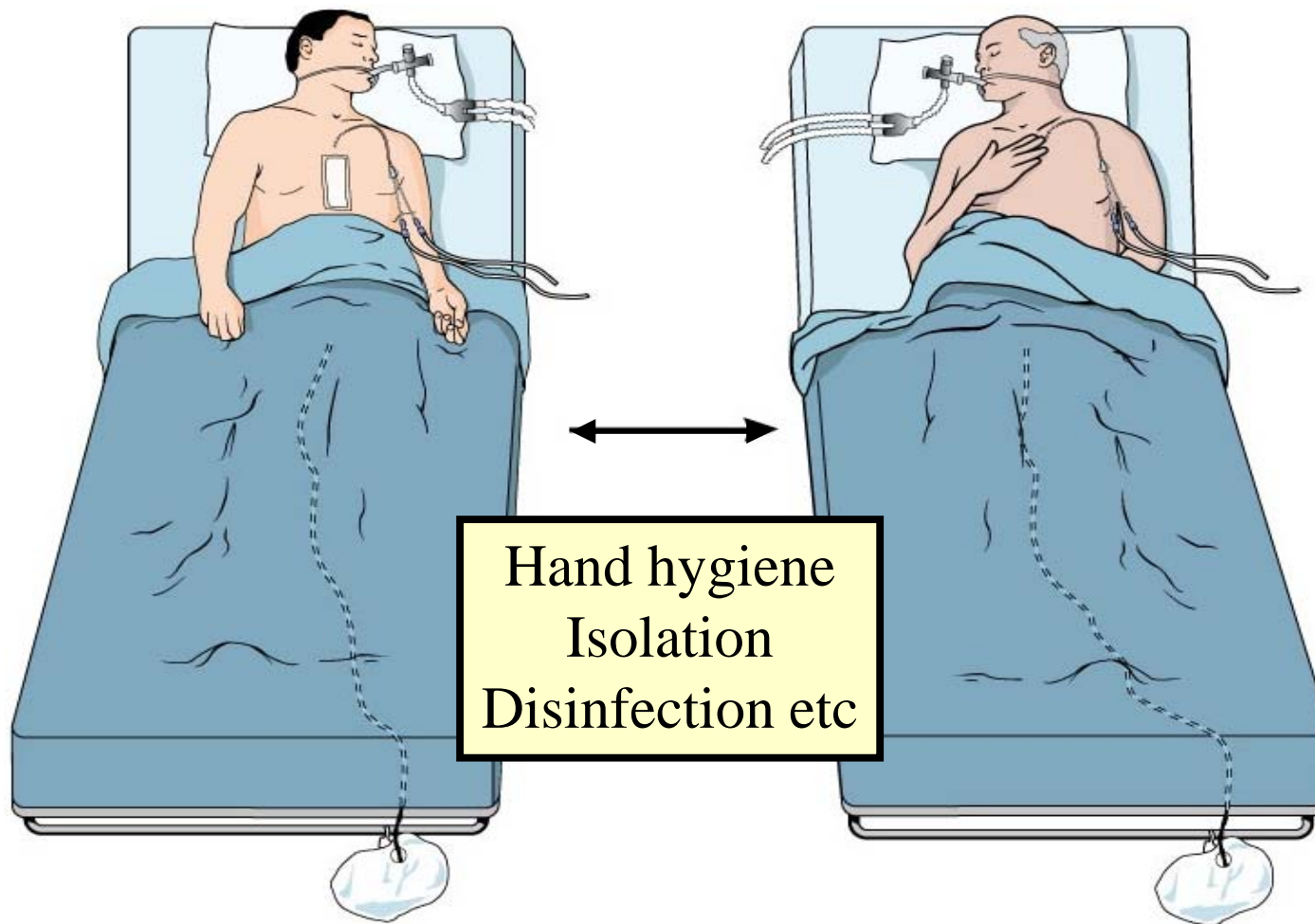
§  $p < 0.001$ .



# Prevent Infection

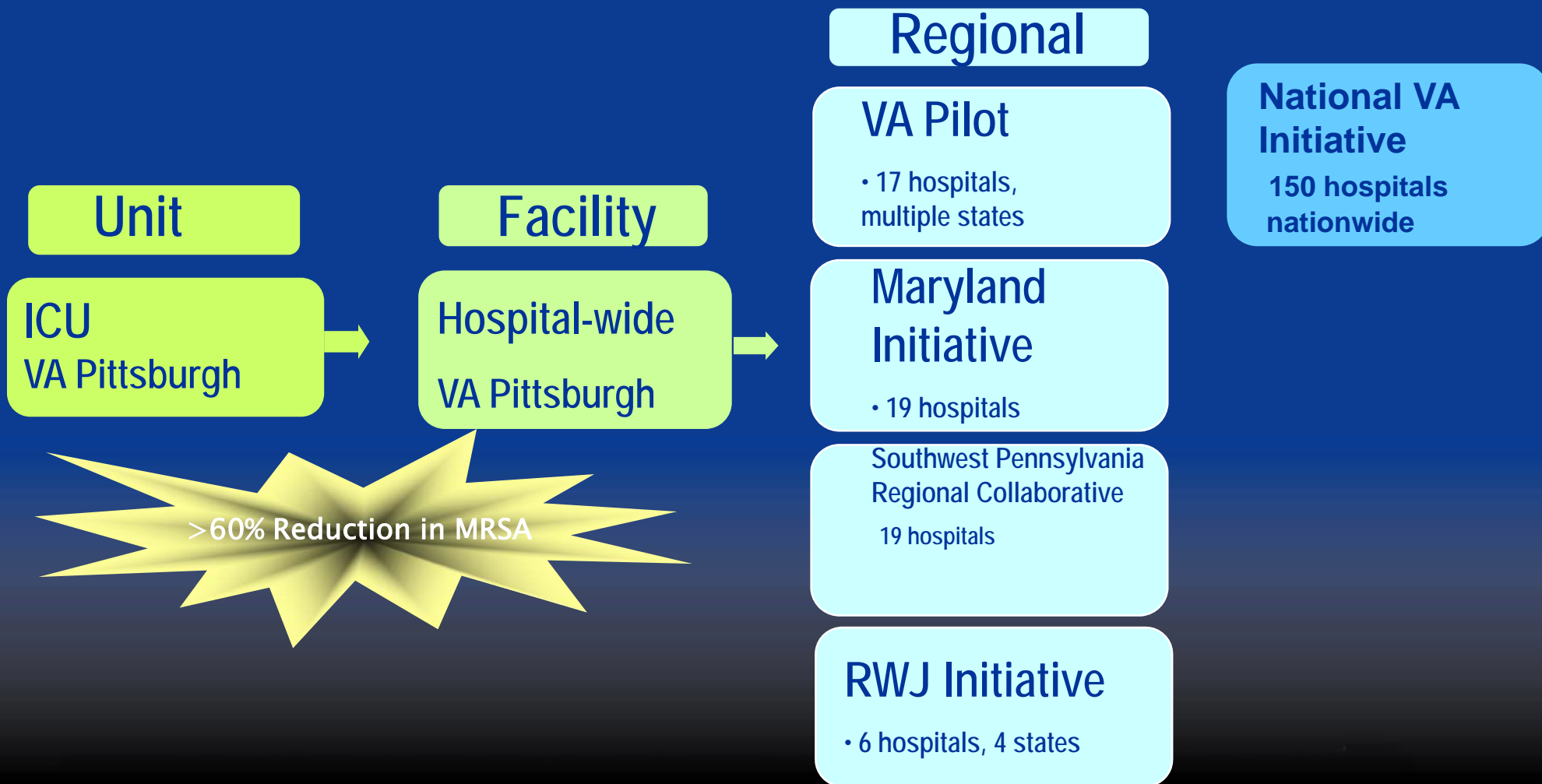


Bundles (sets of infection control recommendations) to prevent infection when inserting devices or performing procedures.



Hand hygiene  
Isolation  
Disinfection etc

# CDC's MRSA Prevention Initiatives





# Common Elements for Successful Infection Prevention

- Simple, check lists
- Patient-centered, integrated with care
- Evidence-based recommendations
- Part of a “package” for prevention
- Engaging and empowering clinicians
- Protocols and systems in place
- Cultural change, leadership support
- Standardized ways for recording information about infections (e.g., NHSN)
- Regular feed-back of information to providers



**Patient Safety**

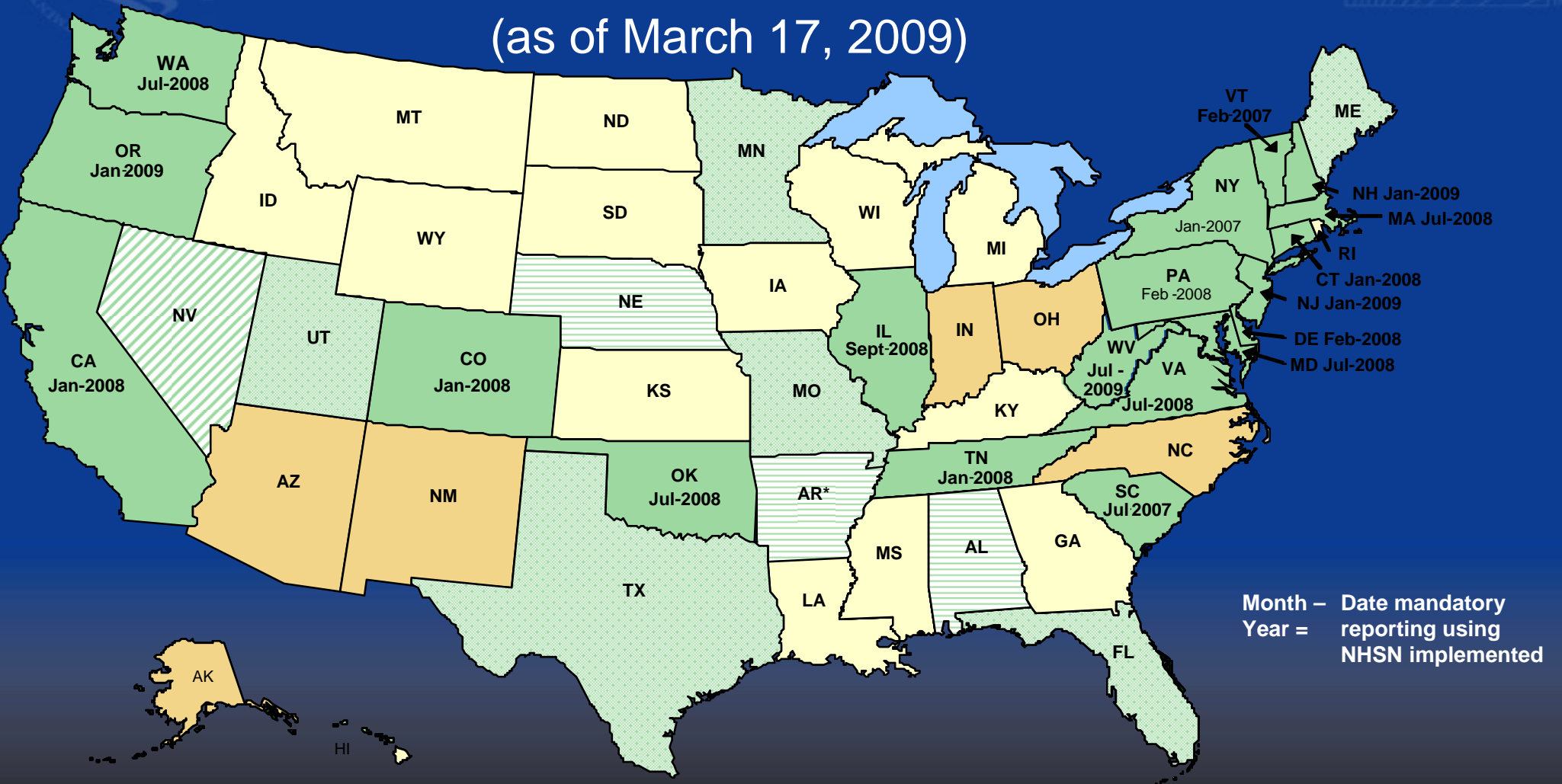
**Healthcare Personnel Safety**

**Research & Development**

**Biovigilance\***

\*In development

# State Legislative Activity for Healthcare-associated Infections (as of March 17, 2009)



- Mandates public reporting using NHSN
- States with no legislation
- Mandates public reporting of infection rates
- States with study laws
- Mandates reporting only to state government
- Voluntary reporting



# Number of Healthcare Facilities using National Healthcare System Network (NHSN)

## April 2007

- 491 facilities enrolled
  - 44% had 201-500 beds
  
- 8 States using or planning to use NHSN for mandatory reporting

## March 2009

- 2230 facilities enrolled (50 States)
  - 66% have  $\leq$  200 beds
  
- 19 States using or planning to use NHSN for mandatory reporting

# CDC successfully collaborates with States to prevent healthcare-associated infections

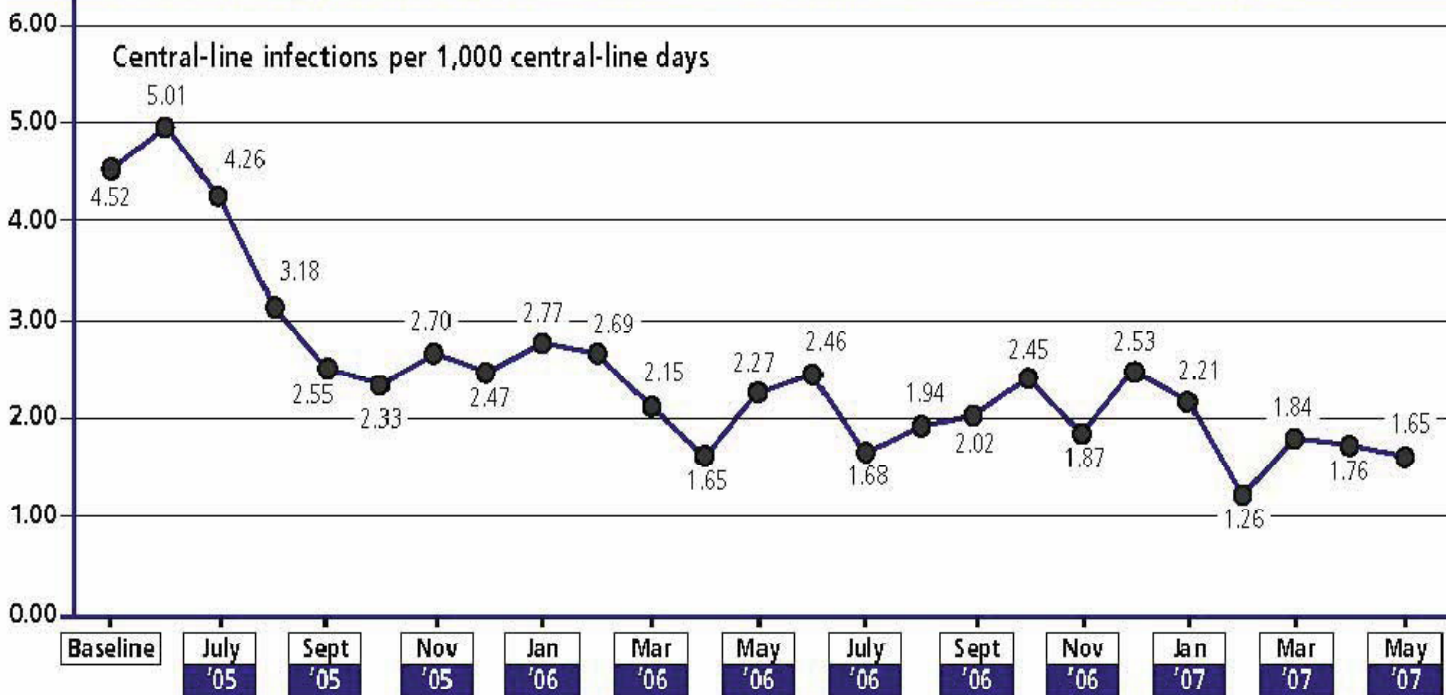
## New York: CDC guidelines basis for prevention implementation initiatives

- Greater New York Hospital Association prevention initiative
- Collaborative partnership with 46 hospitals

### Monthly ICU CLAB Infection Rates for Hospitals

Participating in the GNYHA/UHF CLABs Collaborative, June 2005–May 2007

Central-line infections per 1,000 central-line days

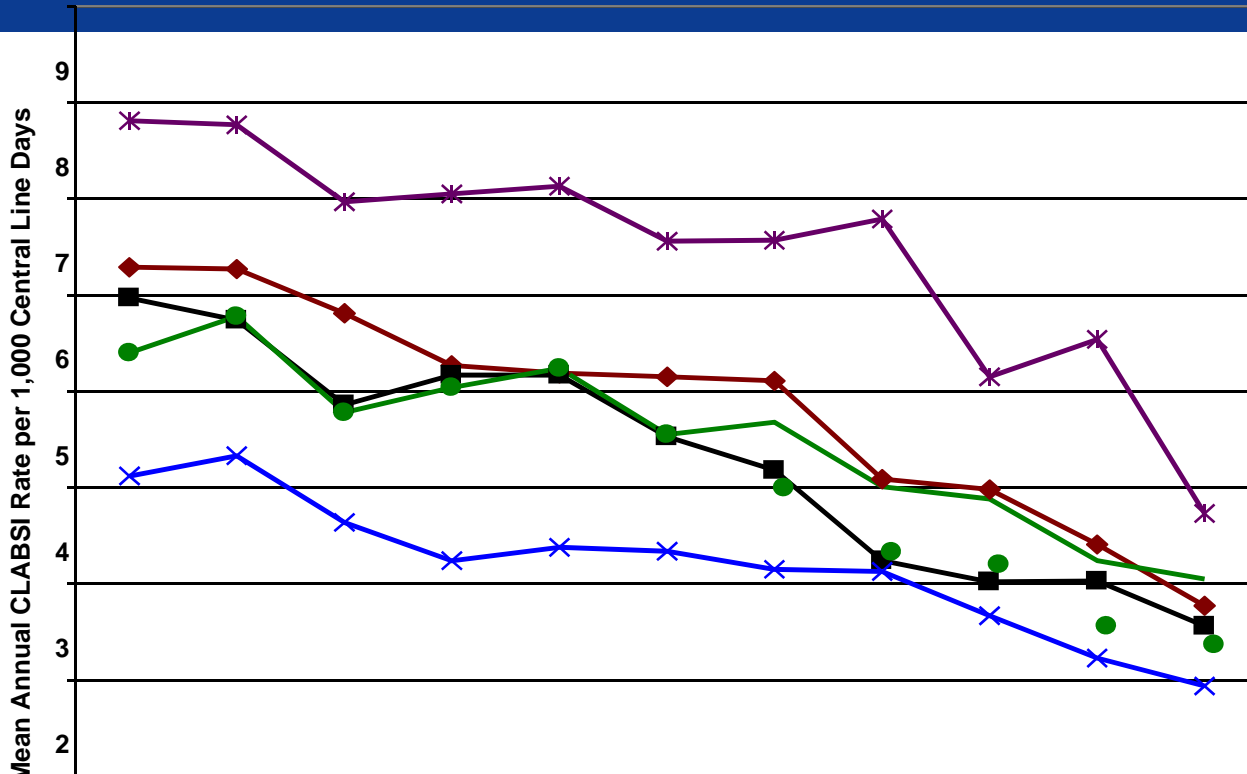


- Focused on incrementally building infrastructure needed for BSI and other future prevention initiatives (e.g. *C. difficile*)
- Communications to share best practices
- Culture of accountability
  - CEO to support staff levels involved
  - Site visits, monthly reporting
- Adopted bundles of practices

# Hospitals Participating in NHSN are Preventing MRSA Bloodstream Infections



Trends in Bloodstream Infections\* by ICU Type, NHSN hospitals, 1997–2007



**JAMA**<sup>®</sup>

Online article and related content current as of February 17, 2009.

**Methicillin-Resistant Staphylococcus aureus Central Line Associated Bloodstream Infections in US Intensive Care Units, 1997-2007**

Deron C. Burton; Jonathan R. Edwards; Teresa C. Horan; et al.

JAMA. 2009;301(7):727-736 (doi:10.1001/jama.2009.153)

# NHSN eSurveillance Moving towards the future



## NHSN

### Component Patient Safety

#### Events Modules

- Device Associated
- Procedure Assoc.
- Medication Assoc.
- MDRO and CDAD
- High Risk Inpatient  
Influenza Vaccination

### Component Healthcare Personnel Safety

### Component Biovigilance

#### Modules

- Hemovigilance

### Component Research and Development

#### eSurveillance

- HL7 CDA
- HL7 Messages

Prevention research

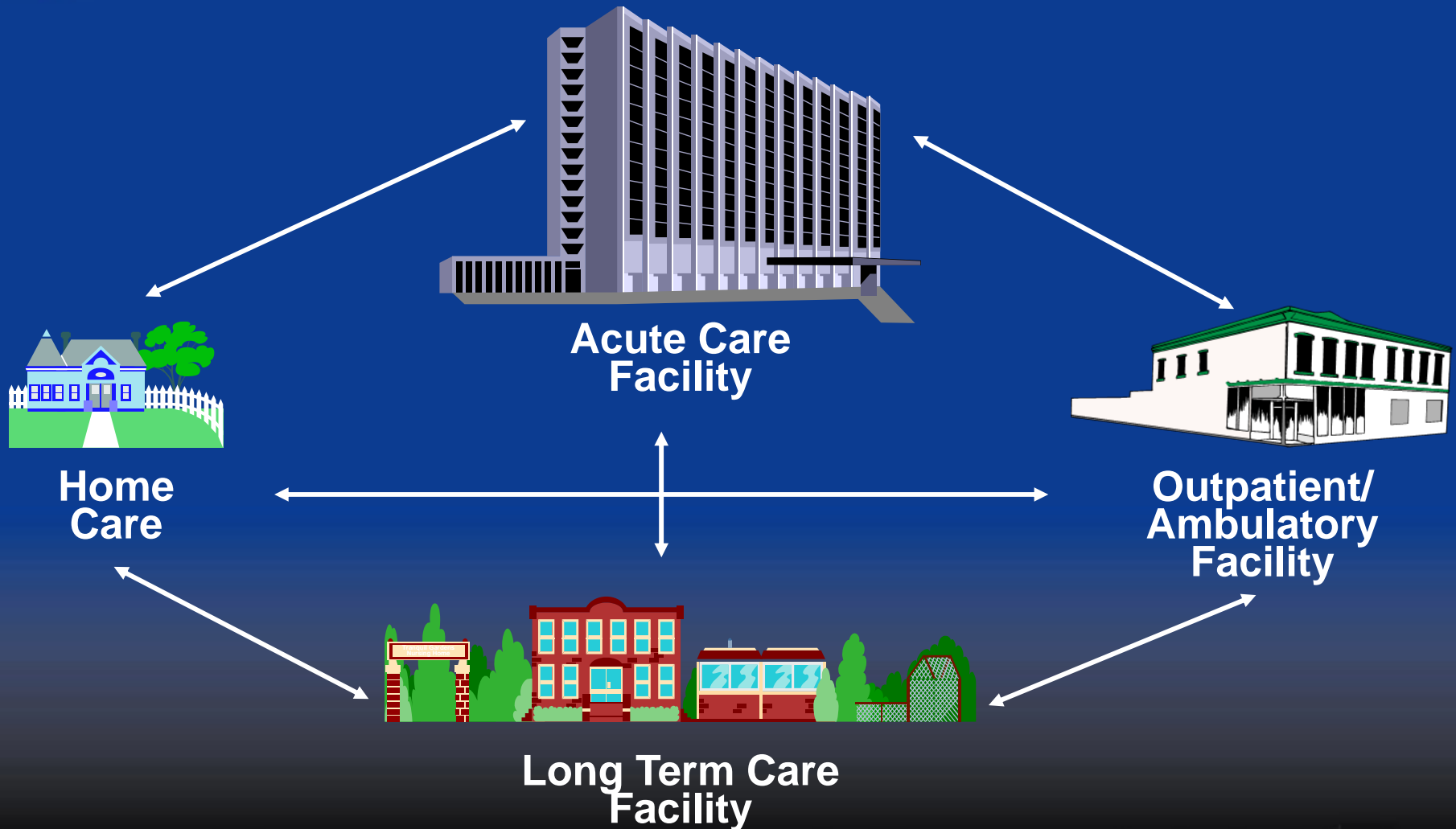
### Data Transmission Standards

- Structured documents for infection reports, denominators, and process of care measures
- Messages for laboratory results, admission/discharge/transfer, and pharmacy data

HL7 = Health Level Seven  
CDA = Clinical Document  
Architecture

MDRO = Multidrug-resistant  
organism  
CDAD = *Clostridium difficile*  
associated disease

# Current Healthcare System







# Preventing Healthcare-associated Infections... the time is NOW

- Problem is critical and costly but preventable
- Interventions can have an immediate national impact
- Interventions can be cost savings
- Ongoing efforts are needed to address changes in healthcare

# Keys for the Elimination of Healthcare-associated Infections



- **Full adherence to recommendations**
- **Collect data and disseminate results**
  - Communication with consumers
  - Evaluate how we're doing
- **Recognize excellence**
- **Identify and respond to emerging threats**
- **Improve science for prevention through research**





Infection prevention is  
**EVERYONE's** responsibility!

<http://www.cdc.gov/ncidod/dhqp/>